Pluto Facility Operations Environment Plan

Australian Operations

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1. INTRODUCTION

1.1 Overview

Woodside Burrup Pty. Ltd. (Woodside) is operator of the Pluto offshore facility and export pipeline on behalf of the Pluto Liquefied Natural Gas (LNG) Joint Venture Participants. The Pluto offshore facility (the facility), including the riser platform and subsea hydrocarbon gathering system, has been in production since 2012 and is operated by Woodside under the Petroleum Titles listed in Table 3-1. The facility is located offshore approximately 160 km northwest of Dampier, in WA-1-IL and WA-34-L, while the associated export pipeline and flowlines are within WA-17-PL and WA-16-PL, respectively. The operation of the facility, Xena-03 Drilling and Tie-back activities, and recovery of well fluids from associated fields and subsea infrastructure, is hereafter collectively referred to as the Petroleum Activities Program. Well fluids are recovered from a series of fields via pipelines and subsea infrastructure, which are produced by the facility and exported to the onshore LNG plants for processing. Subsea tiebacks relevant to the facility include:

- Pluto
- Xena-03
- Pyxis.

The Pluto Alpha platform (PLA) combines accommodation, utilities, operation of production facilities and the water treatment module (see Section 3). The platform is designed to be operated in both not-normally crewed and minimally crewed states. The offshore facilities are remotely operated from the Central Control Room (CCR), either from the CCR at Pluto LNG Park (PLP) or Remote CCR in Perth.

This Environment Plan (EP) has been prepared as part of the requirements under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth) (referred to as the Environment Regulations), as administered by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

In accordance with the requirements of Regulation 41 of the Environment Regulations, Woodside has submitted a revision to the Pluto Facility Operations EP to NOPSEMA at least 14 days prior to the end of the five-year period from the original acceptance under what is now Regulation 35 of the Environment Regulations. At the time of the original acceptance, the relevant provision was Regulation 11 of the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cth).

In accordance with the requirements of Regulation 39 of the Environment Regulations, Woodside has revised the Pluto Facility Operations EP to incorporate a new stage of the activity which is the tie-back, commissioning and operation of the Xena-03 well. Key components of the Xena-03 tie back activity that represent a new stage of the Pluto Facility Operations EP include:

- The activity is a single well; therefore, the Xena-03 well and tieback are proposed to form part of an existing production system.
- The activity would be conducted within the spatial area described in the existing Pluto Facility Operations EP, with a slight temporary expansion to the Operational Area during construction activities.
- The addition of the Xena-03 well forms an orderly continuation of the Pluto project (EPBC 2006/2968) within existing timeframes specified in EPBC approval.
- The operation of proposed Xena-03 well and subsea infrastructure is consistent with the activities already described within this Pluto Facility Operations EP.

- No further increase to the active number of wells producing to the Pluto offshore facility is planned[1].

1.2 Purpose of the Environment Plan

In accordance with the objectives of the Environment Regulations, the purpose of this EP is to demonstrate that:

- The potential environmental impacts and risks (planned (routine and non-routine) and unplanned) that may result from the Petroleum Activities Program (PAP)are identified
- Appropriate management controls are implemented to reduce impacts and risks to a level that is 'as low as reasonably practicable' (ALARP) and acceptable
- The PAP is carried out in a manner consistent with the principles of ecologically sustainable development (ESDev) (as defined in Section 3A of the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act)).

This EP describes the process and resulting outputs of the risk assessment, whereby impacts and risks are managed accordingly.

The EP defines activity-specific environmental performance outcomes, standards, and measurement criteria (MC). These form the basis for monitoring, auditing, and managing the PAP to be undertaken by Woodside and its contractors. The implementation strategy specified in this EP provides Woodside and NOPSEMA with the required level of assurance that impacts and risks associated with the activity are reduced to ALARP and are acceptable.

1.3 Scope of the Environment Plan

The scope of this EP covers the activities that define the Petroleum Activities Program, as described in Section 3, for a period of up to five years. The Petroleum Activities Area (PAA), as defined in Section 3.2.1, defines the spatial boundary of the Petroleum Activities Program.

This EP addresses potential environmental impacts from planned activities and potential unplanned events that originate from within the PAA. Transit to and from the PAA by project vessels, as well as port activities associated with these vessels, are not within the scope of this EP. Vessels supporting the PAP operating outside the PAA (e.g., transiting to and from port) are subject to applicable maritime Regulations and other requirements and are not managed by this EP.

1.4 Environment Plan Summary

Table 1-1 summarises the content of this EP, as required by Regulation 35(7).

[1] Accurate at the time of writing. Should development opportunities be identified during the validity of this EP, Woodside will engage with NOPSEMA to determine the appropriate environmental approval pathway prior to pursuit of the opportunity.

Table 1-1: EP summary

EP Summary Material Requirement	Relevant Section of this EP Containing EP Summary Material
The location of the activity	Section 3.2
A description of the receiving environment	Section 4
A description of the activity	Section 3
Details of the environmental impacts and risks	Section 6
The control measures for the activity	Section 6
The arrangements for ongoing monitoring of the titleholder's environmental performance	Section 7.10
Response arrangements in the oil pollution emergency plan	Section 7.14
Consultation already undertaken and plans for ongoing consultation	Section 5
Details of the titleholder's nominated liaison for the activity	Section 1.7.2

1.5 Structure of the Environment Plan

The EP has been structured to reflect the process and requirements of the Environment Regulations, as outlined in Table 1-2.

Table 1-2: EP process phases, applicable Environment Regulations and relevant section of EP

Criteria for Acceptance	Content Requirements/Relevant Regulations	Elements	Section of EP
Regulation 34(a): is appropriate for the nature and scale of the activity	Regulation 21: Environmental Assessment Regulation 22 Implementation strategy for the environment plan Regulation 24: Other information in the environment plan	The principle of 'nature and scale' applies throughout the EP	Section 2 Section 3 Section 4 Section 5 Section 6 Section 7
Regulation 34(b): demonstrates that the environmental impacts and risks of the activity will be reduced to as low as reasonably practicable	Regulation 21(1)–21(7): 21(1) Description of the activity 21(2)(3) Description of the environment 21(4) Requirements 21(5)(6) Evaluation of environmental impacts and risks 21(7) Environmental performance outcomes and standards Regulation 24(a)–24(c): A statement of the titleholder's corporate environmental policy A report on all consultations between the titleholder and any relevant person	Set the context (activity and existing environment) Define 'acceptable' (the requirements, the corporate policy, relevant persons) Detail the impacts and risks Evaluate the nature and scale Detail the control measures – ALARP and acceptable	Section 1 Section 2 Section 3 Section 4 Section 5 Section 6 Section 7
Regulation 34(c): demonstrates that the environmental impacts and risks of the activity will be of an acceptable level			

Criteria for Acceptance	Content Requirements/Relevant Regulations	Elements	Section of EP
Regulation 34(d): provides for appropriate environmental performance outcomes, EPS and MC	Regulation 21(7): Environmental performance outcomes and standards	Environmental Performance Objectives (EPOs) Environmental Performance Standards (EPSs) Measurement Criteria (MC)	Section 6
Regulation 34(e): includes an appropriate implementation strategy and monitoring, recording, and reporting arrangements	Regulation 22: Implementation strategy for the environment plan	Implementation strategy, including: • Environmental Management System (EMS)Oil Pollution Emergency Plan (OPEP) and scientific monitoring • ongoing consultation.	Section 7 Appendix H
Regulation 34(f): does not involve the activity or part of the activity, other than arrangements for environmental monitoring or for responding to an emergency, being undertaken in any part of a declared World Heritage property within the meaning of the EPBC Act	Regulation 21 (1)–21(3): 21(1) Description of the activity 21(2) Description of the environment 21(3) Without limiting [Regulation 21(2)(b)], relevant values and sensitivities may include any of the following: • (a) the world heritage values of a declared World Heritage property within the meaning of that Act • (b) the national heritage values of a National Heritage place within the meaning of that Act • (c) the ecological character of a declared Ramsar wetland within the meaning of that Act • (c) the presence of a listed threatened species or listed threatened ecological community within the meaning of that Act • (e) the presence of a listed migratory species within the meaning of that Act • (f) any values and sensitivities that exist in, or in relation to, part or all of: • (i) a Commonwealth marine area within the meaning of that Act, or • (ii) Commonwealth land within the meaning of that Act	No activity, or part of the activity, undertaken in any part of a declared World Heritage property	Section 3 Section 4 Section 6

Criteria for Acceptance	Content Requirements/Relevant Regulations	Elements	Section of EP
Regulation 34(g): (i) the titleholder has carried out the consultations required by Regulation 25 (ii) the measures (if any) that the titleholder has adopted, or proposes to adopt, because of the consultations are appropriate	Regulation 25: Consultation with relevant authorities, persons and organisations, etc. Regulation 24(b): A report on all consultations under Regulation 25 of any relevant person by the titleholder, that contains: (i) a summary of each response made by a relevant person, and (ii) an assessment of the merits of any objection or claim about the adverse impact of each activity to which the environment plan relates, and (iii) a statement of the titleholder's response, or proposed response, if any, to each objection or claim, and (iv) a copy of the full text of any response by a relevant person	Consultation in preparation of the EP	Section 5
Regulation 34(h): Complies with the Act, this instrument and any other Regulations made under the Act	Regulation 23: Details of the Titleholder and liaison person Regulation 24(c): Details of all reportable incidents in relation to the proposed activity	All contents of the EP must comply with the Act and the Regulations	Section 1.6 Section 7.12

1.6 Description of the Titleholder

Woodside Burrup Pty Ltd is the operator of the facility and associated infrastructure on behalf of itself and its Pluto LNG joint venture partners, MidOcean Pluto Pty Ltd and Kansai Electric Power Australia Pty Ltd. The Titleholder for this activity is Woodside (refer to Table 3-2 for a list of petroleum titles associated with the Petroleum Activities Program).

Woodside is Australia's leading natural gas producer. Woodside's operations are characterised by strong safety and environmental performance in remote and challenging locations. Wherever Woodside works, it is committed to living its values of one team, we care, innovate every day, results matter and build and maintain trust.

Since 1984, the company has been operating the landmark Australian project, the North West Shelf, which is one of the world's premier liquefied natural gas (LNG) facilities.

Woodside has an excellent track record of efficient and safe production. Woodside strives for excellence in safety and environmental performance and continues to strengthen relationships with customers, partners, co-venturers, governments, and communities. Further information about Woodside can be found at https://www.woodside.com .

1.7 Details of Titleholder and Nominated Liaison

In accordance with Regulation 23 of the Environment Regulations, details of the titleholder and nominated liaison and arrangements for the notification of changes are described below.

1.7.1 Titleholder

Woodside Burrup Ltd

11 Mount Street

Perth, Western Australia

T: 08 9348 4000

ACN: 120 237 416

1.7.2 Nominated Liaison

Andrew Winter

Corporate Affairs Manager

11 Mount Street

Perth, Western Australia

Telephone: 08 9348 4000

Email: feedback@woodside.com

1.7.3 Arrangements for Notifying Change

If the titleholder, titleholder's nominated liaison, or the contact details for either change, then NOPSEMA will be notified in writing within two weeks or as soon as practicable.

1.8 Woodside Management System

The Woodside Management System (WMS) provides a structured framework of documentation to set common expectations governing how all employees and contractors at Woodside will work. Many of the standards presented in Section 6 are drawn from the WMS documentation, which comprises four elements as outlined below (and illustrated in Figure 1-1):

- Our **Values and Policies:** Set the enterprise-wide direction for Woodside by governing our behaviours, actions, and business decisions and ensuring we meet our legal and other external obligations.
- **Expectations**: Set essential activities or deliverables required to achieve the objectives of the Key Business Activities and provide the basis for developing processes and procedures.
- **Processes and Procedures**: Processes identify the set of interrelated or interacting activities that transforms inputs into outputs, to systematically achieve a purpose or specific objective. Procedures specify what steps, by whom, and when required to carry out an activity or a process.
- **Guidelines:** Provide recommended practice and advice on how to perform the steps defined in Procedures, together with supporting information and associated tools. Guidelines provide advice on how activities or tasks may be performed, information that may be taken into consideration, or how to use tools and systems.

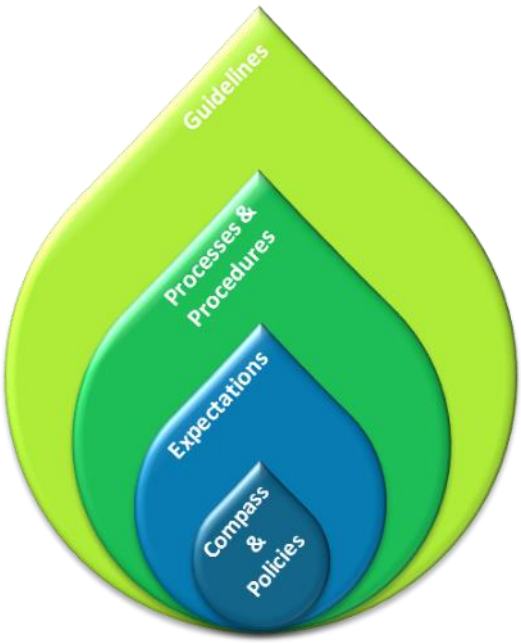


Figure 1-1: The four major elements of the WMS Seed

The WMS is organised within a Business Process Hierarchy based upon Key Business Activities so that the system remains independent of organisation structure, is globally applicable and scalable wherever required. These Key Business Activities are grouped into Management, Support, and Value Stream activities as shown in Figure 1-2. The Value Stream activities capture, generate and deliver value through the exploration and production lifecycle. The Management activities influence all areas of the business, while Support activities may influence one or more value stream activities.

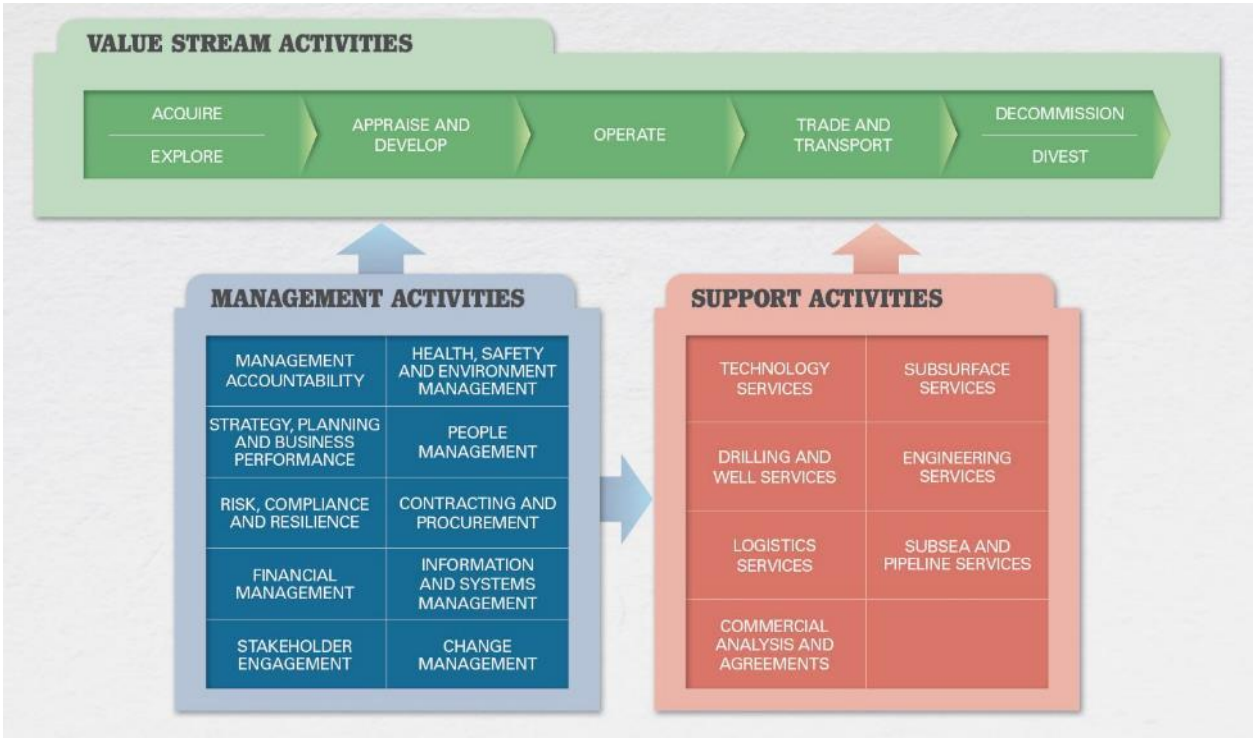


Figure 1-2: The WMS business process hierarchy

1.8.1 Environment and Biodiversity Policy

In accordance with Regulation 24(a) of the Environment Regulations, Woodside's Environment and Biodiversity Policy is provided in Appendix A of this EP.

As the objective of the policy, Woodside recognises the intrinsic value of nature and the importance of conserving biodiversity and ecosystem services to support the sustainable development of our society. We are committed to doing our part. We understand and embrace our responsibility to undertake activities in an environmentally sustainable way.

As part of the policy's principles, Woodside commits to:

- implementing a systematic approach to the management of the impacts and risks of our operating activities on an ongoing basis, including emissions and air quality, discharge and waste management, water management, biodiversity and protected areas
- applying the mitigation hierarchy principle (avoid, minimise, restore) and a continuous improvement approach to ensure we maintain compliance, improve resource use efficiency and reduce our environmental impacts
- embedding environmental and biodiversity management, and opportunities, in our business planning and decision-making processes
- complying with relevant laws and Regulations and applying responsible standards where laws do not exist
- not undertaking new activities[2] within the boundaries of natural sites on the UNESCO World Heritage List[3]
- not undertaking new activities within IUCN Protected Areas [4] unless compatible with management plans in place for the area.
- achieving net zero deforestation[5] for new activities.
- developing Biodiversity Management Plans for all new major projects (CAPEX >USD$2 billion).
- supporting positive biodiversity outcomes in regions and areas in which we undertake activities
- setting targets and publicly reporting on our environmental and biodiversity performance.

The application of the policy is the responsibility of all Woodside employees, contractors and joint venturers engaged in activities under Woodside operational control. Woodside managers are also responsible for promotion of the policy in non-operated joint ventures.

The policy is reviewed regularly and updated as required. The Environment and Biodiversity Policy is made available on our website, along with the other Board policies: https://www.woodside.com/who-we-are/corporate-governance-and-policies .The version applicable to the activity covered in this EP was reviewed in December 2024.

1.9 Description of Relevant Requirements

In accordance with Regulation 21(4) of the Environment Regulations, a description of requirements, including legislative requirements, that apply to the activity and are relevant to the management of

[2] Does not include non-industrial and existing activities that are compatible with maintenance of the listed outstanding universal values
[3] New UNESCO World Heritage Listings that overlap existing activities will be assessed at the time of listing.
[4] New IUCN Protected Areas that overlap existing activities will be assessed at the time of listing.
[5] Definition of Forest: 'native trees higher than 5 metres and a canopy cover of more than 10 percent on the land to be cleared'.

risks and impacts of the PAP are detailed in Appendix B. This EP will not be assessed under the Environment Protection Act 1986 (WA) as the activity does not occur on State land or within State Waters.

1.9.1 Offshore Petroleum and Greenhouse Gas Storage Act 2006

The *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (Cth)(OPGGS Act) provides the regulatory framework for offshore exploration and production activities and greenhouse gas beyond three nautical miles (nm) of the mainland (and islands) to the outer extent of the Australian Exclusive Economic Zone (EEZ) at 200 nm.

The relevant requirements in Section 572 and 270 of the OPGGS Act are detailed in Table 1-3.

Table 1-3: Relevant requirements of Sections 572 and 270 of the OPGGS Act

Section Number	Relevant Requirement	Relevant Section of the EP
Section 270 – Consent to surrender title[6]		
Section 270(c)(i) and Section 270(c)(ii)	The Joint Authority may consent to the surrender sought by the application only if the registered holder of the permit, lease or licence: c) has: (i) to the satisfaction of NOPSEMA, removed or caused to be removed from the surrender area (defined by subsection (7)) all property brought into the surrender area by any person engaged or concerned in the operations authorised by the permit, lease or licence, or (ii) made arrangements that are satisfactory to NOPSEMA in relation to that property, and	Not applicable
Section 572 – Maintenance and removal of property etc. by titleholder		
Section 572(2)	A titleholder must maintain in good condition and repair all structures that are, and all equipment and other property that is: (a) in the title area, and (b) used in connection with the operations authorised by the permit, lease, licence or authority.	Section 7.5
Section 572(3)	A titleholder must remove from the title area all structures that are, and all equipment and other property that is, neither used nor to be used in connection with the operations: (a) in the title area, and (b) used in connection with the operations authorised by the permit, lease, licence or authority.	Sections 3 and 7.5
Section 572(7)	This section has effect subject to: (a) any other provision of this Act, and (b) the Regulations, and (c) a direction given by NOPSEMA or the responsible Commonwealth Minister under: (i) Chapter 3, or (ii) this Chapter (d) any other law	Section 7.5

Under the OPGGS Act, the Environment Regulations apply to petroleum activities in Commonwealth Waters and are administered by NOPSEMA. The objective of the Environment Regulations is to ensure petroleum activities are performed in a manner:

- consistent with the principles of ESDev (as set out in the EPBC Act)

[6] There is no intent to surrender any titles in the scope of this EP.

- by which the environmental impacts and risks of the activity will be reduced to ALARP
- by which the environmental impacts and risks of the activity will be of an acceptable level.

1.9.2 Environment Protection and Biodiversity Conservation Act 1999 (Cth)

One of the objectives EPBC Act is to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places in Australia. These are defined under Part 3 of the Act as 'matters of national environmental significance' (MNES). The EPBC Act sets a regime which aims to ensure actions taken on (or impacting upon) Commonwealth land or waters are consistent with the principles of ESD. When a person proposes to take an action that they believe may need approval under the EPBC Act, they must refer the proposal to the Commonwealth Minister for Environment.

In relation to offshore petroleum activities in Commonwealth waters, in accordance with the "Streamlining Offshore Petroleum Approvals Program" (the Program), requirements under the Act are now administered by NOPSEMA, commencing February 2014. The Program requires any offshore petroleum activities, authorised by the OPGGS Act to be conducted in accordance with an accepted EP. The definition of 'environment' in the Program covers all matters protected under Part 3 of the EPBC Act.

1.9.3 Offshore Project Approval

The Pluto LNG Project (including both offshore and onshore infrastructure) was referred for assessment under the EPBC Act (EPBC 2006/2968) and the level of assessment was set as Public Environment Report (PER). The action was approved 12 October 2007 with conditions.

It should be noted that a Consolidated Approval Notice for EPBC 2006/2968 dated 14 June 2015 was issued to consolidate the approval conditions, and the approval conditions were subject to variation on the date of the notice. A key element to the variation relates to conditions requiring a plan for managing impacts of the action. The previous conditions required the Minister's approval of such plans, with the variation now automatically deeming the plan to have been approved by the Minister if the measures are included in an environment plan related to the action submitted to NOPSEMA after 27 February 2014 and in force under the Environment Regulations.

Conditions in relation to the EPBC Act approval that are considered relevant to the scope of this EP are provided in Table 1-4.

Table 1-4: Conditions from Pluto Gas condensate field (EPBC 2006/2968) relevant to the PAP

Condition Number	Condition	Relevant Section of EP
1	The person taking the action must submit, for the approval of the Minister, a plan (or plans) for managing the offshore impacts of the action. The plan (or plans) must include measures for: a) drilling operations: (i) drilling fluid type and disposal method. (ii) drill cuttings disposal method. (iii) fuel and chemical handling and transfer procedures. (iv) Cetacean interaction procedures for supply vessels and aircraft that are consistent with Part 8 of the Environment Protection and Biodiversity Conservation Regulations 2000; and (v) Cetacean and Whale shark (*Rhincodon typus*) sightings reporting	The Xena-03 Tie-back project is the only planned construction and installation activity covered under this EP. Relevant sub-conditions are addressed in the following sections: i. Sections 3.11.2 and 6.7.8 ii. Sections 3.11.2.3 and 6.7.8 iii. Section 6.9.5. iv. Sections 6.7.3, 6.7.4 and 6.9.9. v. Sections 6.7.3, 6.7.4 and 6.9.9.

Condition Number	Condition	Relevant Section of EP
	b) construction and installation: (i) design and construction that allow for the decommissioning of all structures and components on the sea floor (ii) impacts and management measures for reuse of any spoil ground material (iii) details of the final selection of wells, anchor type and placements and flowline paths (iv) hydrotest fluid type, handling and risk assessment of disposal impacts (v) interaction procedures for supply vessels and aircraft that are consistent with Part 8 of the Environment Protection and Biodiversity Conservation Regulations 2000 (vi) cetacean and whale shark sightings reporting.	Relevant sub-conditions are addressed in the following sections: i. Sections 3.11 and 7.5 ii. Not relevant iii. Section 3.11 iv. Sections 3.11.4 and 6.7.5 v. Sections 6.7.3, 6.7.4 and 6.9.9 vi. Sections 6.7.3, 6.7.4, 6.9.9 and 7.13.3.2
	c) operations: (i) trading tanker vetting procedures (ii) the monitoring and disposal of produced water (PW), including the analysis of expected PW chemistry, baseline biological and physical information at the PW outfall site, toxic impacts of PW on marine flora and fauna based on ecotoxicological, bioaccumulation and biodegradation studies, industry best practice disposal of PW monitoring and reporting of biological and physical indicators and contingency measures if adverse impacts are indicated (iii) monitoring and management the collection, handling and disposal of naturally occurring radioactive materials (NORMs) (iv) interaction procedures for supply vessels and aircraft that are consistent with Part 8 of the Environment Protection and Biodiversity Conservation Regulations 2000 (v) cetacean and whale shark sightings reporting. Individual offshore activities may not commence until the plan (or plans) for that specific activity has been approved. The approved plan (or plans) must be implemented.	i. Not applicable ii. Sections 3.5.5, 4.4, 4.5 and 6.7.7 iii. Sections 3.6.7 and 6.9.7 iv. Sections 6.7.3, 6.7.4 and 6.9.9 v. Sections 6.7.3, 6.7.4 and 6.9.9.
4	The person taking the action must submit for the Minister's approval an oil spill contingency plan to mitigate the environmental effects of any hydrocarbon spills. The oil spill contingency plan must include: • the types of dispersants, protective booms, clean up gear, and related equipment to be used in the event of an oil spill and the storage arrangements • training of staff in oil spill response measures • identification of sensitive areas, and specific response measures for these areas • details of the insurance arrangements that have been made in respect of the costs associated with repairing any environmental damage arising from potential oil spills • the reporting of oil spill incidents. • Offshore construction may not commence until the plan is approved. The approved plan must be implemented.	Woodside's Emergency Preparedness and Response arrangements (refer to Section 7.14 and associated documents).
8	At least twelve months before the expiry of the period for which this approval has effect, the person taking the action Limited must submit a decommissioning plan for approval by	Decommissioning is beyond the scope of this EP.

Condition Number	Condition	Relevant Section of EP
	the Minister that considers the removal of all structures and components above the sea floor, including subsea wells, manifolds and flowlines and any other associated infrastructure and the disposal and management of any NORMs. Decommissioning may not commence until the plan is approved. The approved plan must be implemented.	
11	If the person taking the action proposes to undertake any subsea tie-in[7] not included in approved plans pursuant to condition 1, the person taking the action must revise such plans or submit a new plan or plans to address the activities associated with, and potential environmental impacts of, the subsea tie-in. Activities associated with subsea tie-ins may not be commenced until each such plan or revised plan has been approved by the Minister. Each plan or revised plan that has been approved by the Minister must be implemented.	The resubmission and subsequent implementation of this EP is considered to meet this Condition (i.e. This EP is submitted as the 'revised plan' to address aspects of condition 1 applicable to the Xena-03 subsea tie-in operation).
12	If the person taking the action wishes to carry out any activity otherwise than in accordance with the plans referred to in conditions 1 ,3, 4, 5, 6 and 8, the person taking the action may submit for the Minister's approval a revised version of any such plan. If the Minister approved a revised plan so submitted the person taking the action must implement that plan instead of the plan as originally approved.	The implementation of this EP is considered to meet this Condition (i.e. This EP is submitted as the 'revised plan' to address aspects of conditions applicable to the Xena-03 subsea tie-in operation).
15	A plan required by condition 1, 4, 8, 11 or 12 is automatically deemed to have been submitted to, and approved by, the Minister if the measures (as specified in the relevant condition) are included in an environment plan (or environment plans) relating to the taking of the action that: • was submitted to NOPSEMA after 27 February 2014, and either: • is in force under the OPGGS Environment Regulations, or • has ended in accordance with Regulation 46 of the OPGGS Environment Regulations.	The implementation of this EP is considered to meet this Condition.
15A	Where a plan required by condition 1, 4, 11 or 12 has been approved by the Minister and the measures (as specified in the relevant condition) are included in an environment plan (or environment plans) that: • was submitted to NOPSEMA after 27 February 2014, and either: • is in force under the OPGGS Environment Regulations, or • has ended in accordance with Regulation 46 of the OPGGS Environment Regulations, the plan approved by the Minister no longer needs to be implemented.	The implementation of this EP is considered to meet this Condition and supersedes previously approved plans.
15B	Where an environment plan, which includes measures specified in the conditions referred to in conditions 15 and 15A above, is in force under the OPGGS Environment Regulations that relates to the taking of the action, the	The implementation of this EP is considered to meet this Condition.

[7] Subsea tie-ins: means the construction and operation of subsea wells, flowlines and other related infrastructure for the purpose of extracting gas from hydrocarbon reserves (other than the Pluto gas reservoir) within that area and conveying that petroleum to the platform located at the site of the Pluto hydrocarbon reservoir.

Condition Number	Condition	Relevant Section of EP
	person taking the action must comply with those measures as specified in that environment plan.	

1.9.4 Recovery Plans and Threat Abatement Plans

Under s139(1)(b) of the EPBC Act, the Environment Minister must not act inconsistently with a recovery plan for a listed threatened species or ecological community or a threat abatement plan for a species or community protected under the Act. Similarly, under s268 of the EPBC Act:

"A Commonwealth agency must not take any action that contravenes a recovery plan or a threat abatement plan."

In relation to offshore petroleum activities in Commonwealth waters, these requirements are now administered by NOPSEMA in accordance with commitments set out in the Programs. Relevant recovery plans or threat abatement plans relevant to the scope of this EP have been identified as described in Section 2.9 and assessed in Section 6.10.

1.9.5 Australian Marine Parks

Under the EPBC Act, Australian Marine Parks (AMPs), formerly known as Commonwealth Marine Reserves, are recognised for conserving marine habitats and the species that live and rely on these habitats. The Director of National Parks (DNP) is responsible for managing AMPs (supported by Parks Australia) and is required to publish management plans for them. Other parts of the Commonwealth Government must not perform functions or exercise powers in relation to these parks that are inconsistent with management plans (s.362 of the EPBC Act). Relevant AMPs are listed in Section 4.8 and in the Master Existing Environment (Appendix K). The North-west Marine Parks Network Management Plan describes the requirements for management.

- Specific zones within the AMPs have been allocated conservation objectives as stated below (International Union for Conservation of Nature [IUCN] Protected Area Category) based on the Australian IUCN reserve management principles outlined in Schedule 8 of the Environment Protection and Biodiversity Conservation Regulations 2000 (Cth) (EPBC Regulations 2000).
- Special Purpose Zone (IUCN category VI) – managed to allow specific activities though special purpose management arrangements while conserving ecosystems, habitats and native species. The zone allows or prohibits specific activities.
- Sanctuary Zone (IUCN category Ia) – managed to conserve ecosystems, habitats and native species in as natural and undisturbed a state as possible. The zone allows only authorised scientific research and monitoring.
- National Park Zone (IUCN category II) – managed to protect and conserve ecosystems, habitats and native species in as natural a state as possible. The zone only allows non-extractive activities unless authorised for research and monitoring.
- Recreational Use Zone (IUCN category IV) – managed to allow recreational use, while conserving ecosystems, habitats and native species in as natural a state as possible. The zone allows for recreational fishing, but not commercial fishing.
- Habitat Protection Zone (IUCN category IV) – managed to allow activities that do not harm or cause destruction to seafloor habitats, while conserving ecosystems, habitats and native species in as natural a state as possible.
- Multiple Use Zone (IUCN category VI) – managed to allow ecologically sustainable use while conserving ecosystems, habitats and native species. The zone allows for a range of

sustainable uses, including commercial fishing and mining where they are consistent with park values.

Two planned activities are proposed within the Montebello Marine Park Multiple Use Zone (IUCN category VI): Subsea Inspection Maintenance, Monitoring and Repair activities along the existing pipeline (Section 3.10) and produced water discharge with associated environmental monitoring (Section 3.5.5). The principles for each zone determine what activities are acceptable within a protected area under the EPBC Act. The Australian IUCN Reserve Management Principles for Multiple Use Zone (IUCN category VI) are considered relevant to the scope of this EP are provided in Table 1-5.

Table 1-5: Australian IUCN Reserve Management Principles relevant to the PAP

Condition Number	Principle
7.01	The reserve or zone should be managed mainly for the sustainable use of natural ecosystems based on the following principles.
7.02	The biological diversity and other natural values of the reserve or zone should be protected and maintained in the long term.
7.03	Management practices should be applied to ensure ecologically sustainable use of the reserve or zone.
7.04	Management of the reserve or zone should contribute to regional and national development to the extent that this is consistent with these principles.

For the North West Marine Parks Network Management Plan (2018), petroleum activities, including transportation of minerals by pipeline, and oil spill response are permittable subject to approval in Multiple Use Zone (IUCN category VI) and Special Purpose Zone Trawl (IUCN category VI). Proposed mining operations conducted under usage rights that existed immediately before the declaration of a marine park do not require approval.

Petroleum Activities (including environmental monitoring in connection with a particular petroleum activity) occurring within these zones are approved by a class approval (Director of National Parks, 2018a). Conditions of the Class Approval that are considered relevant to the scope of this EP are provided in Table 1-6.

Table 1-6: Conditions of Class Approval relevant to the PAP

Condition Number	Condition	Relevant Section of the EP
1	The Approved Actions must be conducted in accordance with: (a) an Environment Plan accepted under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (b) the EPBC Act (c) the EPBC Regulations (d) the North-west Network Management Plan (e) any prohibitions, restrictions or determinations made under the EPBC Regulations by the Director of National Parks (f) all other applicable Commonwealth and state laws (to the extent those laws are capable of operating concurrently with the laws and instruments described in paragraphs (a) to (e)).	Conditions 1a, b, c, f are met by the submitted EP (Section 1.2) 1d The impacts on the marine park values have been considered in Sections 6.7.2, 6.7.5 and 6.7.7. 1e Consultation has been undertaken with the Director of National Parks and no prohibitions, restrictions or determinations have been made (Section 5).
2	If requested by the Director of National Parks, an Approved Person must notify the Director prior to conducting Approved Actions within Approved Zones.	Section 5 describes requirements to notify the DNP prior to activities within the Montebello Multiple Use Zone.

3	If requested by the Director of National Parks, an Approved Person must provide the Director with information relating to undertaking the Approved Actions (or gathered while undertaking the Approved Actions), that is relevant to the Director's management of the Approved Zones.	If requested by the Director of National Parks, information relating to undertaking the Approved Actions (or gathered while undertaking the Approved Actions), that is relevant to the Director's management of the Approved Zones will be provided.

1.9.6 World Heritage Properties

Australian World Heritage management principles are prescribed in Schedule 5 of the EPBC Regulations 2000. Management principles that are considered relevant to the scope of this EP are provided in Table 1-7.

Table 1-7: Relevant management principles under Schedule 5 – Australian World Heritage management principles of the EPBC Act

Number	Principle	Relevant Section of the EP
3	Environmental impact assessment and approval 3.01 This principle applies to the assessment of an action that is likely to have a significant impact on the World Heritage values of a property (whether the action is to occur inside the property or not). 3.02 Before the action is taken, the likely impact of the action on the World Heritage values of the property should be assessed under a statutory environmental impact assessment and approval process. 3.03 The assessment process should: – identify the World Heritage values of the property that are likely to be affected by the action, and – examine how the World Heritage values of the property might be affected, and – provide for adequate opportunity for public consultation. 3.04 An action should not be approved if it would be inconsistent with the protection, conservation, presentation or transmission to future generations of the World Heritage values of the property. 3.05 Approval of the action should be subject to conditions that are necessary to ensure protection, conservation, presentation or transmission to future generations of the World Heritage values of the property. 3.06 The action should be monitored by the authority responsible for giving the approval (or another appropriate authority) and, if necessary, enforcement action should be taken to ensure compliance with the conditions of the approval.	3.01 and 3.02: Assessment of significant impact on World Heritage values is included in Section 6. Principles are met by the submitted EP. 3.03 (a) and (b): World Heritage values are identified in Section 4.9.9 and considered in the assessment of impacts and risks for the Petroleum Activity in Section 6. 3.03(c): Relevant persons consultation and feedback received in relation to impacts and risks to the Ningaloo World Heritage Property are outlined in Section 5. 3.04, 3.05 and 3.06: Principles are considered to be met by the acceptance of this EP.

Note that Section 1 – General Principles and Section 2 – Management Planning of Schedule 5 are not considered relevant to the scope of this EP and, therefore, have not been included.

2. ENVIRONMENT PLAN PROCESS

2.1 Overview

This section outlines the process taken by Woodside to prepare this EP, once the activity was defined as a petroleum activity. The process describes the activity, the existing environment, followed by the environmental risk management methodology used to identify, analyse and evaluate risks to meet ALARP levels and acceptability requirements, and develop EPOs and EPSs. This section also describes Woodside's risk management methodologies as applied to implementation strategies for the activity. The EP is revised each 5-year period having regard to material changes to operational processes, amendments to applicable legislation or relevant developments in good industry practice.

Regulation 21(5) of the Environment Regulations requires the EP to include details of the environmental impacts and risks for the Petroleum Activities Program, and an evaluation of all the impacts and risks, appropriate to the nature and scale of each impact and risk. The objective of the risk assessment process described in this section is to identify risks and associated impacts of an activity, so they can be assessed, and appropriate control measures applied to eliminate, control or mitigate the impact/risk to ALARP, and to determine if the impact or risk level is acceptable.

Environmental impacts and risks include those directly and indirectly associated with the Petroleum Activities Program, and include potential emergency and accidental events:

- Planned activities have the inherent potential to cause environmental impacts.
- Environmental risks are unplanned events with the potential for environmental impact (termed risk 'consequence').

In this section, potential impacts from planned activities are termed 'impacts', and 'risks' are associated with unplanned events with the potential for environmental impact (should the risk be realised), with such impacts termed potential 'consequences.

2.2 Environmental Risk Management Methodology

2.2.1 Woodside Risk Management Process

Woodside recognises that risk is inherent to its business and that effective management of risk is vital to delivering on company objectives, success and continued growth. Woodside is committed to managing risk proactively and effectively. The objective of Woodside's risk management system is to provide a consistent process for recognising and managing risks across Woodside's business. Achieving this objective includes ensuring risks consider impacts across these key areas of exposure: health and safety, environment, finance, reputation and brand, legal and compliance, and social and cultural.

The environmental risk management methodology used in this EP is based on Woodside's Risk Management Procedure. This procedure aligns to industry standards, such as international standard ISO 31000. WMS risk management procedures, guidelines and tools provide guidance of specific techniques for managing risk, tailored for particular areas of risk within certain business processes. Procedures applied for environmental risk management include (Sections 2.2.2 to 2.2.4):

- Health, Safety and Environment Management Procedure
- Impact Assessment Procedure
- Process Safety Management Procedure.

The risk management methodology provides a framework to demonstrate that risks and impacts are continually identified, reduced to ALARP and assessed to be at an acceptable level, as required by the Environment Regulations. The key steps of Woodside's Risk Management Process are shown

in Figure 2-1. A description of each step and how it is applied to the scopes of this activity is provided in Sections 2.2 to 2.12.

Figure 2-1: Woodside's risk management process

2.2.2 Health, Safety and Environment Management Procedure

The Health, Safety and Environment Management Procedure provides the structure for managing health, safety and environment (HSE) risks and impacts across Woodside, defines the decision authorities for company-wide HSE management activities and deliverables, and supports continuous improvement in HSE management.

2.2.3 Impact Assessment Procedure

To support effective environmental risk assessment, Woodside's Impact Assessment Procedure (Figure 2-2) provides the steps to meet the required environment, health and social standards by ensuring impact assessments are undertaken appropriate to the nature and scale of the activity, the regulatory context, the receiving environment, interests, concerns and rights of relevant persons, and the applicable framework of standards and practices.

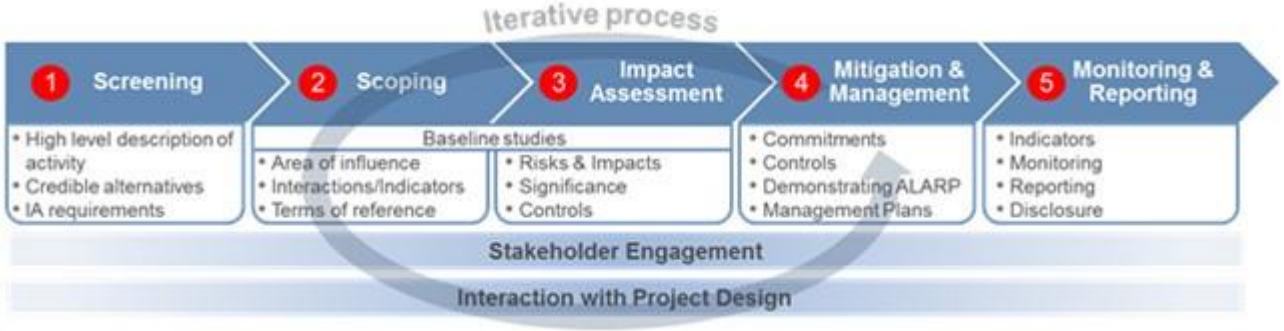


Figure 2-2: Woodside's impact assessment process

2.2.4 Process Safety Management Procedure and Process Safety Risk Assessment Procedure

Due to the nature and scale of petroleum activities, Woodside's Process Safety Management Procedure establishes Woodside's framework for Process Safety Management (Section 7.2.2). This framework includes the Process Safety Risk Assessment Procedure (PSRA). The PSRA is a key part of Woodside's process safety management framework for managing the integrity of systems and processes that handle hazardous substances over the exploration and production lifecycle. The PSRA sets out methods so that process safety risks are understood and controlled, including that all process safety hazards are systematically identified, assessed and treated so that the associated risks are reduced to a level that is tolerable and ALARP.

2.3 Environment Plan Development Process

The EP development process is illustrated in Figure 2-3. Each element of this process is discussed further in Section 2.5 to Section 2.12.

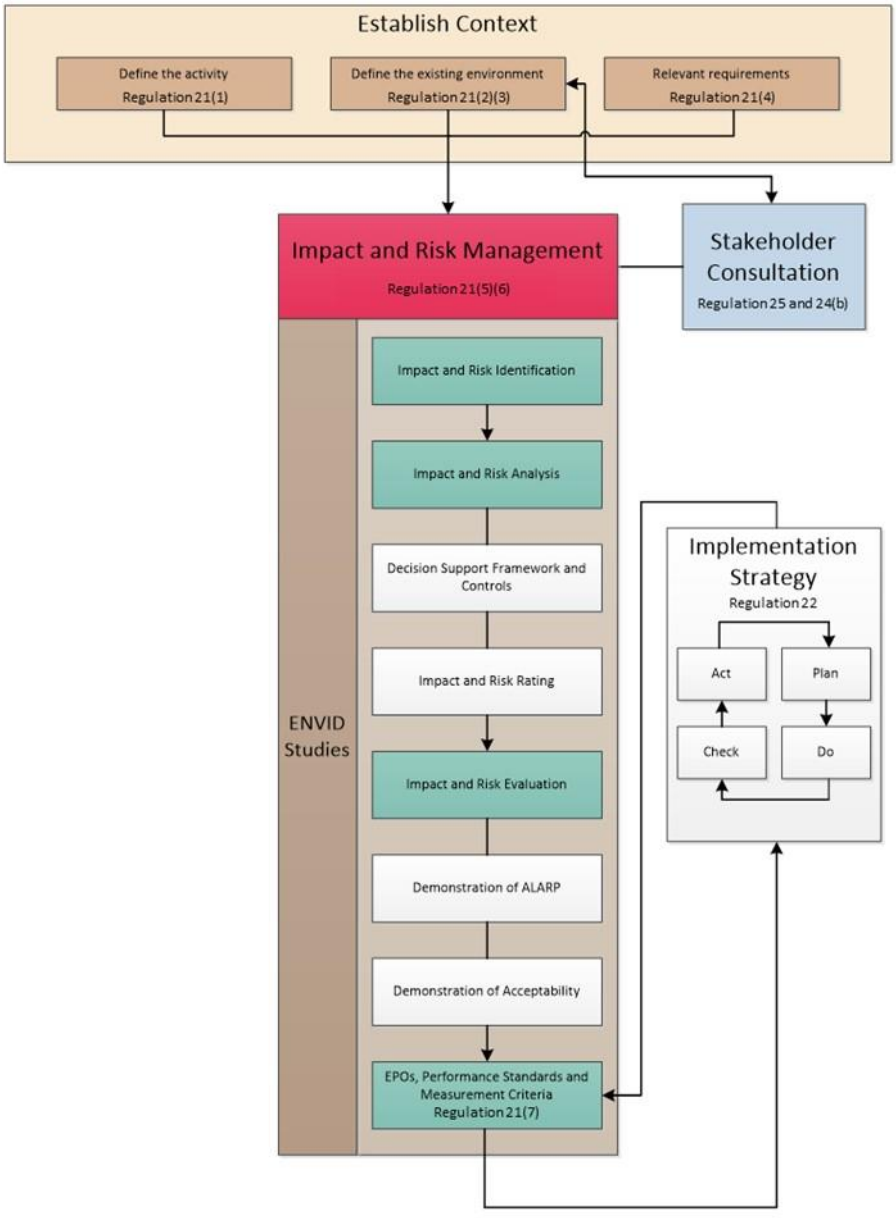


Figure 2-3: EP development process

2.4 Establish the Context

2.4.1 Define the Activity

This first stage involves evaluating whether the activity meets the definition of a 'petroleum activity' as defined in the Environment Regulations. The activity is described in relation to:

- the location
- what is to be undertaken
- how it is planned to be undertaken, including outlining operational details of the activity and proposed timeframes.

The 'what' and 'how' are described in the context of 'environmental aspects'[8] to inform the risk and impact assessment for planned (routine and non-routine) and unplanned (accidents/ incidents/ emergency conditions) activities.

The activity is described in Section 3 and is referred to as the Petroleum Activities Program.

2.4.2 Define the Existing Environment

The context of the existing environment is described and determined by considering the nature and scale of the activity (size, type, timing, duration, complexity, and intensity of the activity), as described in Section 4. The purpose is to describe the existing environment that may be impacted by the activity, directly or indirectly, by planned or unplanned[9] events.

A description of values and sensitivities relevant to Woodside's North West Shelf Operations is contained within the Master Existing Environment (Master EE) document. The Master EE is provided in Appendix K and is revised in accordance with Woodside's Management of Knowledge process when Woodside considers that information contained within the Master EE is superseded or when Woodside assesses relevant new information (Section 7.10.1.3).

The Existing Environment (Section 4) is structured into subsections defining the physical, biological, socio-economic and cultural features and values of the existing environment that may be affected by the activity, in accordance with the definition of environment in Regulation 5 of the Environment Regulations. These subsections make particular reference to:

- The environmental, and social and cultural consequences as defined by Woodside (refer to Table 2-1), which address key physical and biological attributes, as well as social and cultural values of the existing environment. These consequence definitions are applied to the impact and risk analysis (refer Section 2.2) and rated for all planned and unplanned activities. Additional detail is provided for unplanned hydrocarbon spill risk evaluation.
- EPBC Act MNES including listed threatened species and ecological communities and listed Migratory species. Defining the spatial extent of the existing environment is guided by the nature and scale of the PAP (and associated sources of environmental risk). This considers the PAA and wider environment that may be affected (EMBA), as determined by the hydrocarbon spill risk assessments. MNES, as defined under the EPBC Act, are addressed through Woodside's impact and risk assessment (Section 6).

[8] An environmental aspect is an element of the activity that can interact with the environment.

[9] For each source of risk, the credible worst-case scenario in conjunction with impact thresholds is used to determine the spatial extent of the EMBA. The worst-case unplanned event is considered to be an unplanned hydrocarbon release, further defined for each activity through the risk assessment process. Interpretation of stochastic oil spill modelling determines the EMBA for the release, which defines the spatial scale of the environment that may be potentially impacted by the Petroleum Activities Program and in turn provides context to the 'nature and scale' of the existing environment.

- Relevant values and sensitivities, which may include world or national heritage listed areas, listed Threatened species or ecological communities, listed Migratory species, or sensitive values.

By grouping potentially impacted environmental values by aspect (as presented in Table 2-1), the presentation of information about the receiving environment is standardised. This information is then consistently applied to the risk evaluation section to provide a robust approach to the overall environmental risk evaluation and its documentation in the EP.

Table 2-1: Example of the environment values potentially impacted which are assessed within the Environment Plan

Environmental Value Potentially Impacted Regulations 21(2)(3)						
Soil and Groundwater	***Marine Sediment***	***Water Quality***	***Air Quality (incl Odour)***	***Ecosystems/Habitats***	***Species***	***Socio-economic***

2.4.3 Relevant Requirements

The relevant requirements in the context of legislation, other environmental approval requirements, conditions and standards that apply to the PAP are identified and reviewed; and are presented in Appendix B.

The Woodside Risk Management Policy, Climate Policy as well as Environment and Biodiversity Policy are presented in Appendix A.

2.5 Impact and Risk Identification

Relevant environmental aspects and hazards were identified that support the process to define environmental impacts and risks associated with an activity.

The environmental impact and risk assessments presented in this EP has been informed by historic as well as more recent hazard and environmental risk identification studies (e.g. HAZID/ENVID) and consequence modelling studies for high consequence, low probability environmental risks. These studies have been reviewed and revalidated, as required, for the five-year revision of this EP. In preparing the 5-year revision, Woodside also considers environmental performance and compliance information gathered during the implementation phase of the in-force EP. Further, feedback from NOPSEMA to Woodside across Woodside's portfolio of environment plans has been considered and integrated, where relevant.

Impacts, risks and potential consequences were identified based on planned activities and unplanned events (based on the description in Section 3), the existing environment (Section 4) and the outcomes of Woodside's consultation process (Section 5). The environmental outputs of applicable risk and impact workshops and associated studies are referred to as ENVID in this EP.

An environmental impacts and risks identification and assessment workshop was undertaken by multidisciplinary teams comprising relevant operational and environmental personnel with sufficient breadth of knowledge, training and experience to reasonably assure that risks and impacts were identified, and their potential environmental consequences assessed. Impacts and risks were identified, during the workshop, for both planned (routine and non-routine) activities and unplanned (accidents/incidents/emergency conditions) events. During this process, risks identified as not applicable (not credible) were removed from the assessment.

Impacts and risks were evaluated and tabulated for each planned activity and unplanned events respectively. Environmental impacts and risks were recorded in an environmental impacts and risk register. The output of the workshop is used to present the risk assessment and form the basis of performance outcomes, standards, and measurement criteria. This information is presented in Section 6, following the format presented in Table 2-2.

Outside of the ENVID process, other potential risks may be identified through consultation. When this is the case, some of these risks may be included as a Risk Assessment in Section 6, even though no direct impact pathway exists as a result of the PAP (PAP). These risks, which are included to demonstrate impact potential in the context of the PAP (such as accelerated weathering of rock art as a result of onshore emissions from processing of Pluto gas; Section **Error! Reference source not found.**) cannot be assigned a consequence or impact descriptor as per the process outlined in Section 2.6.3 because current literature and evaluation does not identify a credible impact as a result of the PAP.

Table 2-2: Example of layout of identification of risks and impacts in relation to risk sources

Impacts and Risks Evaluation Summary														
Source of Risk	***Environmental Value Potentially Impacted***							***Evaluation***						
	Soil and Groundwater	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems / Habitat	Species	Socio-economic	Decision Type	Consequence / Impact	Likelihood	Risk Rating	ALARP Tool	Acceptability	Outcome
Summary of source of impact/risk														

2.6 Impact and Risk Analysis

Risk analysis further develops the understanding of a risk by defining the impacts and assessing appropriate controls, as well as considering previous risk assessments for similar activities, relevant studies, past performance, external consultation feedback, and the existing environment.

These key steps were undertaken for each risk identified during the risk assessment:

- Identify the Decision Type in accordance with the decision support framework.
- Identify appropriate control measures (preventive and mitigation) aligned with the Decision Type.
- Assess the risk rating.

2.6.1 Decision Support Framework

To support the risk assessment process and Woodside's determination of acceptability (Section 2.8.2), Woodside's HSE risk management procedures include the use of a decision support framework based on principles set out in the Guidance on Risk Related Decision Making (Oil and Gas UK, 2014). This concept is integrated into the environmental impacts and risks identification and assessment workshop to determine the level of supporting evidence that may be required to draw sound conclusions regarding risk level and whether the risk is acceptable and ALARP (Section 2.8). Application of the decision support framework confirms:

- activities do not pose an unacceptable environmental risk

- appropriate focus is placed on activities where the impact or risk is anticipated to be acceptable and demonstrated to be ALARP
- appropriate effort is applied to manage risks and impacts based on the uncertainty of the risk, the complexity and risk rating (i.e., potential higher order environmental impacts are subject to further evaluation/assessment).

The framework provides appropriate tools, commensurate to the level of uncertainty or novelty associated with the risk/impact (referred to as the Decision Type A, B, or C). The Decision Type is selected based on an informed discussion around the uncertainty of the risk/impact and is documented in impact and risk register worksheets.

This framework enables Woodside to appropriately understand a risk and determine if the risk or impact is acceptable and can be demonstrated to be ALARP.

2.6.1.1 Decision Type A

Decision Type A risks and impacts are well understood and established practice. They are generally recognised as good industry practice and are often embodied in legislation, codes and standards, and use professional judgment.

2.6.1.2 Decision Type B

Decision Type B risks and impacts typically involve greater uncertainty and complexity; and can include potential higher-order impacts/risks. These risks may deviate from established practice or have some lifecycle implications and therefore require further engineering risk assessment to support the decision and so that the risk is ALARP. Engineering risk assessment tools may include:

- risk-based tools such as cost-based analysis or modelling
- consequence modelling
- reliability analysis
- company values.

2.6.1.3 Decision Type C

Decision Type C risks and impacts typically have significant risks related to environmental performance. Such risks typically involve greater complexity and uncertainty therefore requiring the adoption of the precautionary approach. The risks may result in significant environmental impact, significant project risk/exposure, or may elicit negative stakeholder concerns. For these risks or impacts, in addition to Decision Type A and B tools, company and societal values need to be considered by undertaking broader internal and external consultation as part of the risk assessment process.

Figure 2-4: Risk-related Decision-making Framework (Oil and Gas UK, 2014)

2.6.1.4 Decision Support Framework Tools

These framework tools are applied, as appropriate, to help identify control measures based on the Decision Type described above:

- **Legislation, Codes and Standards (LCS)** – identifies the requirements of legislation, codes and standards that are to be complied with for the activity.
- **Good Industry Practice (GP)** – identifies further engineering control standards and guidelines that may be applied by Woodside above that required to meet the LCS.
- **Professional Judgement (PJ)** – uses relevant personnel with the knowledge and experience to identify alternative controls. Woodside applies the hierarchy of control as part of the risk assessment to identify any alternative measures to control the risk.
- **Risk-based Analysis (RBA)** – assesses the results of probabilistic analyses such as modelling, quantitative risk assessment and/or cost–benefit analysis to support the selection of control measures identified during the risk assessment process.
- **Company Values (CV)** – identifies values identified in Woodside's code of conduct, policies and Our Values. Views, concerns and perceptions are to be considered from internal Woodside stakeholders directly affected by the planned impact or potential risk.
- **Societal Values (SV)** – identifies the views, concerns and perceptions of relevant persons and addresses relevant stakeholder views, concerns and perceptions.

2.6.1.5 Decision Calibration

To determine that the alternatives selected, and the control measures applied are suitable, these tools may be used for calibration (i.e., checking) where required:

- LCS/Verification of Predictions – Verification of compliance with applicable LCS and/or good industry practice.
- Peer Review – Independent peer review of PJs, supported by RBA, where appropriate.

- Benchmarking – Where appropriate, benchmarking against a similar facility or activity type or situation that has been deemed to represent acceptable risk.
- Internal Consultation – Consultation undertaken within Woodside to inform the decision and verify company values are met.
- External Consultation – Consultation undertaken to inform the decision and verify societal values are considered.

Where appropriate, additional calibration tools may be selected specific to the Decision Type and the activity.

2.6.2 Control Measures (Hierarchy of Controls)

Risk reduction measures are prioritised and categorised in accordance with the hierarchy of controls, where risk reduction measures at the top of the hierarchy take precedence over risk reduction measures further down:

- Elimination of the risk by removing the hazard.
- Substitution of a hazard with a less hazardous one.
- Engineering Controls include design measures to prevent or reduce the frequency of the risk event, or detect or control the risk event (limiting the magnitude, intensity and duration) such as:
  - prevention: design measures that reduce the likelihood of a hazardous event occurring
  - detection: design measures that facilitate early detection of a hazardous event
  - control: design measures that limit the extent/escalation potential of a hazardous event
  - mitigation: design measures that protect the environment if a hazardous event occurs
  - response equipment: design measures or safeguards that enable clean-up/response after a hazardous event occurs.
- Procedures and Administration includes management systems and work instructions used to prevent or mitigate environmental exposure to hazards.
- Emergency Response and Contingency Planning includes methods to enable recovery from the impact of an event (e.g., protection barriers deployed near the sensitive receptor).

2.6.3 Impact and Risk Classification

Environmental impacts and risks are assessed to determine the potential impact significance/consequence. The impact significance/consequence considers the magnitude of the impact or risk and the sensitivity of the potentially impacted receptor (Figure 2-5).

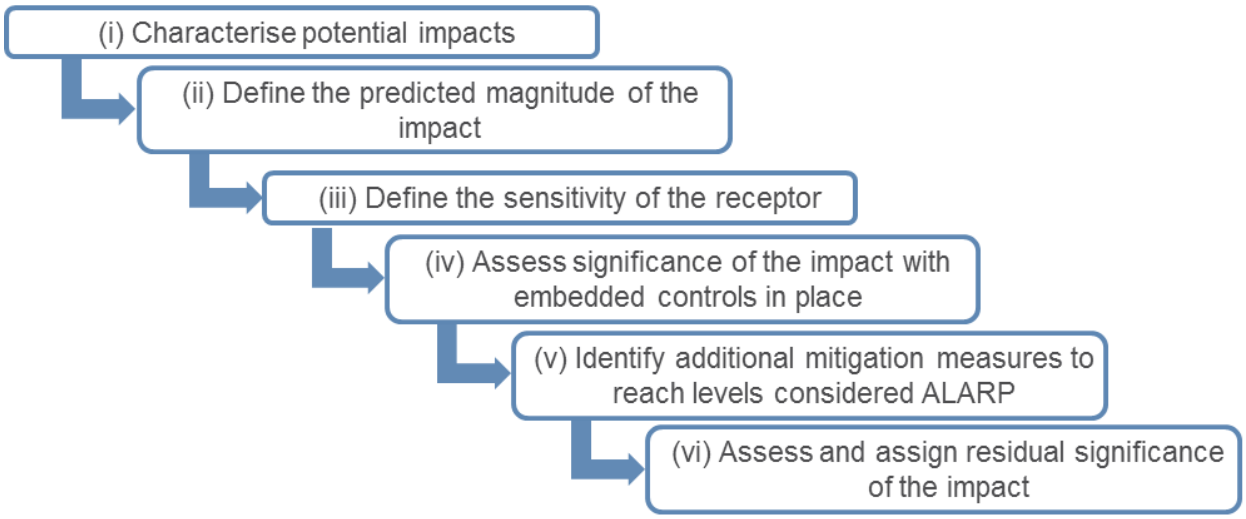


Figure 2-5: Environmental risk and impact analysis

Impacts are classified in accordance with the consequence (Table 2-3) outlined in Woodside's Risk Management Procedure and Risk Matrix (Figure 2-6). Risks are assessed qualitatively and/or quantitatively in terms of both likelihood and consequence in accordance with this matrix.

The impact and risk information, including classification and evaluation information as shown in the example (Table 2-2), are tabulated for each planned activity and unplanned event.

Table 2-3: Woodside Risk Matrix (environment and social and cultural) consequence descriptions

Environment	Social and Cultural	Consequence Level
Catastrophic, long-term impact (>50 years) on highly valued ecosystem, species, habitat or physical or biological attribute.	Catastrophic, long-term impact (>20 years) to a community, social infrastructure or highly valued area/item of international cultural significance.	A
Major, long-term impact (10 to 50 years) on highly valued ecosystem, species, habitat or physical or biological attribute.	Major, long-term impact (5 to 20 years) to a community, social infrastructure or highly valued area/item of national cultural significance.	B
Moderate, medium-term impact (2 to 10 years) on ecosystem, species, habitat or physical or biological attribute.	Moderate, medium-term impact (2 to 5 years) to a community, social infrastructure or highly valued area/item of national cultural significance.	C
Minor, short-term impact (1 to 2 years) on species, habitat (but not affecting ecosystem function), physical or biological attribute.	Minor, short-term impact (1 to 2 years) to a community or highly valued area/item of cultural significance.	D
Slight, short-term impact (<1 year) on species, habitat (but not affecting ecosystem function), physical or biological attribute.	Slight, short-term impact (<1 year) to a community or area/item of cultural significance.	E
No lasting effect (<1 month). Localised impact not significant to environmental receptor.	No lasting effect (<1 month). Localised impact not significant to area/item of cultural significance.	F

2.6.4 Risk Rating Process

The risk rating process assigns a level of risk to each risk event, measured in terms of consequence and likelihood. The assigned risk rating is determined with controls in place, therefore; the risk rating is determined after identifying the Decision Type and appropriate control measures.

The risk rating process considers the potential environmental consequences and, where applicable, the social and cultural consequences of the risk. The risk ratings are assigned using the Woodside Risk Matrix (refer to Figure 2-6).The risk rating process is done using the steps described in the subsections below.

2.6.5 Select the Consequence Level

Determine the worst-case credible consequence (Table 2-3) associated with the selected event, assuming all controls (preventive and mitigative) are absent or have failed. If more than one potential consequence applies, select the highest severity consequence level.

2.6.6 Select the Likelihood Level

Determine the description that best fits the chance of the selected consequence occurring, assuming reasonable effectiveness of the prevention and mitigation controls (Table 2-4).

Table 2-4: Woodside Risk Matrix likelihood levels

Likelihood Description						
Frequency	1 in 100,000 to 1,000,000 years	1 in 10,000 to 100,000 years	1 in 1000 to 10,000 years	1 in 100 to 1000 years	1 in 10 to 100 years	>1 in 10 years
Experience	Remote: Unheard of in the industry	Highly Unlikely: Has occurred once or twice in the industry	Unlikely: Has occurred many times in the industry but not at Woodside	Possible: Has occurred once or twice in Woodside or may possibly occur	Likely: Has occurred frequently at Woodside or is likely to occur	Highly Likely: Has occurred frequently at the location or is expected to occur
Likelihood Level	0	1	2	3	4	5

2.6.7 Calculate the Risk Rating

The risk rating is derived from the consequence and likelihood levels above, in accordance with the Woodside Risk Matrix shown in Figure 2-6. A likelihood and risk rating are only applied to environmental risks, not environmental impacts from planned activities.

This risk rating is used as an input into the risk evaluation process and ultimately for prioritising further risk reduction measures. Once each risk is treated to ALARP, the risk rating articulates the ALARP baseline risk as an output of the ENVID studies.

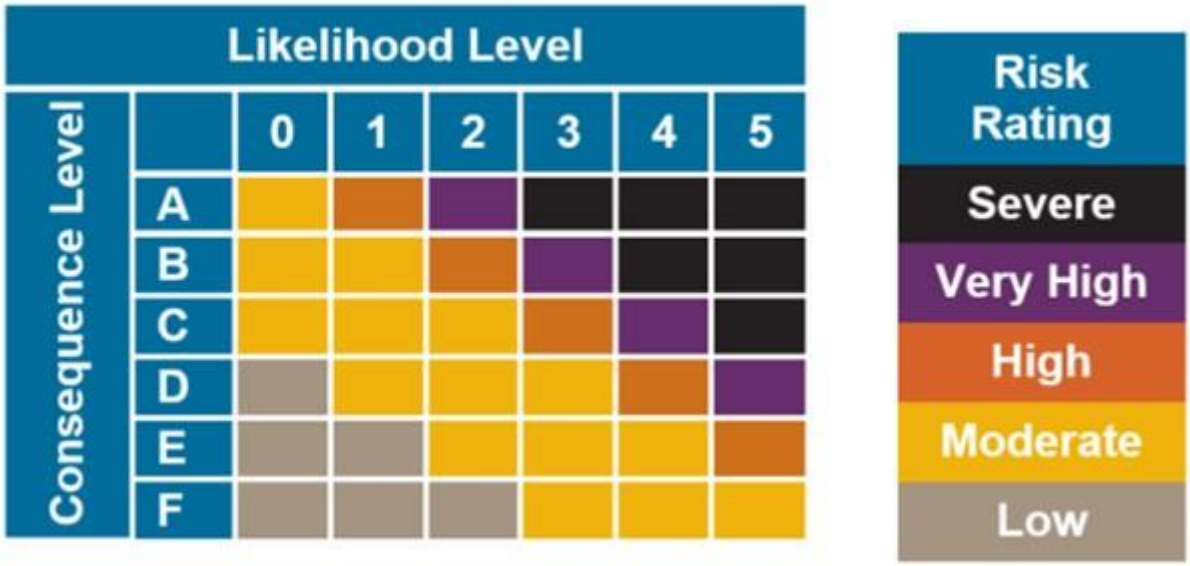


Figure 2-6: Woodside Risk Matrix – risk level

To support ongoing risk management (as a key component of Woodside's Process Safety Management Framework – refer to the implementation strategy in Section 7), Woodside uses the concept of 'current risk' and applies a Current Risk Rating to indicate the current or 'live' level of risk, considering controls that are currently in place and effective on a day-to-day basis. The Current Risk Rating is effective in articulating potential divergence from baseline risk, such as if certain controls fail or could potentially be compromised. Current Risk Ratings aid in communicating and making visible the risk events and for the continual management of risk to ALARP by identifying risk reduction measures and assessing acceptability.

2.7 Classification and Analysis of Major Environment Events (MEEs)

For Woodside's production facilities, a further level of analysis is undertaken to identify, classify and analyse MEEs. This extra level of rigour is applied so that sufficient controls are in place for risks with potential Level B and above consequences. In the health and safety area, major accident events (MAEs) are identified using a similar process, which supports consistency in managing key risks within Woodside in accordance with Process Safety Risk Management Procedures.

Woodside defines a MEE as an event with potential environment, reputation (pertaining to environment events), social or cultural consequences of level B or higher as per Woodside's Risk Matrix (Figure 2-6). MEEs are evaluated against credible worst-case scenarios that may occur when all controls are absent or have failed.

2.7.1 Major Environment Event Identification

The ENVID process identifies numerous sources of risk with differing consequence levels. These risks are screened for those risk events that meet the MEE criteria, and MEE risks are analysed further through detailed consequence modelling and probability/ frequency studies and examined for 'appropriateness' of controls in a bowtie risk assessment.

Risks that do not meet the MEE definition, although screened out of the MEE process, are still evaluated for ALARP and risk acceptability using the methodology described in Section 2.8. Some high consequence/low probability events which do not meet the MEE consequence threshold may still undergo additional consequence and probability assessment where they could have a high adverse impact on the company's reputation or relationships with relevant persons, beyond requirement to demonstrate ALARP and acceptable risk levels following application of controls.

2.7.2 MEE Classification

A standard naming convention has been established for MEEs which is based around ensuring the MEE titles reflect the cause of the event (e.g., 'subsea system loss of containment') rather than the event itself (e.g., significant hydrocarbon spill to the marine environment). The MEEs are assigned a unique identification code (e.g., MEE-01, MEE-02, etc).

2.7.3 Bowtie Analysis

MEEs are subject to more detailed analysis using the bowtie risk assessment technique, which illustrates cause outcome pathways for each MEE and controls in place to prevent the 'top event' or mitigate the consequences (outcomes). The key drivers for adopting the bowtie technique for MEEs are that it:

- identifies the controls (prevention and mitigation barriers) necessary so that the risk is acceptable and ALARP
- supports the process of demonstrating ALARP (described in Section 2.8.1)
- enables verification of and linking to the relevant sections of the WMS that supports barriers
- improves the capacity for lessons learnt and incident prevention by being able to directly relate causes of an incident to those controls that failed
- ensures greater visibility and granularity in the assessment process and enables complex risk scenarios to be presented in an easy to understand format.

The bowtie technique (an example bowtie diagram is shown in Figure 2-7) shows the relationships between the 'Causes' that may lead to a particular unwanted event ('Top Event'), together with the range of potential escalation paths that can lead to a variety of 'Outcomes' (or consequences). A bowtie also shows the preventive barriers that may prevent a Top Event from occurring specific to each Cause, and the mitigation barriers in place to limit the potential effects once the Top Event has been realised, specific to each credible MEE Outcome.

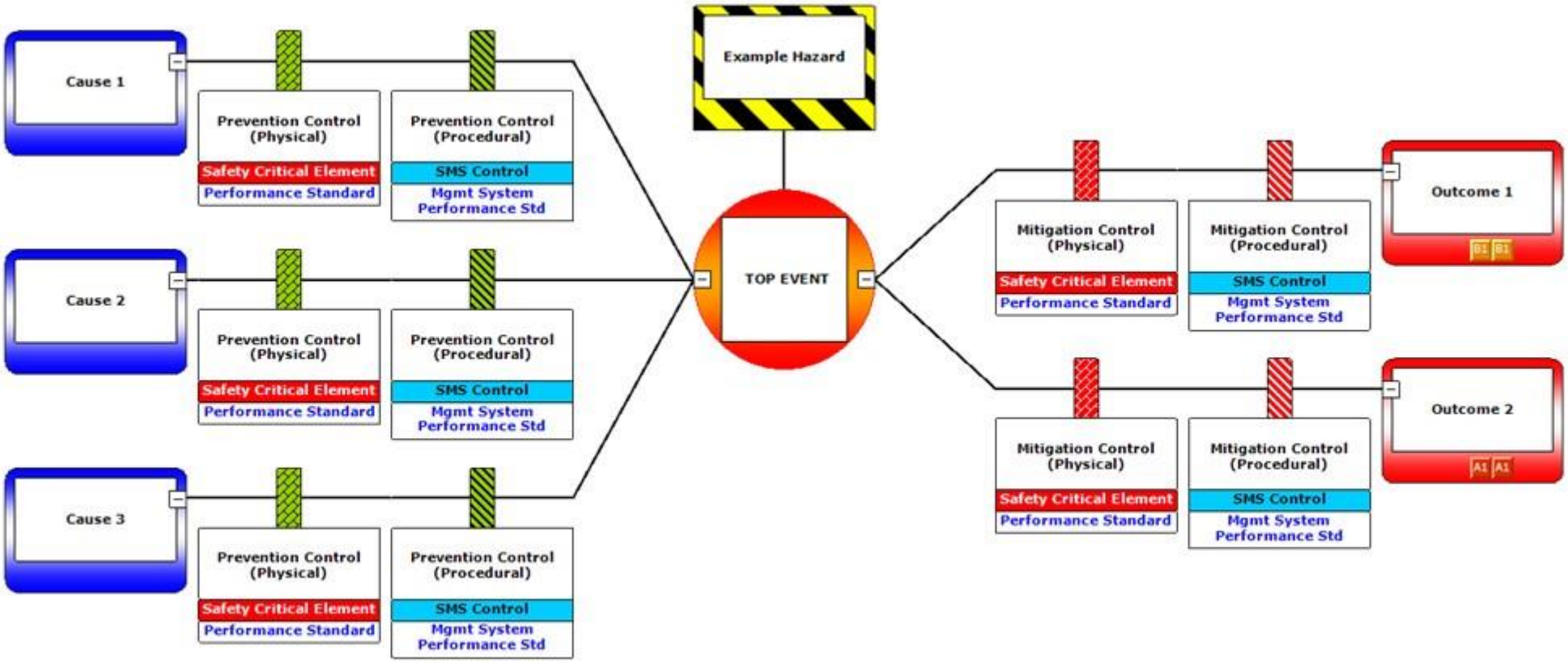


Figure 2-7: Example of bowtie diagram structure

2.7.4 MEE Register

A MEE Register is prepared for each production facility after completing the bowtie diagrams. The purpose of the MEE Register is to record the MEE identification process, groupings, bowtie diagrams and datasheets in a consolidated format. Datasheets are prepared for each MEE, which summarise the hazard description, hazard management, emergency response, ALARP summary and a list of critical barriers identified on the bowties (known as safety and environment critical elements (SCEs)).

Potential common causes that contribute to MAEs/MEEs, or that can result in failure or degradation of the controls in place to protect against MAEs/MEEs, include some generic mechanisms of SCE failure and generic human error. These are represented in bowties applicable to multiple MEEs and identified in the MEEs applicable to this EP.

2.7.5 Safety and Environment Critical Elements and Technical Performance Standards

Woodside identifies and manages SCEs technical and management system performance standards in accordance with Process Safety Management Procedures, Risk Management Procedures and Change Management Procedures (further described in the implementation strategy in Section 7). SCEs are identified for MAEs and MEEs. An SCE is a hardware control, the failure of which could cause or contribute substantially to, or the purpose of which is to prevent or limit the effect of a MAE, MEE or process safety event. In addition, Woodside defines a safety and environment critical component (SCC) as an item of equipment or structure forming part of a hardware SCE that supports the SCE in achieving the safety function.

Once an SCE is identified as an MEE barrier for the operated facility, technical performance requirements are developed for the facility SCE in accordance with the Global SCE Performance Standards and process described in the SCE Management Procedures and form the SCE Facility Performance Standard. Each SCE Performance Standard represents a statement of the performance required of an SCE (e.g., functionality, availability, reliability, survivability). SCE Performance Standard requirements are used to establish agreed assurance tasks for each SCE, support the management of operations within acceptable safety and/or environment risk levels, and for the continuous management of risk to ALARP. An assurance task is an activity carried out by the operator to confirm that the SCE meets, or will meet, its SCE Performance Standard. Examples of assurance tasks include inspection routines, maintenance activities, test routines, instrumentation calibration, and reliability monitoring.

SCE Facility Performance Standards do not always align directly with EPSs. They are used in conjunction with the WMS to identify and treat potential step-outs from expected controls performance or integrity envelopes and so that SCE performance can be optimised. Woodside's HSE Event Reporting Guideline describes the process for identifying 'Failure to meet Facility Performance Standard', which is when the SCE does not meet the goal as stated in the relevant Performance Standard. (see Section 7.4). Situations where SCEs fail to meet Facility Performance Standards represent a potential increase in risk that, if not addressed immediately, have the potential to result in a process safety event, or worsen the consequences of one. Recording SCE Failure to Meet Performance Standard Events into the Event Reporting Database is important to highlight risk, investigate causes, manage risks and meet potentially applicable external reporting requirements. For applicable SCEs, 'Failure to meet Facility Performance Standard' represent scenarios that may fail to achieve an EPS presented in this EP.

The results of the MEE classification and analysis for Pluto Offshore operations are presented in Section 6.8.1 of this EP. More detail on the SCE and Performance Standards process, and the interrelationships to other parts of the SCE Management Procedures, is described in Section 7.4.

2.7.6 Safety-critical Management System Barriers

For each MEE, Safety-critical Management System specific measures are also identified. These are management system components (generally WMS processes) that are key barriers to, or measures for, managing MEEs.

2.8 Impact and Risk Evaluation

Environmental impacts and risks cover a wider range of issues, differing species, persistence, reversibility, resilience, cumulative effects, and variability in severity than safety risks. Determining the degree of environmental risk, and the corresponding threshold for whether a risk/impact has been reduced to ALARP and is acceptable, is evaluated to a level appropriate to the nature and scale of each impact or risk. Evaluation includes considering the:

- decision type
- principles of ESDev – as defined under the EPBC Act
- internal context – ensuring the proposed controls and risk level are consistent with Woodside policies, procedures and standards (Section 7 and Appendix A)
- external context – the environment consequence (Section 6) and stakeholder acceptability (Section 5)
- other requirements – ensuring the proposed controls and risk level are consistent with national and international standards, laws and policies.

In accordance with Regulations 34(a), 34(b), 34(c) and 34(b) and 21(5)(b), Woodside applies the process described in the subsections below to demonstrate ALARP and acceptability for environmental impacts and risks, appropriate to the nature and scale of each impact or risk.

2.8.1 Demonstration of ALARP

The descriptions in Table 2-5 articulate how Woodside demonstrates that different risks, impacts and Decision Types identified within the EP are ALARP.

Table 2-5: Summary of Woodside's criteria for ALARP demonstration

Risk	Impact	Decision Type
Low and Moderate	***Negligible, Slight, or Minor (D, E or F)***	***A***
Woodside demonstrates these risks, impacts and Decision Types are reduced to ALARP if: • identified controls meet legislative requirements, industry codes and standards, applicable company requirements and industry guidelines, or • further effort towards impact/risk reduction (beyond using opportunistic measures) is not reasonably practicable without sacrifices that are grossly disproportionate to the benefit gained.		
High, Very High or Severe	***Moderate and Above (C, B or A)***	***B and C***
Woodside demonstrates these higher order Risks, Impacts and Decision Types are reduced to ALARP (where it can be demonstrated using good industry practice and risk-based analysis) that: • legislative requirements, applicable Woodside requirements and industry codes and standards are met • societal concerns are accounted for • the alternative control measures are grossly disproportionate to the benefit gained.		

2.8.2 Demonstration of Acceptability

The descriptions in Table 2-6 articulate how Woodside demonstrates how different risks, impacts and Decision Types identified within the EP are Acceptable.

Table 2-6: Summary of Woodside's criteria for acceptability

Risk	Impact	Decision Type
Low and Moderate	***Negligible, Slight, or Minor (D, E or F)***	***A***
Woodside demonstrates these risks, impacts and Decision Types are 'Broadly Acceptable' if they meet legislative requirements, industry codes and standards, applicable company requirements and industry guidelines. Further effort towards risk reduction (beyond using opportunistic measures) is not reasonably practicable without sacrifices that are grossly disproportionate to the benefit gained.		
High, Very High or Severe	***Moderate and Above (C, B or A)***	***B and C***
Woodside demonstrates these higher order Risks, Impacts and Decision Types are 'Acceptable if ALARP' if it can be demonstrated using good industry practice and risk-based analysis (RBA), if legislative requirements are met and societal concerns are accounted for, and the alternative control measures are grossly disproportionate to the benefit gained. In undertaking this process for Moderate and High risks, Woodside evaluates: • the principles of ESDev as defined under the EPBC Act • the internal context – the proposed controls and consequence/risk level are consistent with Woodside policies, procedures and standards • the external context – consideration of the environment consequence (Section 6) and stakeholder acceptability (Section 5) are considered • other requirements – the proposed controls and consequence/risk level are consistent with national and international industry standards, laws and policies ad consideration of applicable plans for management and conservation advice, conventions and significant impact guidelines (e.g., MNES). For potential C or above consequence/impact levels where significant uncertainty exists in analysis of the risk or impact (such as, for predicted or potential high risk of significant environmental impacts, significant project risk/exposure, novel activities, lack of consensus on standards, and significant stakeholder concerns; e.g., Decision Type C), acceptability may be required to be conducted separately for key receptors. This is not applicable for risks, given the consequence of an unplanned risk event occurring may not be acceptable and, therefore, acceptability is demonstrated in the context of the residual likelihood of an event occurring and subsequent impacts. Additionally, Very High and Severe risks require 'Escalated Investigation' and mitigation. If after further investigation the risk remains in the Very High or Severe category, the risk requires appropriate business engagement with increasing involvement of senior management in accordance with Woodside's Risk Management Procedure to accept the risk. This includes due consideration of regulatory requirements.		

2.9 Recovery Plan and Threat Abatement Plan Assessment

A separate assessment is undertaken to demonstrate the EP is not inconsistent with any relevant recovery plans or threat abatement plans (refer Section 6.10). An assessment of associated national objectives and action areas contribute to the demonstration of acceptability. The steps in this process are:

- Identify relevant listed threatened species and ecological communities (Section 4).
- Identify relevant recovery plans and threat abatement plans (Section 6.10).
- List all objectives and (where relevant) the action areas of these plans and assess whether these objectives/action areas apply to government, the Titleholder, and the PAP (Section 6.9).
- For those objectives and action areas applicable to the PAP, identify the relevant actions of each plan, and evaluate whether impacts and risks resulting from the activity are clearly not inconsistent with that action (Section 6.10).

2.10 Environmental Performance Outcomes, Environmental Performance Standards, and Measurement Criteria

EPOs, EPSs and MC are defined to address the potential environmental impacts and risks. These are explored in Section 6.

2.11 Implement, Monitor, Review and Reporting

An implementation strategy for the PAP describes the specific measures and arrangements to be implemented for the duration of the program. The strategy is based on the principles of AS/NZS ISO 14001 Environmental Management Systems, and demonstrates:

- control measures are effective in reducing the environmental impacts and risks of the PAP to ALARP and Acceptable levels
- EPOs and EPSs set out in the EP are met through monitoring, recording, auditing, managing non-conformance, and reviewing
- all environmental impacts and risks of the PAP are periodically reviewed in accordance with Woodside's risk management procedures
- roles and responsibilities are clearly defined, and personnel are competent and appropriately trained to implement the requirements set out in this EP, including in emergencies or potential emergencies
- arrangements are in place for oil pollution emergencies, to respond to and monitor impacts
- environmental reporting requirements are met, including 'reportable incidents'
- appropriate consultation is undertaken throughout the activity.

The implementation strategy is presented in Section 7.

2.12 Consultation

Woodside consults relevant persons in the course of preparing an EP in accordance with Regulation 25 of the Environment Regulations. Woodside's consultation methodology is presented in Section 5. Woodside's consultation record is at Appendix F.

3. DESCRIPTION OF THE ACTIVITY

3.1 Overview

This section has been prepared in accordance with Regulation 21(1) of the Environment Regulations and describes the activities to be undertaken as part of the PAP under this EP. It includes the location of the activity, general details of the facility associated infrastructure, the operational details of the activity, and additional information relevant to consideration of environmental risks and impacts.

The Pluto facility currently produces gas and condensate from the Pluto, Pyxis and Xena fields via the Pluto subsea hydrocarbon gathering system (Section 3.4). This EP includes the ongoing operation of the Pluto facility and Xena-03 Drilling and Tie-back activities associated with the Xena-03 well, in the Xena field. An overview of the PAP is provided in Sections 1.1, 3.1.1, 3.1.2 and Table 3-1.

3.1.1 Pluto Facility Operations Overview

The Pluto offshore facility (the facility) and export pipeline is outlined in Figure 3-1. The facility produces wet gas and condensate from the Pluto, Pyxis and Xena fields in Production Licence WA-34-L. The platform is designed to be operated in both not-normally-crewed (NNC) and minimally crewed states. The offshore facilities are remotely operated from the central control room (CCR), either from the central control room at Pluto LNG Park or remote central control room in Perth. Gas and condensate are transported onshore for processing via a 180 km long export pipeline.

A Produced Water Handling Module (PWH) was installed on the riser platform in 2019 and commissioned in 2024 to enable the processing and discharge of produced water at the platform. Wet gas is processed through the PWH, with gas and condensate transported to the onshore LNG Plant for processing. These activities are outlined in Table 3-1.

3.1.2 Xena-03 Tie-back Overview

Woodside plans to drill and complete the Xena-03 infill production well within this EP revision. The work includes drilling one new well in the Xena field, as well as installation of an associated wellhead, xmas tree, and connecting the well to the existing Pyxis Hub subsea infrastructure (Section 3.4). The well will be located at approximately 177 m water depth.

The well will be drilled and completed using a moored or hybrid mobile offshore drilling unit (MODU). Typically, two or three support vessels will support the MODU during drilling activities, with at least one vessel in the vicinity to complete standby duties, if required. Supply vessels from Dampier Port will frequent the MODU at regular intervals throughout drilling operations, as required.

Installation of the subsea infrastructure will be undertaken using an installation vessel. Another installation vessel, similar to vessels used for IMMR activities, may be used to install the xmas tree and for cold commissioning the wells and during start-up (if required). Support vessels associated with subsea installation activities may transit between the PAA and port, however transit activities are not within the scope of this EP.

The scope for this EP covers the tie-back of the Xena-03 well to the existing Pyxis Hub subsea infrastructure (Section 3.4), including drilling, completion, and subsea installation (including minor changes to existing infrastructure) along with pre commissioning, cold commissioning and start-up. These activities are outlined in Table 3-1 and described in detail in Section 3.4.2.3.

Table 3-1: PAP overview

Item	Description
Production/ Infrastructure licences	WA-1-IL, WA-34-L
Pipeline licences	WA-16-PL, WA-17-PL
Platform location	115° 22’ 5.582” E 19° 59’ 46.476’ S
Water depth (lowest astronomical tide (LAT)) at Pluto topsides location	85 m
Key components of the facilities	Fixed platform, processing equipment including PWH, pipelines; subsea infrastructure Pluto, Xena and Pyxis wells, wellheads, manifolds, umbilicals, chemical supply lines, risers, flowlines, flexible jumpers
Key components of pipeline subsea infrastructure	Xmas trees, flowlines/pipelines and umbilicals
Number of wells	11 existing production wells (PLA01, PLA02, PLA03, PLA04, PLA05, PLA06, PLA07, PLA08, XNA01, XNA02, PYA01, and PL-PYA02)) Drilling, completion, and production for 1 new well proposed to be constructed in 2025 (XNA03)
Subsea infrastructure	Existing: • Pluto riser platform • Pluto Export Pipeline • Pluto/Xena-03/Pyxis subsea infrastructure (including umbilicals and flowlines) Xena-03 Proposed (planned installation Q3, 2025): • one subsea xmas tree and wellhead • one flexible flowline • one set of flying leads • one electrohydraulic umbilical (EHU) and associates umbilical termination assemblies (UTAs)
MODU	Moored MODU or hybrid MODU
Vessels	Pluto Operations: • platform support vessels, ASV, subsea support vessels Xena-03 Tie-back: • MODU, MODU support vessels including AHVs, installation vessel/s
Key activities	Pluto Operations: • routine production • routine inspection, maintenance, monitoring and repair of the platform and associated subsea infrastructure. • well unloading and clean-up • non-routine and unplanned activities and incidents associated with the above. Xena-03 Tie-back: • subsea infrastructure stabilisation • mooring installation for the MODU • development drilling and completions activities via MODU • installation of xmas tree

Item	Description
	• site surveys • installation of flowline, flying leads, subsea tree, subsea distribution unit • tie-in to existing subsea infrastructure • pre-commissioning of the new subsea infrastructure • cold commissioning of the well and xmas tree • start-up to the Pluto facility including unload of well to onshore LNG Plant and performance testing • contingent intervention, workover, or re-drill for the new well

3.2 Location

The riser platform is located in Commonwealth waters off WA, in Production Licence Area WA-1-IL approximately 160 km north west of Dampier and 75 km north of Barrow Island (Figure 3-1). Gas and condensate produced from the facility are exported via the 180 km long pipeline and associated 6-inch chemical supply line, to onshore for processing.

Currently, gas is produced from seven Pluto wells, two Pyxis wells and two wells in the Xena field. An additional well in the Pluto field (PLA08) is anticipated to commence production in 2025 and an additional well in the Xena field (Xena-03) is proposed to be tied back in this EP, 11 km from the riser platform.

The riser platform is marked on nautical charts and surrounded by a 500 m petroleum safety zone (PSZ). The riser platform is marked on general aviation maps and categorised as a Danger Area for civil aircraft. The danger-type is listed in the General Pilots Manual as “avoid flight over facility between surface and 1500 feet”. The export pipeline is also marked on nautical charts. The coordinates and permit areas of the facility and associated infrastructure are presented in Table 3-2.

Table 3-2: Approximate location details for the PAP, including all relevant infrastructure

Structure	Water Depth (approx. m LAT)	Latitude	Longitude	Title
Riser platform	85	-19° 54’ 49.24’’	115 ° 7 ‘ 54.47‘’	WA-1-IL
Pluto A and B flowlines	85–830	-	-	WA-16-PL
Export pipeline (Commonwealth)	41–85	-	-	WA-17-PL
PLA01ST1 well	830	-19° 54’ 48.23’’	115 ° 7 ‘ 54.75‘’	WA-34-L
PLA02 well	830	-19° 54’ 48.57’’	115 ° 7 ‘ 55.79‘’	WA-34-L
PLA03ST1 well	830	-19° 54’ 48.70’’	115 ° 7 ‘ 56.33‘’	WA-34-L
PLA04 well	830	-19° 54’ 48.69’’	115 ° 7 ‘ 55.57‘’	WA-34-L
PLA05 well	830	-19° 54’ 49.24’’	115 ° 7 ‘ 54.47‘’	WA-34-L
PLA06 well	830	-19° 54’ 48.26’’	115 ° 7 ‘ 54.14‘’	WA-34-L
PLA07ST1	830	-19° 54’ 47.61”	115° 07’ 54.95”	WA-34-L
PLA08[10] well	~830	-199° 54’ 42.00”	115° 08’ 02.42”	WA-34-L
PYA01 well	958	-19° 49’ 40.33”	115° 10’ 34.94”	WA-34-L
PL-PYA02	862	-19° 52’ 34.88”	115° 09’ 00.65”	WA-34-L

[10] This drilling activity was covered in WA-34-L Pyxis Drilling and Subsea Installation Environment Plan accepted 21 December 2023. Locations provided are approximate until final as-built surveys are completed. Production is expected to commence Q2 2025.

Structure	Water Depth (approx. m LAT)	Latitude	Longitude	Title
Xena tie-in	~180	-19° 58’ 15.25’’	115 ° 12 ‘ 45.47‘’	WA-34-L
XNA01 well	178	-19° 58’ 13.57’’	115 ° 12 ‘ 46.17‘’	WA-34-L
XNA02 Well	180	-19° 57’ 49.13”	115° 13’ 02.76”	WA-34-L
Proposed XNA03 Well	~177	-19° 56’ 28.91”	-115°13’44.30	WA-34-L

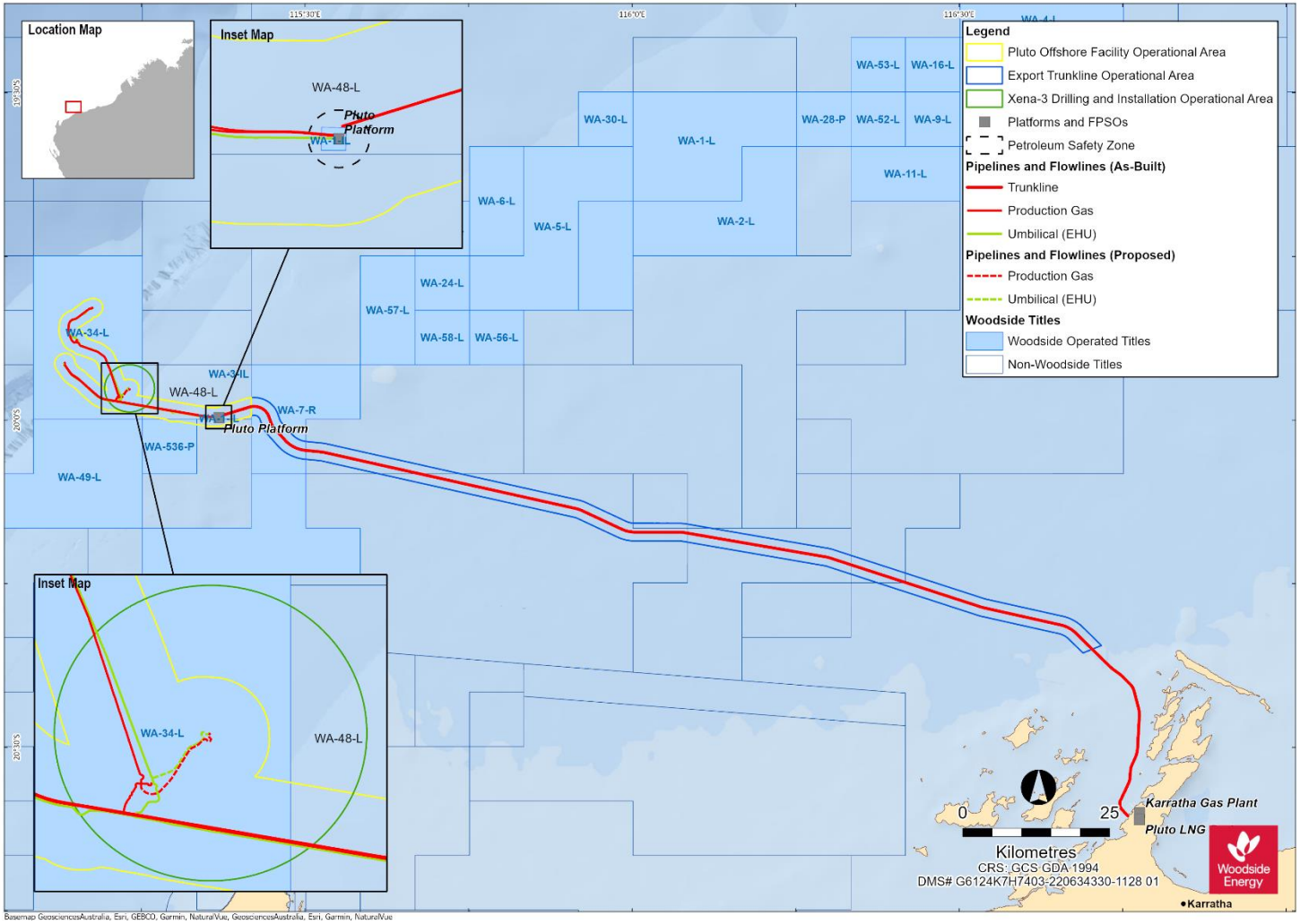


Figure 3-1: Location of the PAP

3.2.1 Petroleum Activities Area

The spatial boundary of the PAP has been described and assessed using three Operational Areas, the Pluto Facility Operational Area, Export Pipeline Operational Area (collectively referred to as the Pluto Operational Area), and the Xena-03 Operational Area. The Operational Areas are collectively referred to as the Petroleum Activity Area (PAA) in this EP, with specific Operational Areas referred to where relevant.

Vessel-related activities within the PAA will comply with this EP. Vessels transiting to the PAA are outside the scope of this EP and are covered by applicable maritime Regulations and other requirements during that time.

3.2.2 Pluto Operational Area

The Pluto Operational Area, risk assessed and managed by this EP, includes vessel-related petroleum activities within the PAA that include:

- the riser platform and the area within a 500 m PSZ around the riser platform
- the export pipeline (P1TL) and associated 6-inch chemical supply line covered by Pipeline Licence WA-17-PL and flowlines in WA-16-PL and an area encompassing 1500 m each side around the subsea pipeline infrastructure
- Pluto, Xena and Pyxis subsea facilities (including wells, production and pigging manifolds, production jumpers, spools, flowlines and flexible jumpers) and an area within 1500 m each side around the subsea infrastructure.

For the purposes of the Description of the Existing Environment (Section 4) and for the Environmental Impact and Risk Assessments (Section 6) the Pluto Operational Area has been divided into two sections where relevant, being:

- the Facility Operational Area (all elements of the Pluto platform and subsea hydrocarbon gathering system (wells, xmas trees, flowlines, spools, jumpers, umbilicals, etc))
- the Export Pipeline Operational Area (pipeline to the boundary between Commonwealth and WA State waters).

3.2.3 Xena-03 Operational Area

The Xena-03 Operational Area has a radius of 4000 m centred on the Xena-03 well location, to allow for MODU mooring operations, drilling of the Xena-03 well, installation of subsea infrastructure (including installation and connection of the Xena-03 flowline), pre-commissioning and related petroleum activities.

The Xena-03 Operational Area allows for MODU mooring operations, including the possible installation of pre-laid moorings and vessel-related petroleum activities. It also includes a 500 m Safety Exclusion Zone (SEZ) around the MODU to manage vessel movements, which will be under the control of the MODU Person in Charge. The primary installation vessel (PIV), operating within the Xena-03 Operational Area, will also be surrounded by a 500 m SEZ when on-location, which will be under the control of the vessel master.

For the purposes of the description of the existing environment (Section 4) and for the environmental impact and risk assessments (Section 6), the Xena-03 Tie-back Operational Area has been referred to where relevant.

3.3 Timing

3.3.1 Pluto Operations

The facility commenced production in 2012. The Pluto facility is designed to operate 24 hours per day, 365 days per year.

Estimated end of life of the Pluto, Xena and Pyxis fields is expected in 2032, subject to reservoir performance Production from PLA08 is expected in Q2 2025. This EP is intended to remain in force in accordance with Regulation 36 of the Environment Regulations.

3.3.2 Xena-03 Tie-back Activities

Drilling of the Xena-03 well is anticipated to commence in Q2 2025 and take around 60 days to complete (Table 3-3). Subsea installation is anticipated to follow in Q3 2025 and to have a cumulative duration of around three weeks (including mobilisation, demobilisation and contingency). Drilling and installation of subsea infrastructure may be performed over multiple campaigns.

Timing and duration of activities is subject to change due to project schedule requirements, MODU/vessel availability, unforeseen circumstances and weather constraints.

When tie-back activities are underway, activities are 24 hours per day, seven days per week. There are no planned concurrent drilling activities under the EP. Simultaneous operations (SIMOPS) activities with subsea installation may occur. Timing and duration of all activities is subject to change due to project schedule requirements, MODU/vessel availability, unforeseen circumstances and weather.

The EP has risk-assessed activities associated with the drilling and tie-back of the Xena-03 well as if they were to occur at any time during the year, this includes drilling activities, subsea infrastructure installation, pre-commissioning activities and intervention, workover, or re-drilling activities. This provides operational flexibility for requirements and schedule changes and vessel/MODU availability. The timeframes are therefore subject to change within the defined calendar years and, as no particular windows have been nominated for avoidance based on environmental and/or stakeholder sensitivities, changes to the above will not be interpreted as ‘new stages’ against Regulation 39(1).

Table 3-3: Summary of timing for tie-back activities

Activity	Approximate Timing (and Cumulative Duration in the Field)
Installation and removal of anchors for MODU	2025 (7–10 days per activity)
Drilling and completions	Q2 2025 (~60 days) 2026 (contingency)
Subsea installation and pre-commissioning/cold commissioning	Q3 2025 (~3 weeks) 2026 (contingency)
Well start-up and performance testing	2025 (~3 weeks) 2026 (contingency)

3.4 Facility Layout and Description

This section provides a high-level overview of the facility and associated infrastructure, as relevant to consideration of the environmental risks and impacts of the Petroleum Activities Program.

3.4.1 Pluto Alpha Topsides

The riser platform topsides comprise five decks separated by two major vertical trusses (Figure 3-2). A pedestal crane is located on the northeast end of the facility. The flare boom is inclined and located

at the northern end of the facility (Figure 3-3). A PWH has been installed on the western side of the riser platform. The helideck is located above the southern corner. Figure 3-3 and Figure 3-4 show the riser platform topsides layout and layout of the PWH respectively.

Other facilities include pig launchers and receivers for the flowlines and export pipeline, vessels for handling pigging fluids, metering for inflow streams, chemical injection facilities (for monoethylene glycol (MEG), water clarifier and corrosion inhibitors), diesel power generators, emergency flare, pedestal crane, temporary waste storage, helideck, bunkering facility, telecommunications, monitoring, control and safety systems and marine navigational aids.

Power generation infrastructure was upgraded during installation of the PWH. This included installation of a gas engine generator as a new main source of power on PLA, commissioning in 2023. Two diesel engine generators are on the platform for backup power generation.

Chemical storage and injection facilities (corrosion inhibitors and water clarifier) are also part of the PWH. Although the riser platform is NNC, permanently installed accommodation facilities are provided on the southern end of the topsides to accommodate personnel required for campaign maintenance, significant modifications and pigging activities. The potential environmental impacts from planned and unplanned activities are discussed in Section 6.

Figure 3-2: Photograph of the Pluto Alpha riser platform

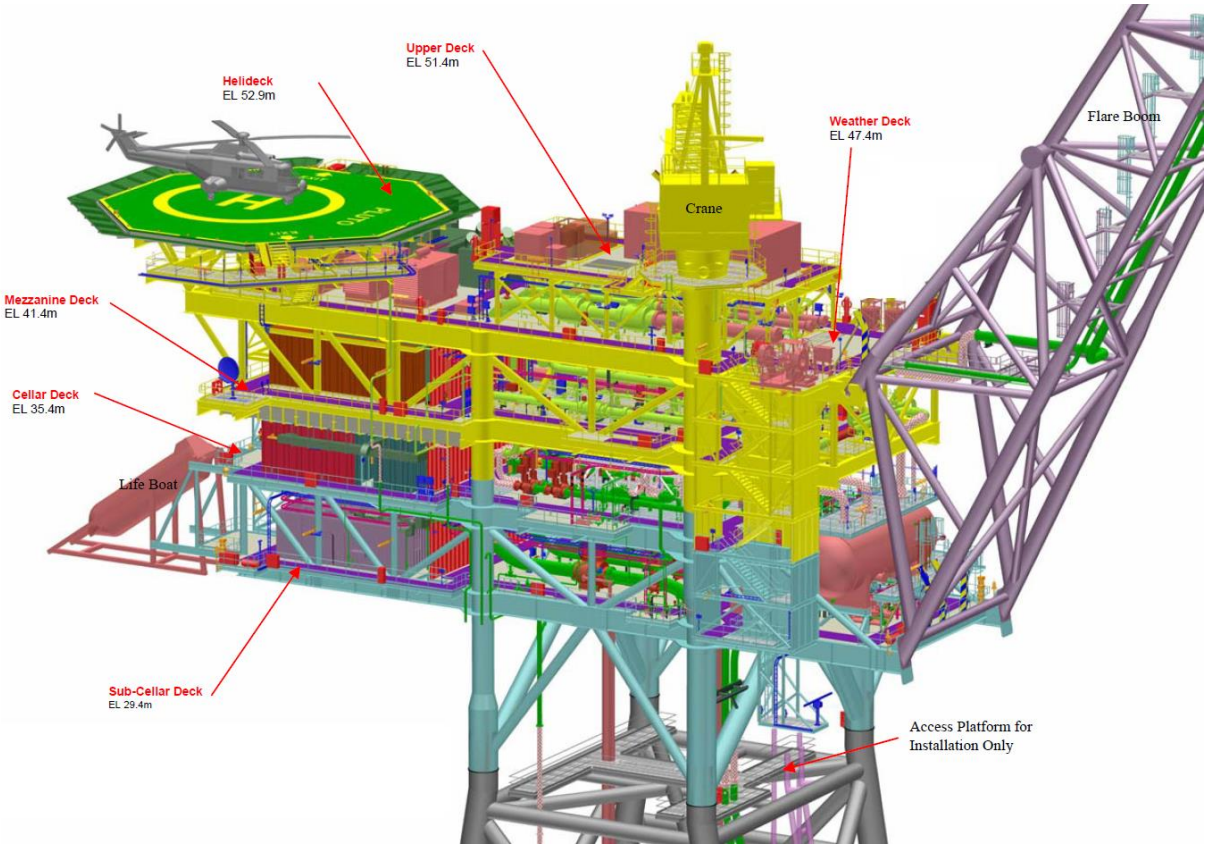


Figure 3-3: Pluto Alpha facility platform layout

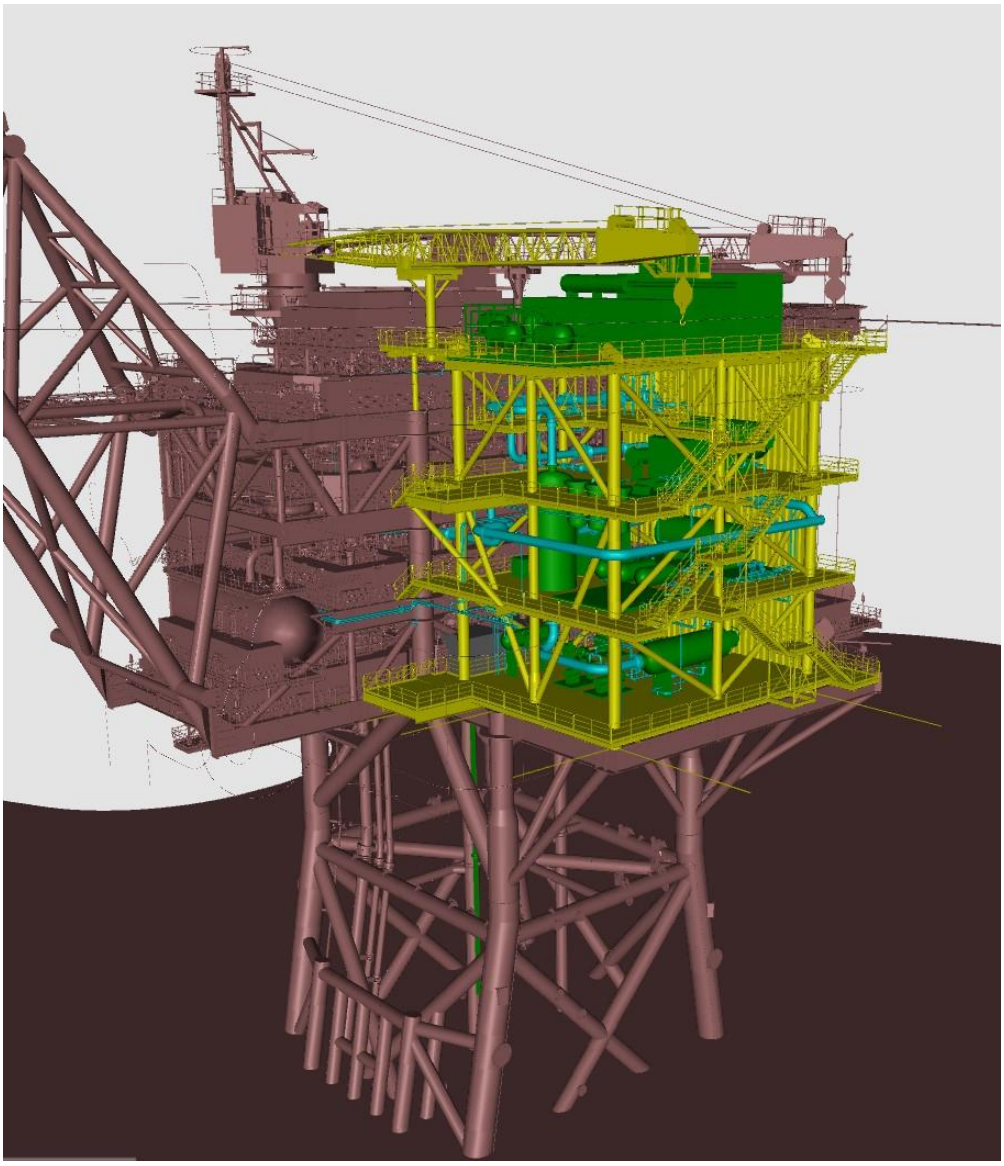


Figure 3-4: Pluto Alpha water handling module layout

3.4.2 Wells and Reservoirs

3.4.2.1 Pluto Wells

Gas and condensate from the Pluto reservoir are currently produced through eight big bore gas production wells (PLA01–07 which are configured in a cluster arrangement around a central manifold at the drill centre (Figure 3-5). PL-PYA02, located separately, also produces from Pluto reservoir (refer Section 3.4.2.3). The primary reservoir isolations are provided by the actuated valves within the tree, and a down-hole surface controlled sub-surface safety valve (SCSSV) is included in the well design as emergency barrier in the event of tree/wellhead catastrophic failure. The wells are completed with a subsea tree system. An additional well (PLA08), is proposed to commence production in Q2 2025.

3.4.2.2 Xena Wells

Condensate and gas from the Xena reservoir are currently produced through two gas production wells (XNA01 and XNA02). The wells are independently isolated and controlled via a spur tie-in to

the existing Pluto electro-hydraulic umbilical, located close to the existing tee locations. MEG and other chemicals as required are distributed to the wells via a dedicated flowline between an existing MEG pipeline end termination (PLET) on the chemical supply line. The existing wells are completed with a subsea tree system, similar to those installed on the Pluto wells. The primary reservoir isolations are provided by the actuated valves within the tree, and a down hole SCSSV is included in the well design as emergency barrier in the event of tree/wellhead catastrophic failure.

An additional infill well from the Xena reservoir (Xena-03) is proposed to be operated during the life of this EP.

3.4.2.3 Pyxis Wells

Condensate and gas from the Pyxis reservoir are produced through one gas production well (PYA01), approximately 25 km north north-east of the existing Pluto A flow line tie-in. PL-PYA02 exploits the Pluto gas field but is considered part of the Pyxis development. Pyxis wells combine in the Pyxis manifold and connect through to the XNA Manifold via a 12-inch flexible flowline.

The wells are independently isolated and controlled via a spur tie-in to the existing Pluto electro-hydraulic umbilical, located close to the existing tee locations (Figure 3-5). MEG and other chemicals are distributed to the well via a new integrated service umbilical supplied from an existing MEG PLET on the chemical supply line. The wells were completed with a subsea tree system, similar to those installed on the Pluto wells. The primary reservoir isolations are provided by the actuated valves within the tree, and a down-hole SCSSV is included in the well design as emergency barrier in the event of tree/wellhead catastrophic failure.

3.4.3 Flowline and Riser System

Two production flowlines connect the subsea production system to the PLA platform. Production from the Pluto wells is selectively directed from the Pluto central manifold into either Flowline A or Flowline B, via Flowline Termination Assemblies and a pigging manifold. The flowlines are routed approximately 27 km through dual 20-inch flowlines with an adjacent chemical supply line, up the continental slope to the riser platform (Figure 3-5).

The wells XNA-02 and proposed Xena-03 connect to production flowlines (currently Flowline A) via the Pyxis hub subsea infrastructure of:

- Well jumpers to the XNA manifold
- flexible production jumper
- mid-line connector system (MLCS-A) to the existing flowline tee

The Pyxis development wells are connected to the production flowlines via the subsea infrastructure of:

- PYX and XNA manifolds and an approximately 25 km connecting flexible flowline up to 12-inch
- Well connection flowlines (8-inch and 10-inch) to PYX manifold
- an 8-inch flexible production jumper from the flowline end terminal to existing MLCS-A and Pluto flowline A in-line tee.

XNA-01 connects to MLCS-B, and tee into Flowline B.

The flowlines are configured as loops to allow round trip pigging of the flowlines from either end, with flowline pig launcher/receivers installed on the topsides. The flowlines and subsea system are sized to match the peak offtake rate required by the onshore LNG plant.

3.4.4 Wet Flowline Conversions

To segregate wet wells for processing through the PWH, Flowline B may need to be converted between dry flowline mode and wet flowline mode. Prior to flowline pigging operations (approximately four-yearly) and in case of infrequent planned/proactive shutdown management, the flowline may be required to be converted between wet and dry flowline modes to treat the flowline with MEG for integrity management and prevent hydrate blockages. Upon restart, the flowline is required to be converted from dry flowline mode back to wet flowline mode. As part of this, up to 52 tonnes of diluted MEG will be displaced from the flowlines and wells, which will enter the water treatment process on the facility and be discharged overboard.

If the wet flowline is shut down, MEG is required to be dosed into in each wet well (~1.6 tonnes) and uninsulated sections of the flowlines subsea (14 tonnes) which will be displaced to the separation and PW treatment process on the facility and discharged overboard.

3.4.5 Pipeline and 6-inch Chemical Supply Line

Gas, condensate and other fluids (process chemicals and produced water) are currently transported from the riser platform to the LNG Plant via a 36-inch pipeline. The pipeline is carbon steel, 36-inch in outside diameter and is corrosion and concrete weight coated. The design and operating parameters for the pipeline and 6-inch chemical supply line are detailed in Table 3-4 and Table 3-5 respectively. Flow assurance is aided by the supply of MEG and other process chemicals in small concentrations (including corrosion inhibitor, biocide, oxygen scavenger, scale inhibitor, etc.) as required to protect the integrity of the pipeline. These chemicals are supplied from onshore storage and MEG regeneration infrastructure and pumped via the 6-inch chemical supply line piggy-backed to the pipeline from onshore to the riser platform. MEG, containing supporting chemicals are then supplied from the riser platform to the wells via a 4-inch chemical supply line.

The offshore gas pipeline and 6-inch chemical supply line route between the shore and the facility is approximately 180 km in length with a shore crossing at Holden Point, just north of the Pluto export jetty. The portion of the pipeline in State waters is not included in the scope of this EP. The offshore pipeline route is shown in Figure 3-1.

Table 3-4: 36-inch Pluto Export Pipeline Design and Operating Parameters

Description	Details
Length	180.94 km (total)
Diameter, external	914 mm from KP -0 KP 180
Wall thickness: Riser Spool pieces and 500m PSZ Pipeline outside of the areas above	 28.6 mm 26.7 mm 24.0 mm
Protective coating specification (Temp <60°C) Pipeline: Riser: Above Water Tie-In and Laydown sections:	 Asphalt Enamel Subsea: System 13B (high build, high solids epoxy) Splash zone: Polychloroprene Top section: System 11A (2 coats of Epoxy Phenolic) FBE (1 joint)
Weight Coating: Material Density Thickness	Concrete (on BE coated sections and at the slope crossing 3040 - 3400 kg/m^3 45 – 120 mm

Pipe steel specifications (pipeline and riser) Material Type: Material Standard: Material Grade:	 Carbon Steel DNV-OS-F101 Grade 450 (X65)
Design pressure and temperature Pressure: Inlet Temperature[11]	 142 barg (@+47m LAT) Max: 60°C / Min: -10°C
Design capacity[12]	1710 MMscfd total wet raw gas equivalent
Minimum Operating Pressure[13]	25 barg at LAT +61m
Cathodic Protection (CP): Pipeline, spool pieces and riser)	 Sacrificial bracelet anodes (Al-Zn-In).
Design Life	35 years
Associated pipeline infrastructure	The pipeline system contains one 36” NRV (swing check valve) and a 36” ROV operated ball valve near the platform location. These valves are installed in an assembly that provides resistance to dropped objects and snag loads and supports the 6” MEG supply line. Pipeline support systems include concrete mattresses and gravity anchors in applicable locations such as pipeline crossings.

Table 3-5: 6-inch Chemical Line Design and Operating Parameters

Description	Details
Length	180.94 km (total)
Diameter, external (all sections)	168.3 mm from KP -0 KP 180
Wall thickness: Riser Spool pieces and 500m PSZ Pipeline outside of the areas above	 14.3 mm 14.3 mm 10.3 to 12.7 mm
Protective coating specification Pipeline: Riser: Above Water Tie-In and Laydown sections:	 3-layer Polypropylene Subsea: System 13B (high build, high solids epoxy) Splash zone: Polychloroprene Top section: System 11A (2 coats of Epoxy Phenolic) FBE (1 joint)
Pipe steel specifications (pipeline and riser) Material Type: Material Standard: Material Grade:	 Carbon Steel ISO 3183-3 (API 5L) L 450 MC (X65)

[11] Maximum operating temperature is at riser inlet. The maximum sustained temperature for corrosion design for the export trunkline is 45°C.
[12] As per Pluto Alpha Facility Safety Case.
[13] For the pipeline, the minimum normal operating pressure will occur when there is full onshore/LNG trains shutdown followed by the onshore plant continuing to draw low rates of fuel gas from the pipeline. The pressure in this condition is equivalent to 25 barg. The minimum internal pressure in the export trunkline under normal operating conditions is 65 barg (i.e. the minimum slug catcher pressure)

Design pressure and temperature Pressure: Inlet Temperature	 34.5 MPag (@+61m LAT) Max: 60°C, Min: 0°C
Design capacity	3,000 bpd lean MEG
Cathodic Protection (CP):	Continuity straps installed on the 6-inch chemical line at all locations where sacrificial bracelets are installed on the pipeline
Design Life	35 years
Associated pipeline infrastructure	On bottom stability achieved using piggyback attachment of 6-inch chemical line onto the trunkline or rock dump.

3.4.6 Subsea Infrastructure

The scope of this EP includes all subsea infrastructure associated with facility. The main components of subsea infrastructure include wells, xmas trees, umbilicals, spools, jumpers, manifolds, flowlines, riser, chemical supply lines and the export pipeline. The layout of existing and proposed subsea infrastructure is shown in Figure 3-5.

The subsea system is remotely operated via satellite links and includes:

- rigid spools transporting hydrocarbons from the wells to the manifold/MLCS where the fluids flow through the 20-inch flowlines to the riser platform for onwards processing at the onshore facility
- jumpers and umbilicals, which provide hydraulic and electric power, communications and chemical supplies
- valves, which control subsea operations and processes
- chokes, which control pressure and flow rates of hydrocarbon
- subsea control module (SCM), which contains sealed and pressure-compensated electro-hydraulic units (typically found on manifold and/or wellheads) and links the surface and subsea controls.

Emergency shutdown (ESD) valves exist at various locations in the offshore facilities, including at the top of each flowline and pipeline risers to the riser platform. A non-return valve (NRV) is also provided on the 36-inch pipeline close to the riser platform as an emergency barrier to reduce the potential for uncontrolled backflow from the pipeline to the riser platform. A number of subsea valves may also be overridden manually from either a remotely operated vehicle (ROV) or by divers.

3.4.6.1 Flowlines Interactions

The following facilities and equipment are near the Pluto flowlines:

- The 44-inch Wheatstone pipeline was installed in 2014 and crosses the Pluto flowlines at approximately KP 19.1. It also crosses the 4-inch MEG line and subsea umbilical.
- The 18-inch Julimar and Brunello flowlines were also installed over the Pluto flowlines, 4-inch MEG line and subsea umbilical crossing at flowline KP21 in 2014.
- The Scarborough 36-inch trunkline (under construction) crosses both Pluto flowlines and MEG/umbilical lines in 152 m water depth, and the Scarborough trunkline 32-inch section crosses the Pyxis flexible flowline in 1007 m water depth.

The design of the crossings ensures the safety and integrity of any new infrastructure can be assured over its design life while not compromising the safety, integrity and operability of the existing facilities.

3.4.6.2 Export Pipeline Interactions

Connected on each side of the Pluto Export Pipeline are the PLA platform and the Pluto LNG Park. The following facilities and equipment are also in the vicinity of the Commonwealth waters section of the Pluto Export Pipeline:

- A 36-inch export pipeline runs adjacent to the 40-inch 1TL within Mermaid Sound (for ~40 km).
- The 36-inch Scarborough Trunkline runs adjacent to the Pluto 36-inch export pipeline from the shore crossing in Mermaid Sound for approximately 161 km.
- The 16-inch Reindeer gas pipeline crosses at KP 75.

3.4.6.2.1 Reindeer Pipeline Crossing

The Santos Reindeer pipeline was installed in late 2010 and crosses the 36-inch pipeline and 6-inch MEG pipeline at KP 75. The design of the Reindeer crossing incorporates sufficient stabilisation of the pipelines, sufficient clearance and was subject to independent validation by DNV.

3.4.6.2.2 Submarine Communications Infrastructure Crossing

The Chevron fibre optic cable to the Wheatstone platform intersects the Export Trunkline Operational Area twice. The fibre optic cable crosses the Pluto trunkline at KP 136 and 150.

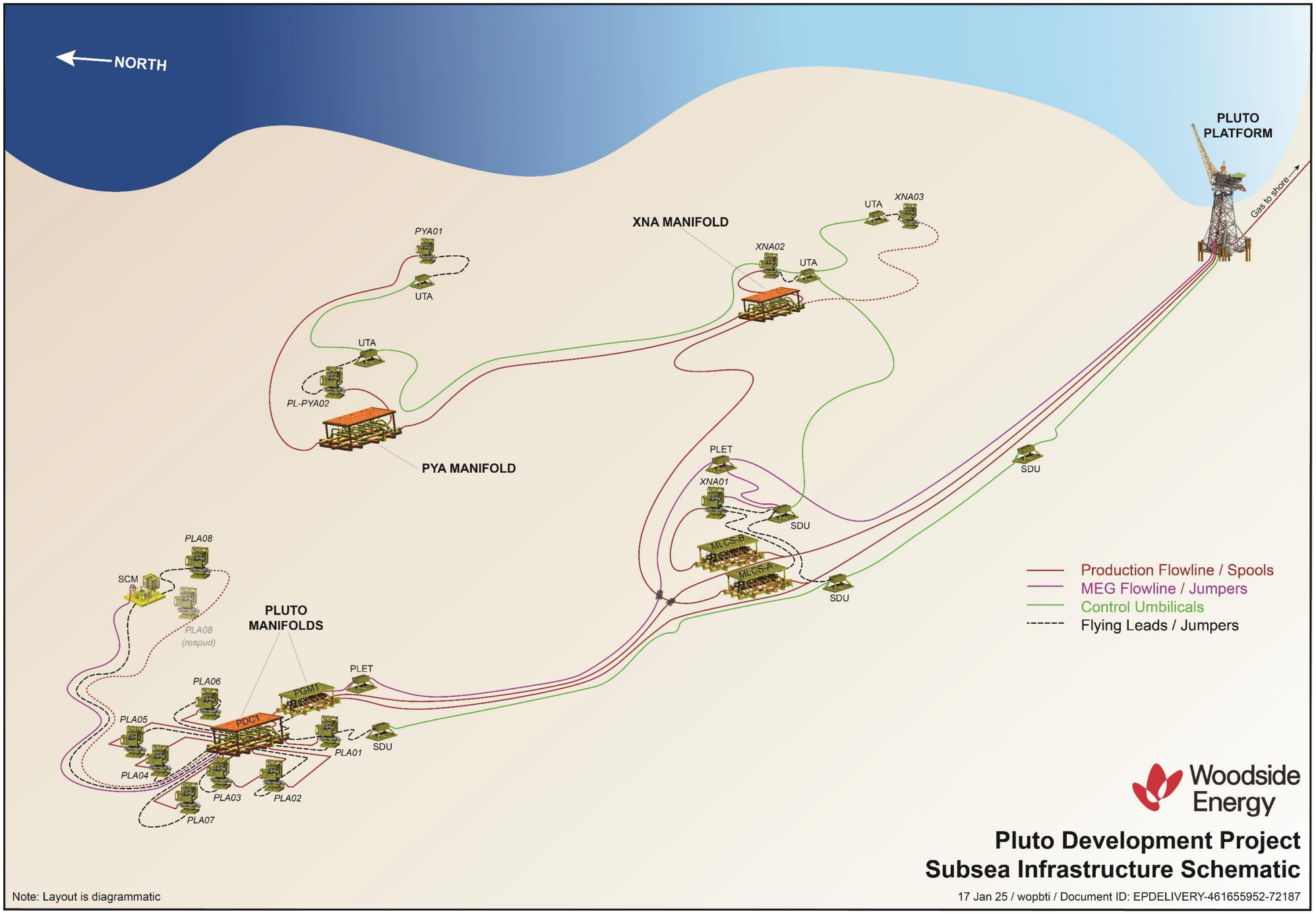


Figure 3-5: Layout of the Pluto facility subsea infrastructure

3.4.7 Field Inventory

The layout of the Pluto subsea infrastructure, including location of the fields, is shown in Figure 3-5 and described in Table 3-6.

Table 3-6: Inventory of subsea wells and key infrastructure, including status

Infrastructure[1]	Status[2]	Decommissioning Planning
Pluto		
7 wells, 2 active pipe support, 2 flowline termination assemblies, 2 manifolds, 7 SDU, 3 PLETs	Maintained for production	Section 7.5
17 rigid spools (2 x 6", 7 x 8", 2 x 14", 4 x 20", 2 x 36"; total length ~2.0 km), 5 flowlines (2 x 4", 1 x 6", 2 x 20"; total length ~263 km), 1 36" trunkline (~181 km)	Maintained for production	
5 umbilicals (total length ~28 km), 25 flying leads, 65 jumpers	Maintained for production	
1 well (PL08), 1 SCM control skid, 2 8" flowlines (total length ~433 m), 10 jumpers	To be commissioned	
Pyxis		
2 wells, 1 manifold, 2 SDU/UTAs	Maintained for production	Section 7.5
3 flowlines (1 x 8", 1 x 10", 1 x 12"; total length ~22 km)	Maintained for production	
2 umbilicals (total length ~21 km), 11 jumpers	Maintained for production	
Xena (existing)		
2 wells, 3 manifolds, 3 SDUs, 1 skid sensor	Maintained for production	Section 7.5
2 8" rigid spools of total length ~800 m, 3 flowlines (2 x 8", 1 x 10"; total length ~1.8 km)	Maintained for production	
1 umbilical (~1.4 km), 29 jumpers	Maintained for production	
1 jumper	Maintained for decommissioning	
Xena-03 (proposed)		
1 well, 2 UTAs	To be installed	Section 7.5
1 10" flowline (~3.0 km)	To be installed	
1 umbilical (~2.2 km), 6 jumpers	To be installed	

[1] Inventory of subsea infrastructure in the title areas or proposed to be installed in the title areas at time of submission of this EP.

[2] Status at time of submission of this EP.

The subsea infrastructure is recorded and tracked using a database. This database is updated as equipment is brought into title, which may include new or replacement equipment. Remotely operated vehicle (ROV) as-found, and as-left surveys are undertaken to identify the location of items placed on the seabed. At the completion of an IMMR campaign, this data is used to update the inventory for the title. Material items dropped to the marine environment and not recovered are added to the inventory for the title.

The subsea system has been designed, fabricated and installed in accordance with best practice and international standards. The pipelines, flowlines and wells are marked on nautical charts. Decommissioning planning is done for infrastructure no longer in use**.**

3.5 Operational Details

This section describes the main operations associated with the facility. It includes key elements in relation to interaction between the activity and the environment, described under the headings of:

- Process Description (Section 3.5.4)
- Utility Systems (Section 3.6)
- Facility Operations (Section 3.7)
- Support Vessel Operations (Section 3.8).

The facility is designed to operate without operator intervention. Normal operations are controlled remotely via satellite links from the Pluto Remote Operations Centre (PROC). Activities that require crewing are:

- engineering projects
- campaign maintenance
- unplanned corrective (breakdown) maintenance
- inspections/audits
- planned facility shutdowns.

Operations fall under any one of the modes of operation of:

- production remote operations
- major projects
- maintenance, including subsea inspection, maintenance, monitoring and repair (IMMR) activities
- well maintenance.

These modes of operation are described below. Production, maintenance and project activities may occur concurrently.

3.5.1 Production Remote Operations

The platform is designed to be operated with minimal/NNC crewing and is remotely operated, monitored, controlled, restarted and diagnosed from the central control room (CCR), either from the central control room at Pluto LNG Park or remote central control room in Perth.

The process control system for the facility provides the monitoring and control functions of:

- basic monitoring of key performance indicators
- adjustment of devices on the facility such as control valves, pumps, and variable speed drives
- alarm signals
- automatic management of duty/standby and lead/lag equipment.

3.5.2 Major Projects

Major projects involve refurbishment, modification or major maintenance on the facility. The Projects function is responsible for undertaking these projects. Potential environmental impacts related to projects are managed through the process outlined in Section 7.2.8.

3.5.3 Maintenance including Inspection, Monitoring, Maintenance and Repair Subsea Activities

Inspection, monitoring, maintenance and repairs, including those undertaken subsea, are intended to maintain safe and sustainable production within the platform.

Maintenance teams routinely visit the facility for:

- planned maintenance campaigns undertaken during routine interventions; campaigns typically last for 15 days, with ten campaigns planned per year
- unplanned corrective (breakdown) maintenance, as required
- shutdown maintenance
- pigging of the pipeline/flowlines for sand and debris removal, liquid management, inline inspection, well clean up and hydrate remediation; the frequency of pigging operations is defined in Pluto Pipeline System Inspection, Monitoring and Maintenance (IMM) Plan
- contingent crewing on the riser platform involving continuous manning for campaign periods to address low probability equipment failures, operational issues or major projects, such as maintenance of the PWH.

The specific team sizes deployed to the facility are based on maintenance requirements, helicopter carrying capacity, availability of accommodation and safety considerations.

When the facility is crewed, primary operation is retained by the PROC, with personnel on the Pluto facility communicating with the PROC. Operational control of equipment is handed to ‘local control’ on the facility on an as-required basis.

3.5.4 Process and Production Description

The riser platform receives well fluids (gas, condensate, associated produced water and other fluids such as process chemicals) from the Pluto, Xena and Pyxis production wells. The facility then exports gas and condensate from the riser platform via the pipeline to the onshore gas plant for processing. With the installation of PWH, the facility has the ability to separate and discharge PW. The riser platform also receives chemicals from the 6-inch chemical supply line, and transports these to the wells via the 4-inch chemical supply flowlines.

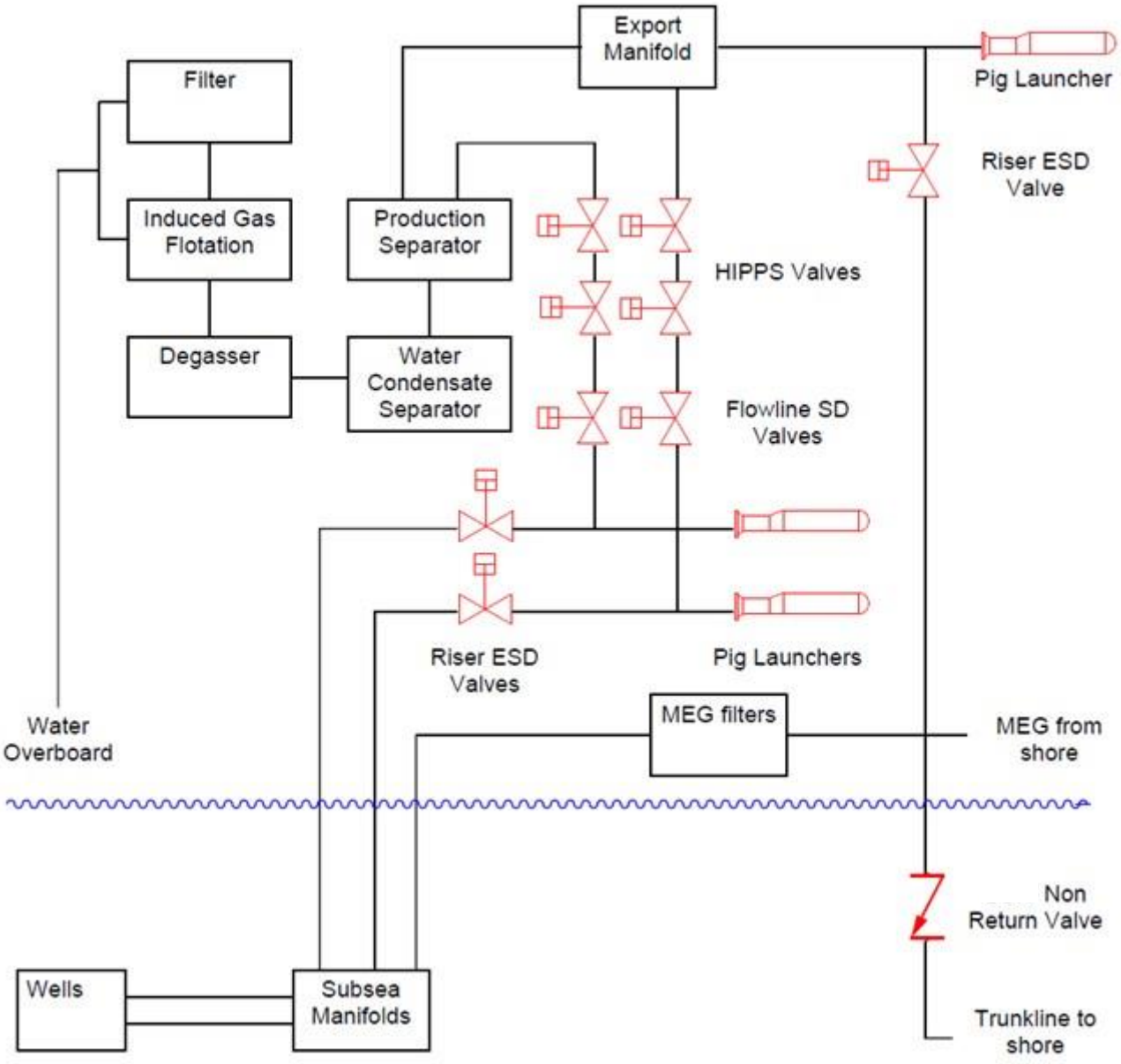


Figure 3-6: High-level Process flow diagram

3.5.5 Produced Water System

Produced water (PW) is brought to the surface from the reservoirs. Each well has a varying amount of PW that is brought to the surface and this changes over time. Due to the expected increase in volumes of PW to be brought to the surface, a PW treatment and disposal system is required on the Pluto facility. Woodside installed a PWH on the riser platform to treat PW. Commissioning of the PWH and associated PW discharge system commenced in 2024, with intermittent operation, and limited produced water rates observed to date (typically <100 m^3/day). The maximum design case for water treatment is 3500 m^3/day. The rate of PW is dependent on the number of wells producing water and their associated flowrate. Prior to reaching elevated discharge rates, there will be initial stages where there will be a no overboard discharge of produced water ('dry mode') as well as periods of low water discharge rates where small volumes of condensed water are continually produced with intervals of short term higher flow produced water. Expected system operating scenarios during production are described as:

- No PW discharge - with production to trunkline system, and PWH module offline or in bypass.
- Low PW flow rates - averaging approximately 100 m^3/d, fluctuating typically between 20 m^3/day – 200 m^3/day. This may increase as wells cut water.
- Elevated PW flow rates established - expected to average approximately 800 m^3/day but may extend up to design capacity 3,500 m^3/day.

The PWH includes a two-phase production separator, water condensate' separator, degasser and a secondary horizontal induced gas floatation (HIGF) vessel, to aid oil in water (OIW) separation. To safeguard from excursions or process upsets, coalescing filters have been installed prior to the end of the process for intermittent use, where OIW concentrations from the HIGF outlet do not meet the required specification for overboard discharge. The filters are in place to manage high OIW without process disruption. They are not suitable for permanent use as the platform is NNC, as described in Section 6.7.7.

3.5.5.1 Produced Water Treatment System

The PWH has a treatment system that directs all wet production fluids through a two-phase production separator and water condensate separator to the PW system, which operates at a low pressure to maximise the removal of dissolved gas. The treatment system consists of a degasser which separates dissolved gas followed by a HIGF unit, which distributes small gas bubbles through the PW in the vessel to enhance OIW separation. In this process, oil and fine solids particles present in the water adhere to the gas bubbles and float to the surface where they are skimmed off as a reject stream to the oily water separator (OWS). PW is then discharged overboard in accordance with OIW monitoring requirements above the water line at +8 m LAT.

If water exiting the HIGF exceeds discharge limits due to excursion or process upset, the water can be routed through a set of coalescing filters for further treatment prior to being discharged overboard. This mitigation stage has been provided to minimise the requirement for reactive platform visits (increased safety risk) in the event of a process upset or excursion of produced water and will allow remote troubleshooting of the process, while maintaining the oil in water specification within operational discharge limits.

The water treatment system includes provision for injection of water clarifier chemical injection if increased efficiency in OIW separation is required. Contingency for demulsifier chemical injection upstream of the inlet separator has also been provided. Use of either is circumstantial based on engineering/operations judgement. In addition, the PW stream can also be routed via coalescing filters, which can be used in upset or non-routine scenarios to reduce OIW concentrations.

Reject streams with residual condensate from the degasser, HIGF and coalescing filters flow to the oily water separator (OWS). Separated condensate is pumped to the pipeline and water is routed back to the main PW stream either upstream of the PW pumps or upstream of the HIGF. The evolved gas from the degasser and HIGF is routed to the flare; the flowrate will be proportional to the PW rate. Water from the OWS can also be comingled with produced water pump discharge (downstream of filters) and discharged overboard. At very low flow rates PW may also be routed back to the trunkline from the PWH.

3.5.5.2 Produced Water Discharge Oil in Water Monitoring

The measurement of OIW in the PW stream is undertaken prior to discharge to the ocean. OIW is measured using online OIW analysers. The analysers are designed specifically for offshore operations and reports total petroleum hydrocarbons (TPH), where TPH is defined as all hydrocarbons that are soluble in the extraction solution and are present in the solvent extract after filtration through Florisil. Two OIW analysers are installed on the module, designed to provide redundancy in case of instrument failure with one analyser at a time selected for process surveillance.

As part of PWH module design, Woodside assessed suitable OIW analyser technologies. Lessons from other Woodside assets were also heeded. The application of the analyser in a low aromatic, gas condensate field like Pluto has been verified with other operators of the selected analyser technology.

Manual sampling and TPH analysis (via offshore-deployed or onshore-laboratory) may be utilised during crewed periods to support produced water system optimisation, calibration activities and in case of equipment outages.

3.5.5.3 Produced Water Discharge Monitoring

PW discharge on the facility is managed in accordance with the Offshore Marine Discharges Adaptive Management Plan (OMDAMP (Section 7.2.3)). This plan has been developed to detail the disposal of routine marine discharges from Woodside's offshore production facilities in accordance with Woodside's Environmental Performance Procedure. Implementation of the plan also verifies the discharges are managed in a way that reduces the potential environmental risks and impacts to ALARP.

In addition to continuous OIW monitoring, PW discharge monitoring includes routine chemical characterisation and ecotoxicity assessments of the PW. This information, combined with dilution modelling is used so that the discharge of PW is in accordance with the required standards outlined in Section 6.7.7. Refer to Section 6.7.7 for a detailed discussion and ALARP justification regarding PW discharge from the Pluto facility.

3.5.6 Utility Gas and Flare System

The riser platform currently has a combined high-pressure flare and utility gas system. A schematic showing the utility gas and flare system is presented in Figure 3-7. With the PWH installed, fuel gas is the primary fuel source for the gas engine. The fuel gas conditioning facilities (filtering and super heating) are part of the module.

Utility gas is required:

- for continuous purging of the flare header to prevent air ingress
- to supply pilot gas for the flare tip pilots
- to supply to the induced gas floatation unit for gas injection to maximise oil in water separation.

The flare system safely collects, contains and disposes relief, blowdown and vent flows from the topsides (pressure safety valves, manual and automatic blowdowns). A flare header collects relieved, entrained or condensed liquids and routes them into a knock-out drum. Liquids in the drum are periodically pumped into the export pipeline. The vapour flows via a riser, mounted on a cantilever boom to the elevated flare tip for burning.

The PWH introduces additional process waste streams directed to the flare including the degasser, induced gas floatation vessel and oily water separation tank.

The flare system is provided with igniters within each of the three wind-shielded flare pilots, each of which can be remotely operated via DCS or manually at the igniter-panel to ensure re-ignition in the unlikely event of flare flame out. Flare flame monitoring is via visual and/or thermal infrared closed circuit TV (CCTV) cameras which are displayed on the main screens within the CCR.

The utility gas system is equipped with a meter that records total utility gas used and a meter that detects the volume of gas purging the flare. Remote operational monitoring of the flare system is in place via:

- flare gas flow metering
- monitoring of the utility gas pressure (with back-up systems activating on low pressure)

- CCTV with thermal infrared view for visual checks

The flare system allows for sustained flaring up to 100 MMscfd, when the flowlines are pigged or in the event depressurisation of the flowlines is necessary.

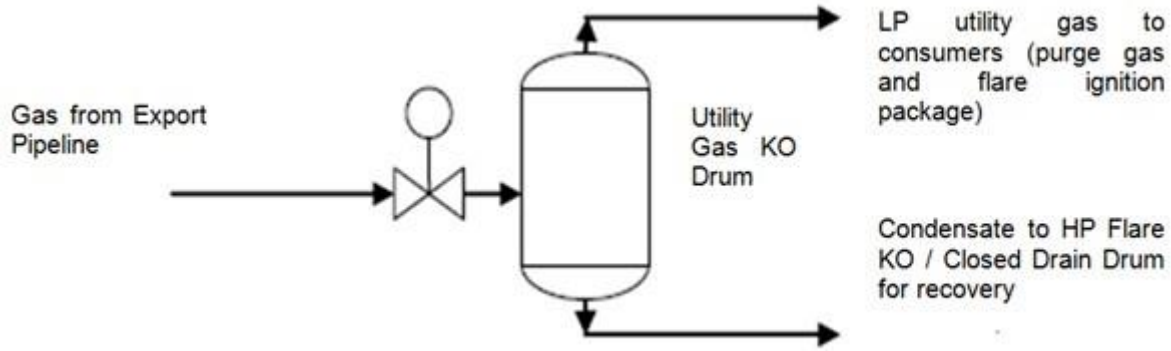


Figure 3-7: Riser platform utility gas system

3.5.7 Drainage Systems

The open and closed drains system consists of both hazardous and non-hazardous open drains. The open drains system is required for disposal of water and hydrocarbons, which are at atmospheric pressure (e.g., deck water). Drains from hazardous areas are totally segregated from drains from non-hazardous areas, to prevent ingress of gases into a non-hazardous area via the drains system.

3.5.7.1 Closed Drains

The closed drain system is designed to safely collect, contain and recycle depressurised hydrocarbons, chemicals and other liquids from normally pressurized and hazardous equipment and is fully contained. The drained liquids are routed to the flare knock-out drum during normal operations and then pumped into the export pipeline for transfer to shore.

3.5.7.2 Hazardous Open Drains

The hazardous open drains system collects non-pressurised spillage, overflows, contaminated deck wash-down and some rainwater from the open drain boxes, tundishes and equipment drip trays in areas designated as hazardous. The PLA hazardous open drains flow to the hazardous open drains collection tank (working volume 11.6 m^3) when the facility is crewed, and work is being undertaken in the area. Areas of the facility have secondary spill protection (bunding) depending on the location, protection and spill risk of each component of the facility to contain and direct flows to the hazardous open drains system.

The hazardous open drains collection tanks are periodically pumped to a waste oil storage tank (capacity 4 m^3) then transported onshore for disposal. The transfer of liquids from the collection tanks to the waste oil storage tank is a manual operation only undertaken while the facility is crewed.

The collection tanks are provided with a submerged centrifugal pump to transfer liquids from the tank at the sub-cellar deck to the waste oil storage tank located in a bunded area on the upper deck.

As part of installation of the PWH to the facility in 2023, an additional open drains collection tank (working volume 10.7 m^3) was added below the sub cellar deck of the module, designed to contain spillage (such as during chemical decant), leakage or washdown during maintenance activities on the module. Pump-out from the module open drain collection tank can be remotely operated to decant to the PLA open drain collection tank, if required, or transferred directly during crewed activities for disposal onshore via the waste oil storage tank.

3.5.7.3 Non-hazardous Open Drains

The non-hazardous area open drains system collects liquids from open drain boxes, tundishes and equipment drip trays in areas designated as non-hazardous. It is segregated from all other drainage systems to eliminate the risk of hydrocarbon vapour transmission from hazardous to non-hazardous areas. Drains from the diesel generator bunds/tanks are part of the non-hazardous area open drains system. Water and any contamination are routed to the non-hazardous area open drains collection tank. This tank is sized for containing in excess of the full volume from a diesel generator day tank and has a working volume of 2 m^3 (with max capacity of 2.6 m^3).

The collected liquids are manually drained to the hazardous area open drains collection tank during every facility campaign maintenance visit (if it contains any liquid) so that the full working volume of the non-hazardous area collection tank is available for spill capture.

3.6 Utility Systems

3.6.1 Platform Lighting

The riser platform has appropriate lighting for there to be a safe working environment during 24-hour operations. Lighting is split between emergency and normal lighting. The emergency light fittings have been located to illuminate the designated escape routes on the facility. Navigational lights are located on the riser platform flare tower and on the booms and towers of the pedestal crane. Helideck lighting is also provided to assist helicopter landing.

Unless required to support over the side activities (such as bunkering and lifting operations), lighting on the facility is directed to the work area when crewed, which limits light spill to the marine environment.

3.6.2 Heating, Ventilation and Air Conditioning System

The heating, ventilation and air conditioning (HVAC) system comprises HVAC equipment, ductwork and associated pipework. It provides independent and interdependent sub-systems with pressurised, conditioned, purge and exhaust air services to all living to various areas including accommodation and various modules which can be operated on an as required basis or continuous basis.

3.6.3 Potable Water

Commercially supplied water from onshore is provided for drinking and domestic use on the riser platform, which is bunkered by support vessels and transferred into a storage tank. The service water passes through a UV disinfection unit to ensure water quality for users.

3.6.4 Monoethylene Glycol System

Lean MEG is filtered onshore, then transferred to the riser platform via the 6-inch subsea chemical supply line. The lean MEG concentration is selected as 90% by weight, which is the optimum concentration to maximise capacity of the distribution system. The topsides arrival pressure of the MEG from the 6-inch chemical supply line is 22 Mpa(g) under normal operations. Once on the riser platform, the MEG is again filtered and distributed to the Pluto/Xena/Pyxis wells via the 4-inch chemical supply line. The MEG flow is controlled by manual adjustments in subsea injection chokes, which are controlled via the PROC.

MEG ensures the water in the flowlines is inhibited against hydrates. Other chemicals, such as corrosion inhibitors, biocides, oxygen scavengers, and scale inhibitors, may be mixed with the MEG to aid in integrity and asset protection. These chemicals are injected into the wells in dilute concentrations as required for technical requirements. Chemicals used on the riser platform are discussed further in Section 3.9.

Injected (rich) MEG normally flows back from the wells with the production fluids in the flowlines to the riser platform, then via the pipeline to the onshore processing facility. It is then separated from the production fluids and stored and regenerated at the onshore processing facility for re-use.

The size and capacity of the MEG supply lines are:

- six-inch chemical supply line (onshore to the riser platform) – 715 m³/day
- four-inch chemical supply line (riser platform to Pluto subsea manifolds) – 354 m³/day.

When MEG is required to be injected into the Wet flowline for hydrate management, this diluted MEG will be processed through the water processing module and discharged overboard via the PW discharge pipe, these volumes are limited and frequency intermittent as detailed in Section 3.5.5. Continuous low-rate MEG discharge to the flowlines and production system and PW discharge may be seen up to 2 m³/day associated with MEG injection bleed into the production system.

If required for intervention purposes, MEG or methanol may also be transferred onto the facility via iso-tanks to a 10 m³ storage vessel.

3.6.5 Power Generation

A gas engine generator provides continuous power during normal operations to systems including the utility gas pre-heater, PWH operations (e.g. pumps), maintaining charge in the uninterruptible power supply (UPS) batteries, and for lighting and navigational aids. Two diesel generators, each with a 240kW capacity, remain on the platform for backup and peak power generation. Peaks in demand also occur during flowline pigging, maintenance activities, and process upset and restart conditions. The generator tanks are located in a bunded area which drains into the non-hazardous open drains system (refer Section 3.5.7).

A grid stability module (GSM) is located on the PWH. The fundamental components of the GSM are a rectifier/inverter and a battery supply. The generators are integrated with a GSM to eliminate the requirement for a hot standby generator and increase fuel efficiency. The gas-fuelled generator is the preferred unit for operation. If fuel gas is not available, or the unit is unavailable, the other diesel units will be started. In the event of a generator trip, the GSM shall maintain the load with no breaks (i.e., seamless) during the transition to an alternate generator supply. When a generator supply is restored, the GSM shall re-commence charging. The generators and GSM are capable of online changeover, synchronisation and load sharing. For operations requiring additional power, one of the standby diesel generators is brought online.

3.6.6 Sewage and Putrescible Wastes

No sewage or putrescible wastes are produced from the riser platform during uncrewed periods. When the facility is crewed, the sanitary drainage system is a combined black and grey water system, with black and grey water discharged to the marine environment as untreated, un-macerated waste. Sewage is disposed via a dedicated overboard caisson. The caisson is a 300 mm carbon steel pipe that discharges at approximately 7.5 m below LAT. A rodding point is also provided at the top of the disposal caisson.

When the facility is crewed, putrescible waste (principally food scraps) is bagged and transported to shore for disposal as domestic waste, in accordance with the requirements of Woodside's Waste Management Plan for Offshore Facilities. During planned maintenance campaigns, shutdown maintenance or major projects additional crew will be present at the Pluto facility. During these times of increased personnel, an accommodation support vessel (ASV) may also be utilised on station to accommodate crew. Sewerage and putrescible discharges associated with the ASV are discussed in Section 3.8.3.

3.6.7 Sand Management

Subsea wells are equipped with downhole sand control (expandable sand screens or open hole gravel pack), acoustic sand detectors and erosion probe located on the subsea xmas trees. The facility basis of design assumes there is a low probability of sand production. Hence, any sand produced in normal operation should not cause any significant erosion or corrosion impact in the flowlines. In the event of sand production and depending on the mode of production (wet or dry), produced sand is expected to accumulate in the onshore facilities (dry mode) or PWH equipment (wet mode). Historical sampling at the facility has not detected any NORM contaminated equipment. Sand and other material (sludge, scale, etc) with the potential to be contaminated with NORMs is tested and disposed of in accordance with Woodside's Waste Management Plan for Offshore Facilities.

3.6.8 Diesel Fuel System

Low sulphur diesel is transferred to the riser platform in bulk from supply vessels via a hose reel located at the dedicated bunker station on the platform. Diesel is bunkered directly into the crane pedestal diesel bulk storage tank which has a maximum storage capacity of 80 m^3. Filters provided on the diesel inlet assist in preventing blockage of the tank level devices. Diesel is metered and distributed to users via a continuously pressurised ring main. Unused diesel is recycled back to the crane pedestal. The tank is equipped with level fall alarms and remote shut-off systems to allow shutdown of the system locally or from the PROC.

Diesel is required for:

- crane tank
- lifeboat tank
- diesel generators (back up to fuel gas).

3.6.9 Hydraulic Fluid System

The riser platform is provided with a hydraulic power unit (HPU) hydraulic fluid storage tank of 4 m^3 capacity. A glycol based hydraulic fluid is supplied to actuate valves on the topsides and subsea facilities including shutdown valves, blowdown valves, high integrity pressure protection system (HIPPS) valves, control valves and subsea xmas tree, surface-controlled sub surface safety valve and choke valves.

Hydraulic fluid is supplied in high- and low-pressure modes with two independent headers. A common production hydraulic power unit is located on the sub-cellar deck to provide both low pressure (LP) and HP hydraulic power for operation of both subsea and topsides valves. The topsides hydraulic system has a supply reservoir and a return reservoir (closed loop), four hydraulic supply pumps and a reservoir pump. Hydraulic fluid supplied to the subsea facilities is in an open-loop configuration, and each actuation of a valve will release a small quantity of the fluid at the SCM vent port. Chemical selection and use are detailed in Section 3.9.All safety critical valves are designed for fail safe operation, in the case of the HPU losing pressure (e.g., in the highly unlikely event of a major platform or umbilical failure).

The PWH has an independent closed loop topsides HPU located on the sub-cellar deck for supplying fluid power to the module actuated on/off valves and control valves with a total system capacity of 2 m^3 in the supply reservoir, with an additional 1 m^3 storage tank permanently connected to the HPU.

Hydraulic power is the only instrument utility available for motive power on the facility. If an activity requires the use of an air powered tool, then portable air compressors will be transported from shore as required. Maintenance of this equipment occurs onshore.

3.7 Facility Operations

3.7.1 Operational Flaring

Flaring is expected to occur during a range of operational circumstances; key operational flaring events are explained in further detail in the following sections. Annual internal facility flare targets are set based on operational activities planned for the year. This target is used to assess facility flare performance.

3.7.2 Normal Operations

A relatively small quantity of gas is required to be continuously flared associated with purge and pilot of the flare system and disposal of waste streams that are not suitable to be recovered to the process.

Continuous flows to the flare (estimated at design PW processing rates) are approximately 4000 tpa. Sources include:

- flare header purges
- flare pilot
- PW degasser
- PW induced gas floatation
- leakage past flare header values such as pressure safety valves (PSVs) and blowdown valves (BDVs)
- oily water separator tank.

3.7.3 Intermittent Process Upsets and Activities

During process upsets or blowdowns, the process control valves on the main process equipment open to relieve topsides system pressure to the flare. The following sources make up intermittent flaring.

3.7.3.1 Operational Pigging

Flaring to facilitate round-trip pigging of the flowlines is an integral part of operation of the facility and occurs as required (approximately once every four years). Produced gas is flared during flowline pigging operations, with liquids exiting the flowlines stored in the flare knock-out drum. Pipeline gas is used to propel the pig in the first half of the flowline loop. Well fluid is used to propel the pig in the second half of the flowline loop, with produced gas and liquids from flowline pigging directed to the pipeline.

The system is sized to flare at a rate of 100 MMscf per day gas during flowline pigging. Additionally, initial depressurisation of the flowlines to flare is required for approximately two hours prior to pig launch to reduce the flowline pressure sufficiently to successfully launch the pigs using pipeline pressure. Each pigging campaign requires three pigging runs each for gauging, cleaning and inspection. The pigging activity typically results in an additional 8,300 tonnes (approx.) in years that flowlines are pigged.

3.7.3.2 Emergency Blowdown

The topsides equipment and piping are divided into isolatable sections, each with a dedicated BDV. During an ESD, each section is separately depressurised to the flare. Each section contains actuated BDVs which allows blowdown of the riser platform inventory. The total volume depressurised is eight tonnes.

3.7.3.3 Manual Depressurisation

Manual depressurisations will result in intermittent flaring of hydrocarbons, triggered by routine equipment maintenance, planned ESD testing and/or depressurisation of equipment and piping to remove the equipment from service. Furthermore, equipment must be depressurised prior to draining as the closed drains system is not intended for high pressure service.

3.7.3.4 Subsea Flowline Depressurisation

The well fluid in the subsea flowlines (which carry hydrocarbons from the subsea wells to the riser platform) may on rare occasions need to be routed to the flare to allow the pressure in the flowlines to be reduced. Reasons the flowlines may require depressurisation are:

- for flowline hydrate management: depressuring must be completed prior to flowlines cooling to seabed temperature when the production system is offline
- over-pressurisation of flowlines above integrity limit
- leak-off testing of well or subsea isolation valves
- production flowline maintenance (if required)
- to facilitate remediation in the event of an unplanned hydrate blockage in the subsea equipment.

3.7.3.5 Estimated Flare Volumes

The amount of gas that may be flared on an annual basis is a dependent of continuous and intermittent process sources, planned activities requiring flaring, and potential unplanned process upsets. The estimated annual amount of gas flared (estimated at design PW processing rates) ranges between approximately 8,500 tpa and 16,800 tpa.

3.7.4 Greenhouse Gas Emissions

The main sources of greenhouse gas (GHG) emissions associated with Pluto production are shown in Table 3-7. GHG sources that are not part of the Pluto facility (e.g., from onshore processing emissions) are included for completeness. In the context of this EP, the emissions are classified as direct and indirect emissions.

Table 3-7: Direct and indirect greenhouse gas emissions sources from the Pluto facility and supply chain

Emission Type	Emissions Source	Location	Jurisdiction	Process
Direct	Pluto facility process	Offshore	Commonwealth	GHG emissions from fuel, flares, fugitives and process vents
Indirect	Support vessels (on charter)	Offshore	Commonwealth	GHG emissions from engines and fugitives on vessels
	Onshore processing*	Onshore	State (WA)	GHG emissions from venting reservoir CO2, combustion of gas as fuel, flares and fugitives associated with processing gas to products such as LNG, LPG, condensate and domestic gas
	Transport	Transit	Subject to consumer location	GHG emissions from transport of products to market, including regassification and distribution of LNG in customer markets
	Regassification, distribution and	Market	Subject to consumer location	GHG emissions from combustion of products as part of power generation and

	combustion by third party user			other energy solutions within the final market

**ISO 19694:2021 defines indirect GHG emissions as GHG emission that is a consequence of an organization's operations and activities, but that arises from GHG sources that are not owned or controlled by the organization. For the purposes of this EP the "organization" is the Pluto facility and therefore onshore processing, and support vessel operations are considered indirect emissions sources.*

3.7.5 Lifting Operations

A pedestal crane is located on the east side of the riser platform at the weather deck, providing the necessary coverage for all on-deck material handling requirements and lifting between the riser platform and supply vessels. The pedestal crane is powered by diesel.

3.7.5.1 Routine Lifting from Platform Support Vessels

Routine lifting operations primarily include transferring stores and equipment from a support vessel to the facility. Support vessels are equipped with dynamic positioning (DP) control for holding station during lifting operations. The types of 'lifted equipment' may vary but generally include containers or skips of various sizes. The stores and equipment required by the facility are secured inside the skip or container. Containers for supply of chemicals are routinely lifted. Equipment is to be appropriately rated for offshore lifting.

After offloading from the supply vessel is complete, the facility then backloads to the supply vessel any items to be returned to shore. These primarily include empty skips or containers or skips containing waste for onshore disposal.

3.7.5.2 Lifting Around the Facility

Once lifted to the lay down area, there may be a need to re-position equipment at various locations throughout the facility for operational purposes. This includes lifting stores or equipment to various landing areas throughout the facility for unloading or use and moving waste bins to required areas.

There may be occasions where a non-routine piece of equipment may need to be lifted. On these occasions, the equipment is packed up in a container or an approved lifting frame.

3.7.5.3 Operational Lifting (Non-crane Based)

There is also a requirement to undertake operational lifting utilising rigging, chain blocks or electric hoists. This lifting is primarily undertaken for maintenance or repairs and involves lifting and removing equipment such as valves, spools and motors.

Maintenance areas are in close proximity to all major equipment. Material handling corridors are provided to allow transportation of materials and equipment.

Once lifted to the lay down area, there may be a need for re-positioning of equipment at various locations throughout the facility for operational purposes. Where required, lifting of material and equipment in/out is achieved via beam clamps. General purpose floor trolleys and skates are used for moving material and equipment to/from laydown areas. Pad-eyes are provided for equipment requiring regular or frequent maintenance, where there is no direct pedestal crane access, or where runway beams are impractical.

3.7.6 Safety Features and Emergency Systems

A range of safety features and emergency systems have been integrated into the design and operation of the offshore facility to manage safety risk. Based on Woodside's Health and Safety Design Premises for Hydrocarbon Facilities, risk management measures have been grouped into the categories of:

- prevention

- detection
- control
- mitigation.

The safety features and emergency measures in place on the facility are listed in Table 3-8. Specific details of these and other safety systems can be found in the Pluto A Operations Safety Case.

Table 3-8: The Pluto facility safety features and emergency systems

Category	Description
Prevention	Inherently safe design (leak minimisation, layout) Dropped object/impact protection (including vessel collision avoidance) Structural design Material selection and corrosion control
Detection	Fire, gas and smoke detection (including manual alarm callpoints)
Control	Process control system Ignition control Depressurisation systems Passive fire protection Heating, ventilation and air conditioning
Mitigation	Escape and evacuation routes Temporary refuge Emergency power and UPS Emergency and escape lighting Critical communications systems Evacuation and rescue facilities and equipment

3.8 Support Vessel Operations

3.8.1 Platform Support Vessels

Platform support vessels are used to transport material and equipment to and from the riser platform when crewed. The specifications of the Mermaid Strait are presented in Table 3-9 as an example and represent typical specifications of a platform support vessel. Vessels supporting the facility may vary depending on vessel schedules and availability. Platform support vessels are typically in operation for the full period that the platform in crewed and may then be further supported by a resupply vessel that visit the platform once or twice in a 15-day period.

While in the field, the vessel(s) also backloads materials and segregated waste for transportation back to the King Bay Supply Facility in Karratha. If a vessel has fast rescue craft (FRC) capability, it can be used to carry out standby duties including during helicopter operations and working over the side activities while in the field. PLA also uses the standby vessel (SBV) located at the nearby Wheatstone platform, which can be called upon to render assistance in the event of a platform emergency and rescue response for helicopter operations.

Figure 3-8: Indicative facility support vessel (Mermaid Strait)

Table 3-9: Indicative platform support vessel specifications (Mermaid Strait)

Particulars	
Type	Diesel Electric, Azimuth, AHT, OSV, DP1
Length overall (LOA)	52.35 metres
Breadth	14.6 metres
Draft	4.9 metres
Dead weight tonnage (DWT)	930 tonnes
Accommodation	Berthing for 24 personnel
Dynamic positioning system	Kongsberg Simrad DP1 with Poscon joystick control
Capacities	
Fuel	592 m^3
Pollution Control	
Spray booms	Nil
Dispersant pump	Nil
Dispersant storage	Woodside issued dispersant kit: tank volume 350 gallons

3.8.2 Subsea Support Vessels

Subsea support vessels, including uncrewed surface vessels (USVs, see Section 3.8.4), are also used for field work such as subsea IMMR activities. Vessels supporting offshore activities may vary depending on operational requirements, vessel schedules, capability and availability.

Subsea activities are typically undertaken from a subsea support vessel or USV and may use an ROV with transponders. For some activities, ROVs (see Section 3.8.5) may also be deployed from the Pluto riser platform. Typical subsea support vessels use a DP system to allow manoeuvrability and avoid anchoring when undertaking works, due to the close proximity of subsea infrastructure. However, vessels are equipped with anchors which may be deployed in an emergency.

The DP system requires the temporary deployment of up to six transponders on the seabed. Transponders are also used for monitoring the location of infrastructure/equipment during a repair. The transponders are attached to small recoverable moorings (metal clump weight or tripod) that are lowered to the seabed and placed in position by ROV. The transponders have a small footprint; less than 0.5 m^2. The transponders and moorings are recovered using ROVs at the end of the activity.

ROV operations often require tool baskets which are temporarily placed on the seabed. These baskets typically have a mesh base with a seabed footprint of approximately 15 m². The baskets are recovered to the vessel at the end of the activity.

3.8.3 Accommodation Support Vessel

An accommodation support vessel (ASV) may be required for short periods to support planned maintenance campaigns, shutdown maintenance or major projects. Typically, these campaigns would last up to 90 days with possible extensions due to unforeseen factors like weather. During the life of this EP, an ASV could be required at any time of the year and would be located next to the facility, inside the PSZ. The use of an ASV may occur once every 3-6 years.

ASV specifications may vary depending on operational requirements, vessel schedules, capability and availability. Typical ASVs use a DP system to allow manoeuvrability and avoid anchoring when in close proximity of the platform. However, vessels are equipped with anchors which may be deployed in an emergency. Indicative ASV specifications are provided in Table 3-10.

Table 3-10: Indicative accommodation supply vessel specifications (Floatel Triumph accommodation support vessel)

Particulars	
Type	Semi-submersible accommodation support vessel
Length overall (LOA)	125 m
Breadth	80 m
Dead weight tonnage (DWT)	27,111 t
Accommodation	500 persons approx.
Dynamic positioning system	DP 3
Capacities	
Fuel	Largest tank 297 m^3 Total capacity 1800 m3

3.8.4 Uncrewed Surface Vessel

A USV may be utilised to complete IMMR activities. The USV will be remotely controlled from an onshore remote operations centre (ROC) in Australia which is staffed 24 hours a day whilst the vessel is in transit or undertaking activities. Key roles in the ROC mirror those on a usual vessel management team and include a Vessel Master, Offshore Manager and ROV Supervisor. The vessels are designed with multiple forms of high speed and reliable communication systems to allow connection to the ROC and provide redundancy in the case of disconnection during operations, including an independent emergency low bandwidth satellite communications system. The vessels are also fitted with 360-degree cameras monitored by the remote vessel master supporting safe navigation. The USV is assessed by Woodside Marine (Section 7.10.2.5) to review compliance with marine laws, flag requirements, vessel class and Woodside's safety and environment requirements. Because there are no facilities to support human occupancy on USVs, emissions and discharges are typically limited to cooling water and combustion of marine diesel. The vessel is equipped with bilge monitoring systems to monitor the bilge tanks for hydrocarbons (such as leaks from engine machinery spaces or from marine diesel tanks), and where detected the bilge pumps will auto disable and the vessel will be required to immediately return to port.

USVs have a maximum speed of 10 knots and may be equipped with a built-in work-class ROV with the ability to deploy and retrieve equipment from the seabed. Key parameters for a typical USV are presented in Table 3-11.

Table 3-11: Indicative USV parameters

Parameter	USV (based on Reach Remote 2)	USV (based on Fugro Maali)
Draft (max)	6 m	2.6 m
Length	23.9 m	12 m
Displacement (Gross Tonnage)	~340 t	14 t
Propulsion System	Diesel-electric hybrid	Diesel-electric hybrid
Total fuel volume	74.1 m^3	3.3 m^3

3.8.5 Remotely Operated Vehicles

The MODU and subsea support vessels may be equipped with an ROV system that is maintained and operated by a specialised contractor aboard the vessel. ROVs may be used during drilling operations and subsea installation, for activities such as:

- anchor holding testing
- connection of mooring systems
- pre-drill seabed and hazard survey
- blowout preventer (BOP) land-out and recovery
- BOP well control contingency
- visual observations at seabed during riserless drilling operation
- pre and post installation survey
- subsea xmas tree control systems hook-up and contingency control
- removal of sediments on or around subsea infrastructure
- installation, testing, pre-commissioning, commissioning and start-up of subsea infrastructure.

An ROV can be fitted with various tools and camera systems that can be used to capture permanent records (both still images and video) of the operations and immediate surrounding environment. Specifically, during installation, the ROV is fitted with hydraulically driven tools to facilitate flowline tie-in. An ROV may also be used in the event of an incident to deploy the Subsea First Response Toolkit.

3.8.6 Helicopter Operations

Helicopters are the primary means of transporting passengers and/or urgent freight to/from the Pluto facility and vessels. They are also the preferred means of evacuating personnel in an emergency. Helicopter operations within the PAA are limited to helicopter take-off and landing on the helideck. Helicopters may be refuelled on the helideck of the MODU. Helicopter support is principally supplied from Karratha Airport, and transports workers from Karratha for planned maintenance.

3.9 Hydrocarbon and Chemical Inventories and Selection

3.9.1 Hydrocarbons

The main hydrocarbon inventories associated with major topside process and non-process equipment are summarised in Table 3-12..

Table 3-12: Hydrocarbon inventories of process and non-process equipment

Material	Storage Means	Capacity/Storage Volume
Hydrocarbons		
Condensate	Knock-out drum	Usual volume 5 to 10 m^3, with capacity 90 m^3
Diesel	Crane pedestal diesel storage tank	80 m^3
	Generator set day tanks	3 × 1.8 m^3
Oily water and chemical waste	Hazardous drain collection tank	14 m^3 (working volume 11.6 m^3)
	Non-hazardous drain collection tank	2.3 m^3
	Waste oil storage tank (transportable ISO container)	4 m^3
	PWH open drains collection tank	14.9 m^3 (working volume 10.7 m^3)
Production separator	Vertical gas/liquid separator	~30 m^3 (normally also incl. PW)
Liquid-liquid separator	Produced water/condensate separator	~40 m^3 (normally also incl. PW)
Degasser	Produced water vessel	40 m^3
Induced gas floatation vessel	Produced water vessel	30 m^3
Oily water separation tank	PW oily water separation tank	~3 m^3

3.9.2 Chemical Usage

Chemicals are utilised for a variety of purposes and can be divided into two broad categories (operational and maintenance), as described below. In addition to the chemicals listed, the riser platform may also maintain small volumes of various facility maintenance chemicals.

3.9.3 Operational Chemicals

3.9.3.1 Operational Process Chemicals

An operational process chemical is the active chemical added to a process or static system, which provides functionality when injected in produced fluid, utility system streams or for pipeline treatment. These chemicals may be present in routine or non-routine discharge streams from the facility. Installation of the PWH, has introduced operational process chemicals corrosion inhibitors (up to 100 ppm dependent on water flow rate due to wet flowline operation) and water clarifiers (up to 50 ppm), some of which will be present in the routine discharge of produced water.

3.9.3.2 Operational Non-Process Chemicals

Operational non-process chemicals include chemicals which do not fall into the category described above but which may be required for operational reasons and, by virtue of their use, may be intermittently discharged or have the potential to be discharged (e.g., required as a result of maintenance or intervention activities). Examples include subsea control fluids, dyes and well intervention/workover chemicals.

Operational non-process chemicals such as hydraulic fluids required for operation of the PWH HPU, have been introduced and included in this EP.

3.9.4 Maintenance Chemicals

Maintenance chemicals include chemicals which are required for general maintenance or ‘housekeeping’ activities and are critical for overall maintenance of the riser platform and its equipment. These may include paints, degreasers, greases, lubricants and domestic cleaning products. They may also include chemicals required for specialty tasks, such as laboratory testing

and analysis. Maintenance chemicals generally present negligible risk to the environment, as they are not discharged as a result of their use (e.g., paint) or are used intermittently and discharged in low volumes (e.g., domestic cleaning products).

3.9.5 Indicative Chemical Inventories

An indicative list of bulk chemicals commonly used (or planned to be used on the facility) and estimated storage quantities, is summarised in Table 3-13. Other chemicals may be used in the future if chemical requirements change; for example, during start-up of new wells, there may also be temporary well clean-up skid which may include water clarifiers. In addition to the chemicals listed, the riser platform may also maintain other small volumes of various operational chemicals and facility maintenance chemicals as previously described.

Table 3-13: Indicative bulk inventories of chemicals

Material	Storage Means	Storage Capacity
MEG	Hydrate inhibitor storage vessel[1] Transportable ISO container	12 m³ (working volume 10 m³)
Methanol (if required)	Hydrate inhibitor storage vessel [1] Transportable ISO container	Typically, 4–6 m³ ISO containers
Subsea control fluid	Hydraulic power unit storage tank	4 m³
Water clarifier (if required)	Water clarifier storage tank	4 m³
Demulsifier	Demulsifier storage tank	4 m³
Corrosion inhibitor	Corrosion inhibitor storage tank (stainless steel) Lifted from vessels in IBC's and gravity drained into storage tank	28 m³ 4 m³
Subsea control fluid	Hydraulic power unit storage tank for PWH	3 m³

[1] Only a single hydrate inhibitor storage vessel is provided on the platform; however, the utility fluid may vary between methanol and MEG depending on operations requirements.

3.9.6 Environmental Consideration during Selection, Assessment and Approval of Chemicals

As part of Woodside's chemical approval process, operational chemicals required by the PAP are selected and approved in accordance with the Woodside Chemical Selection and Assessment Environment Guideline. This guideline is used to demonstrate that the potential impacts of the chemicals selected are acceptable and ALARP and meet Woodside's corporate requirements (as outlined in Woodside's Environmental Performance Procedure, which requires chemicals to be selected with the lowest practicable environmental impacts and risks, subject to technical constraints). A summary of the environmental requirements of the guideline is outlined below.

3.9.7 Environmental Selection Criteria

The Woodside Chemical Selection and Assessment Environment Guideline follows the principles outlined in the OCNS which manages chemical use and discharge in the United Kingdom (UK) and the Netherlands (background on the OCNS provided is below).

Operational chemicals will be selected/assessed in compliance with the Woodside Chemical Selection and Assessment Environment Guideline, specifically:

- Where operational chemicals with an OCNS rating of Gold/Silver/E/D and no OCNS substitution or product warning are selected, or a substance is considered to pose little or no risk to the environment (PLONOR), no further control is required. (Such chemicals do not represent a significant impact on the environment under standard use scenarios and therefore, are considered ALARP and acceptable).

- If other OCNS rated or non-OCNS rated operational chemicals are selected, the chemical will be assessed as follows:
  - If there is no planned discharge of the operational chemical to the marine environment, written technical verification of the 'no discharge' fate must be provided, and no further assessment is required.
  - If there is planned discharge of the operational chemical to the marine environment, a further assessment/ALARP justification will be conducted.

The ALARP assessment will include consideration of chemical toxicity, biodegradation and bioaccumulation potential, using industry standard classification criteria (CEFAS scheme criteria).

If a product has no specific ecotoxicity, biodegradation or bioaccumulation data available, the following options are considered:

- Environmental data for analogous products can be referred to where chemical ingredients and composition are largely identical.
- Alternatively, environmental data may be referenced for each separate chemical ingredient (if known) within the product.

If no environmental data is available for a chemical or if the environmental data does not meet the acceptability criteria outlined above, potential alternatives for the chemical will be investigated, with preference for options with a Hazard Quotient (HQ) band of Gold or Silver, or are OCNS Group E or D with no substitution or product warnings.

If no more environmentally suitable alternatives are available, further risk reduction measures (e.g., controls related to use and discharge) will be considered for the specific context and implemented where relevant so that the risk is ALARP and acceptable.

Once the further assessment/ALARP justification has been completed, concurrence from the relevant manager that the environmental risk as results of chemical use is ALARP and acceptable is obtained.

3.9.8 Background Overview of the Offshore Chemical Notification Scheme

The OCNS applies the requirements of the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention). The OSPAR Convention is widely accepted as best practice for chemical management.

All chemical substances listed on the OCNS ranked list of registered products have an assigned ranking based on toxicity and other relevant parameters such as biodegradation, and bioaccumulation, in accordance one of two schemes (as shown in Figure 3-9):

- Hazard Quotient Colour Band: Gold, Silver, White, Blue, Orange and Purple (listed in order of increasing environmental hazard), or
- OCNS Grouping: E, D, C, B or A (listed in order of increasing environmental hazard). Applied to inorganic substances, hydraulic fluids and pipeline chemicals only.

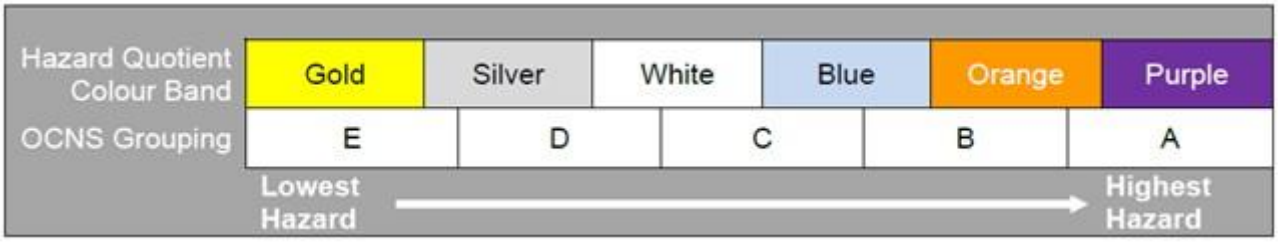


Figure 3-9: Offshore Chemical Notification Scheme ranking

3.10 Subsea Inspection, Maintenance, Monitoring and Repair Activities

3.10.1 Overview

Subsea infrastructure, including the platform substructure, is designed not to require significant intervention. Inspection and maintenance are undertaken to ensure the integrity of the infrastructure and identify problems before they present a risk of loss of containment. Maintaining infrastructure integrity also supports decommissioning planning. Intervention may be required to repair identified problems.

To manage subsea threats (risks) the IMMR process requires an appropriate response to be selected to manage specific equipment risks. This is typically one of: inspection, maintenance, monitoring and repair.

The IMMR process for subsea infrastructure maintains equipment in good condition and repair, for production and to enable future removal.

Subsea activities are typically undertaken from a subsea support vessel or uncrewed surface vessel (USV) and may use an ROV to inspect equipment. For some activities, ROVs may also be deployed from the PLA platform.

Maintenance and repair activities may require the deployment of frames/baskets which are temporarily placed on the seabed. These typically have a perforated base with a seabed footprint of about 15 m². This temporary equipment is removed from field via recovery to subsea support vessels at the completion of IMMR activities. Typical IMMR activities are described below.

3.10.1.1 Inspection

Inspection of subsea infrastructure is the process of physical verification and assessment of components in order to detect changes to the as-installed location and condition by comparison to initial state following installation and previous inspections. Details of typical subsea infrastructure inspections/surveys and indicative frequencies are provided in Table 3-14. Scope and frequency of subsea equipment (operational and redundant) and pipeline inspections are determined using a risk-based inspection (RBI) methodology and associated plans. RBI is commonly used within the industry as a method for determining inspection frequencies (Energy Institute, 2009; DNV, 2019).

During planned inspections, anomalies may be identified by ROV, for example visible hydrates, discharges or bubbling which may indicate fugitive emissions. In accordance with the Subsea and Pipelines Integrity Management Procedure, the anomaly is identified and assessed for scale during the inspection by performing visual bubble estimates or bubble measurements, where it is feasible to do so. The anomaly and its scale are noted in the anomaly/inspection report and recorded in Woodside's centralised Inspection Database. The anomaly is then assessed to determine future monitoring and/or corrective actions to address the anomaly.

Table 3-14: Typical subsea infrastructure inspections and surveys, their purpose and approximate frequencies

Type of Inspection/ Survey	Subsea Infrastructure	Purpose	Approximate Frequency
General visual inspection	All subsea infrastructure	Check general infrastructure integrity.	Varied – every 1 to 8 years
Close visual inspections	All subsea infrastructure (including previously identified anomalies)	Investigate certain subsea infrastructure components, anomaly identification, and estimation of any fugitive emissions and discharges.	Varied – every 2 to 6 years
Cathodic protection	All subsea infrastructure	Check for corrosion and renew sacrificial anodes, if required.	Varied – every 2 to 6 years
Wall thickness surveys	Production and crossover manifolds, flowlines and pipelines	Monitor the condition of subsea infrastructure. (i.e., ultrasonic testing). Typically, only performed if a specific threat is identified through other means.	Typical: Once every 25 years Worst case: Once every 5 years
Acoustic survey (e.g., multibeam echo sounder (MBES), sidescan sonar (SSS)	Pipelines	Identify buckling, movement, scour and seabed features. Low frequency/ intensity signals undertaken on the flowlines.	Varied – every 1 to 6 years
Non-destructive testing (NDT)	Pipeline and manifolds (if required)	Evaluates the properties of material/items using electromagnetic, radio graphic, acoustic resonance technology, ultrasonic, or magnetic equipment.	Typical: Once every 25 years Worst case: Once every 25 years per well
Seabed sampling surveys including minor grabs/cores	NA	Identify benthic fauna, sediment characteristics, determine level of penetration/compaction, etc. Grabs/cores typically disturb 0.1 m² of seabed per sample.	Typical: Once every 25 years Worst case: Once every 5 years
Anode inspections and/or replacement	Production and crossover manifolds, trees, flowlines and pipelines	Samples taken of anode materials for testing.	Typical: Once every 25 years
Marine growth sampling	All subsea infrastructure	Samples taken of marine growth for testing.	Typical: Once every 25 years Worst case: Once every 5 years
Sub bottom profiling	Around subsea components	Low frequency echo sounder undertaken to identify returns of metals under the seabed.	Varied – every 1 to 6 years
Laser surveys	Dimensional check on spools	Used to conduct dimensional checks on spools, etc, and measure proximity.	Varied – every 1 to 6 years

Type of Inspection/ Survey	Subsea Infrastructure	Purpose	Approximate Frequency
Pigging	Export pipeline, flowline	Inspection, maintenance, repair or to facilitate modifications.	Typical – Once every 4 years Worst case – every 2 years

3.10.1.2 Monitoring

Monitoring of subsea infrastructure refers to the process of surveillance of the physical and chemical environment that a subsea system or component is exposed to, in order to determine if and when damage may occur, and (where relevant) predict the rate or extent of that damage. Monitoring activities may include process composition testing, corrosion probes, corrosion mitigation checks, metocean and seismic monitoring, and cathodic protection testing. Other monitoring activities include process monitoring (temperature, pressure, etc), cyclone weather monitoring, and hydraulic fluid usage.

3.10.1.3 Maintenance

Maintenance activities on subsea infrastructure are those required at regular or planned intervals to prevent deterioration or integrity failure of infrastructure. Typical maintenance activities are described in Table 3-15.

Table 3-15: Typical maintenance activities, their purpose and approximate frequencies

Type of maintenance	Subsea infrastructure	Purpose	Approximate Frequency
Cycling of valves via control system	Wells and manifolds	Test functionality of technical integrity valves	Every 6 months for well barriers during operations
Marine growth removal	Production and cross over manifolds and retrieval components (e.g., chokes) and jacket cleaning	Reduce weight or gain visual access	Based on outcomes from visual inspections (Table 3-14) and marine growth trends on regional infrastructure
Flushing of chemical hydraulic fluid lines	Hydraulic fluid lines	For repair scenarios	When required for repair
Leak and pressure testing	All subsea infrastructure	Test integrity of subsea infrastructure	Following installation of subsea infrastructure components after a repair or intervention, prior to return to service
Pigging	Export pipeline	Cleaning of trunkline or liquids management	Typically, every year for cleaning and liquids management; pigging not required at current export rates but would be performed on as needs basis

3.10.1.4 Repair

Repair activities are those required when a subsea system or component is degraded, damaged or has deteriorated to a level outside of acceptance limits as defined by design codes. Damage sustained may not necessarily pose an immediate threat to continued system integrity but may present an elevated level of risk to environment or production reliability. Due to the design of subsea infrastructure and materials used, repairs are undertaken on an as needs basis. The requirements and frequency of these repairs are dictated by the outcome of the inspection and maintenance

regimes described in Table 3-14 and Table 3-15. Typical subsea repair activities, described in the following sections, include.

- subsea choke and/or battery module replacement
- chemical injection throttling valve (CITV) replacement
- subsea control module (SCM) or electrical distribution unit (EDU) replacement
- power and communications router, tree and downhole replacement
- multi-phase flow meter (MPFM) or wet gas flow meter (WGM) replacement
- acoustic sand detector (ASD) replacement
- hydraulic control router (HCR) replacement
- hydraulic flying lead (HFL) replacement
- electrical flying lead (EFL) replacement
- pipeline or spool support with grout bag, mattress, anchors or rock dumping
- spool disconnection and/or replacement
- umbilical jumper replacement and/or relocation
- flowline/pipeline replacement
- scour prevention installation
- cathodic protection system replenishment/repair.

When equipment is replaced, the redundant equipment, may remain in-situ or be removed from the field. The location of redundant subsea infrastructure items is recorded as part of the ROV as left survey and included in a database for Pluto subsea inventory.

3.10.2 Subsea Chemical Usage

Planned chemical discharges may occur during a range of subsea system operation and IMMR activities. The chemicals and volumes released will be specific to each activity. Releases are discussed and provided in the specific activity sections below and, where practical, typical and approximate worst-case volumes provided. Typical volumes are the expected releases associated with the activity following depressurisation and flushing activities.

Operational chemicals to be used within Pluto subsea infrastructure are selected and assessed using Woodside's chemical selection and assessment procedures as detailed in Section 3.9.

Typical chemicals which are used in subsea infrastructure and may be released during IMMR activities include:

- Subsea control fluid – The subsea control fluid presently used in the facility subsea systems is HW443. HW443 is a water-based product.
- Hydrate control – MEG is used for hydrate control. Provision for methanol on an as-needed basis.
- Corrosion inhibitor – Corrosion inhibitor is generally used to manage and prevent corrosion in flowlines, pipelines, pipes, vessels and tanks.
- Water clarifier - Water clarifier is generally added if required to assist with oil and water separation to help reduce elevated oil in water concentration in produced water.
- Demulsifier – Demulsifiers are generally added to assist with reducing water content in the production hydrocarbons.

- Biocide – Biocides are generally used to prevent the bacterial growth in pipelines that may cause corrosion.
- Dye – Chemical dyes are used to identify the source of a leak.
- Acid – Where removal of calcium deposits is required, Woodside typically uses sulphamic (or equivalent) acid. Alternatives such as citric acid may be used.
- Oxygen scavenger – Oxygen scavenger is used to de-oxygenate the flowlines and prevent corrosion and aerobic bacterial growth.
- Grout – The material used in grout, mattresses and rock is typically concrete-based.
- Staurolite products – Staurolite products are used for abrasive/sand blasting to clean and remove marine growth. The main component is staurolite, which is a naturally forming mineral.

3.10.3 Marine Growth Removal

Due to the relatively high rate of marine growth on the NWS, it is often necessary to remove excess growth prior to undertaking many subsea IMMR activities. Marine growth removal is undertaken with a ROV or a diver. The different techniques are described in Table 3-16.

Table 3-16: Marine growth removal techniques

Activity/Equipment	Description
Water jetting	Uses high pressure water to remove marine growth
Brush systems	Uses brushes attached to a ROV to remove marine growth
Acid (typically sulphamic acid)	Dissolving of calcium deposits between interfaces on subsea infrastructure
Sand/abrasive blasting	Additional cleaning to allow close visual inspections

3.10.4 Intervention Isolations

The Woodside Engineering Operating Standard – Subsea Isolation defines a proven isolation to be a valved isolation where the effectiveness of the isolation has been confirmed via vent, bleed, or instrumentation points. An activity specific philosophy/procedure must be developed in line with this standard for each isolation. Isolation testing will result in a planned release of hydrocarbons to the environment.

3.10.5 Pipeline Pigging Operations

Pipeline cleaning pigging currently occurs approximately annually to manage liquid hold-up and solids generation, and as part of the planned inspection programme. Pipeline maintenance and monitoring requirements may increase pipeline pigging frequency with time, to monitor pipeline integrity more closely as the facilities age and/or in response to findings from intelligent pigging campaigns. Liquid hold-up management pigging (to assist flow through to the onshore LNG facility) may be required on an as-needs basis to support flow assurance outcomes.

3.10.6 Sediment Relocation

If sediment builds up around a pipeline or other subsea infrastructure, an ROV-mounted suction pump/dredging unit may be used to relocate the sediment to allow inspection/works to be undertaken. This activity is limited to the relocation of small amounts of sediment material in the immediate vicinity of the subsea infrastructure (i.e., within the existing footprint). Sediment relocation typically results in minor seabed disturbance and some localised turbidity.

3.10.7 Corrosion Protection

The aim of corrosion protection is to preventor limit the chemical reactions that cause corrosion and to manipulate them in such a way that corrosion is avoided or mitigated. Corrosion prevention techniques used are:

- corrosion protection layers to provide a barrier of corrosion-resistant material between the subsea environment and the structural material
- anode skids where an anode is attached to the subsea asset to act as 'sacrificial metal' which is more easily corroded.

Measurements may be undertaken using probes (e.g., electrical resistance probes) to assess the effectiveness of these techniques. If a measurement identifies the corrosion protection layer requires repairs, appropriate remediation options will be investigated.

If additional anode skids are required, they will be placed on the seabed using a support vessel crane. A typical anode skid will have a seabed footprint of approximately 8 m². It is necessary to remove marine growth around the point where the anode skid is to be connected in order to establish good continuity through clamping and/or welding.

Activities may result in some minor disturbance due to placement of skids, removal of marine growth from equipment, sediment relocation, the placement of ROV tool baskets and DP transponders on the seabed.

3.10.8 Span Rectification, Pipeline Protection and Stabilisation

Due to tidal currents or other scouring processes, sections of pipelines, spool flowlines and umbilicals may become unsupported by the seabed (span) and/or become unstable on the seabed. Spanning or instability may expose the component to risk of stress beyond design parameters, increasing risk of failure.

A number of techniques may be used for span rectification or component stabilisation and protection, including grout bags, mattresses, anchors, piling or rock placement. All techniques require the use of a support vessel crane to deploy the material and a ROV so that it is accurately placed on the seabed. In addition, a subsea component may require protection from additional activities (e.g., supply vessel lifts onto the facility and pipeline crossings).

3.10.8.1 Grout Bags

Span rectification typically involves placement of a grout bag with anti-scouring skirts under the spanned component. Grout is pumped into the grout bag from a support vessel via a downline. Once the bag is inflated, it acts as a pillow with the pipe resting on top (Figure 3-10). Typical grout volumes will depend on the size of the span and may vary from 200 kg to greater than 2000 kg.

Figure 3-10: Grout bags in position

3.10.8.2 Mattresses

Mattresses are typically made of concrete and may be used for span rectification or pipeline protection and stabilisation. An example of a mattress over a pipeline is provided in Figure 3-11. Mattresses are typically 3 m by 6 m in size and therefore may disturb 18 m² of the seabed.

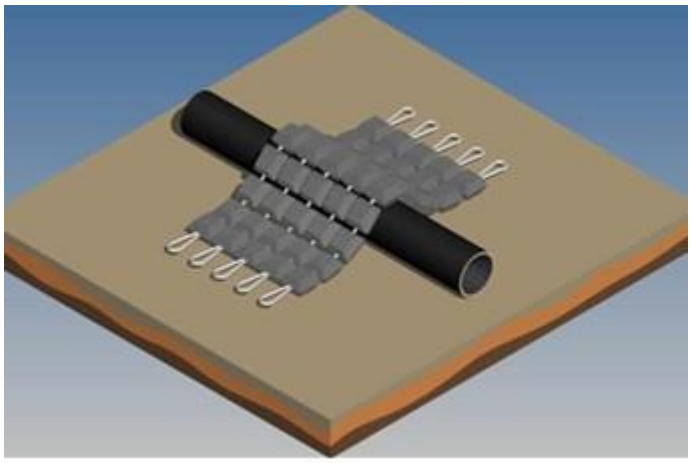


Figure 3-11: Concrete mattress for span rectification or pipeline protection or stabilisation

3.10.8.3 Rock Placement

Rock placement for span rectification is typically small scale and involves the use of one tonne bulker bags filled with rock, with the number of bags varying to suit the application. This activity will cause seabed disturbance due to placement of material on the seabed; however, the area of seabed affected will be small and localised and is unlikely to extend beyond the area originally impacted during the laying of the pipeline.

In addition, the activity may result in some minor disturbance from removal of marine growth, sediment relocation, the placement of ROV tool baskets and DP transponders on the seabed.

3.10.9 Suspension and Preservation of Redundant Equipment

In the event equipment is degraded, damaged or has deteriorated to a level outside of acceptance limits, equipment may be repaired, replaced, or preserved and suspended until decommissioning. A risk assessment will be undertaken considering level of risk to safety, health, and environment or production reliability and will determine if the infrastructure will be repaired, replaced or suspended and preserved.

A typical program to suspend and preserve redundant equipment is as follows:

- Complete an as-found ROV survey of the umbilical/jumper and adjacent infrastructure.
- Remove marine growth, if required.
- Relocate any sediment build-up in the area surrounding infrastructure, if required.
- Flush prior to disconnection.
- Isolate equipment.
- Install caps/flanges.
- Relocate infrastructure to a safe location (if required).

3.10.10 Well Management and Maintenance Activities

The facility subsea well interventions, workovers and well kills require a suitable vessel or MODU to accommodate and support intervention packages. Therefore, these activities do not form part of the scope of this EP. Unloading and clean-up from subsea wells via the facility may be required infrequently. Unloading and clean-up discharges are routed via the process facilities to be cleaned of any remaining chemicals and fluids in the wellbore or reservoir.

3.10.10.1 Well Unloading and Clean-up

Following subsea interventions, workovers and well kills, the well may be unloaded and flowed via the process facilities to be cleaned of any remaining chemicals and fluids in the wellbore or reservoir. During this phase, the products may be processed as follows:

- Gas will be routed into the production process where possible or flared if unsuitable.
- Fluids will be routed to the HP flare knock-out drum which discharges liquids to the closed drain system.
- Wastes (may include fluids and sand/solids) will be managed as appropriate based on composition. Solids will be separated for onshore disposal as required following Woodside's Waste Management Plan for Offshore Facilities. An additional strainer may be placed in the flowlines prior to the main separators to remove any large debris that may be in the wellbore.

3.11 Xena-03 Drilling and Tie-back Activities

3.11.1 Drilling Activities

This EP includes drilling activities for the Xena-03 well in the Xena-03 Operational Area and tie-back to the Pluto facility, in the PAA. Well construction activities are conducted in a number of stages, as described below. Well design will be optimised for ultimate recovery.

Detailed well designs will be submitted to NOPSEMA as part of the Approval to Drill and the accepted Well Operation Management Plan (WOMP), as required under the Offshore Petroleum and Greenhouse Gas Storage (Resource Management and Administration) Regulations 2011.

For clarity, all activities specific to the Xena-03 Drilling and Tie-back campaign will herein be referred to as the Xena-03 Tie-back activities.

3.11.1.1 Cement Unit Test

Upon arrival on location at the Xena-03 Operational Area, the MODU may need to perform a cement unit test, or 'dummy cement job', to test the functionality of the cement unit and the MODU's bulk cement delivery system before performing an actual cement job. This operation is usually performed after a MODU has been out of operation for an amount of time (warm-stack), if maintenance on the cement unit has been performed, or if it is the first time a MODU is being used in-country and commissioning of the cement unit system is required.

A 'dummy cement job' involves mixing a sacrificial cement slurry at surface, and once functionality of the cement unit and delivery system has been confirmed, the slurry is discharged through the usual cement unit discharge line (which may be up to 10 m above the sea level) or through drill pipe below sea level as a cement slurry. The slurry is usually a mix of cement and water; however, may sometimes contain stabilisers or additives. The indicative volume of cement that may be discharged to sea during a cement unit test is approximately 100 bbl.

3.11.1.2 Top Hole Section Drilling

PAP drilling commences with the top-hole section as follows:

- The MODU arrives and establishes position over the well site.

- Top-hole sections are drilled riserless using seawater with pre-hydrated bentonite sweeps/XC polymer sweeps or drilling fluids to circulate drilled cuttings from the wellbore. As a contingency, water-based mud (WBM) may be used in the presence of a shallow gas anomaly.

Once the top hole sections of the well have been drilled, steel tubulars (called conductor or casing) are inserted into the wellbore to form the surface/intermediate casing and secured in place by pumping cement into the annular space above the casing shoe or to surface (seabed), which will involve discharging excess cement at the seabed.

3.11.1.3 Blowout Preventer and Marine Riser Installation

After setting the surface or intermediate casing, a BOP is installed on the wellhead, and the marine riser above it, to provide a physical connection between the well and MODU. This enables a closed circulation system to be maintained, where weighted drilling fluids and cuttings can be circulated from the wellbore back to the MODU, via the riser.

In addition, the BOP provides a means for sealing, controlling and monitoring the well during drilling operations. The BOP components operate using open hydraulic systems, using water-based BOP control fluids.

Each time a BOP pressure and function test schedule is undertaken approximately 3620 L of water-based fluid is released to the marine environment, of this approximately 4% is control fluid additive. BOP operation includes function and pressure testing approximately every 21 days, and a function test (approximately 2665 L) approximately every seven days, excluding the week a pressure test is conducted.

3.11.1.4 Bottom Hole Section Drilling

A closed system (riser in place) is used for drilling bottom hole sections to the planned wellbore total depth (TD). The bottom hole sections will be drilled using water-based mud (WBM) drilling fluids, although contingency non-water-based muds (NWBM) may be used if WBM cannot meet technical requirements (Section 3.11.5).

Protective steel tubulars (casings and liners) are inserted as required. The size, grade, weight, length and inclination of the casing/liner sections within the wellbore are determined by factors such as the geology/subterranean pressures likely to be encountered in the area and any specific information or resource development requirements.

After a string of casing/liner has been installed into the wellbore, it is cemented into place. The casing/liner is then pressure tested. Once the pressure testing is passed, drilling of the next section can resume with the riser in place to circulate drill cuttings and drilling fluids back to the MODU.

Cementing operations can be performed to:

- provide annular isolation between hole sections and structural support of the casing/liner as required.
- set a plug in an existing well to sidetrack.
- plug a well so it can be suspended/abandoned.

Cement is transported as dry bulk to the MODU by the support vessels, mixed as required by the cementing unit on the MODU and pumped by high pressure pumps to the surface cementing head then directed down the well.

3.11.1.5 Formation Evaluation

Formation evaluation is the interpretation of a combination of measurements taken inside a wellbore to detect and quantify hydrocarbon presence in the rock adjacent to the well. ‘Formation evaluation

while drilling' (FEWD) is the process by which the presence and quantity of hydrocarbon in a reservoir is measured according to its response to radioactive and electrical input. It may include extracting small cores, wireline logging, full diameter cores and other down-hole technologies, as required. FEWD tools will be incorporated into the drillstring during development drilling and may include gamma ray, directional deep resistivity, callipers, density-neutron, sonic and tools which can measure formation pressures. Some FEWD tools contain radioactive sources; however, no radioactive material will be released to the environment and radiation fields are not generally detectable outside the tool when the tool is not energised. Therefore, they do not present an environmental risk.

3.11.1.6 Wellbore Clean Out

As required throughout activities with the riser connected, wells will be displaced from one drilling fluid system to another, or from the drilling fluid system to completion brine. A chemical clean out pill or fluids train will be circulated between the two fluids. Brine is typically a filtered brine with <70 NTU or <0.05% total suspended solids (TSS). This results in a brine and seawater discharge after this operation.

Clean out fluids and completion brine will be captured and stored on the MODU and discharged if oil concentration is <1% by volume or returned to shore if discharge requirements cannot be met.

3.11.1.7 Xmas Tree Installation

Before the upper completion is installed into the well, the horizontal xmas tree will be installed from either an installation vessel or directly from the MODU. Due to the subsea well layout, if installation was to occur from an installation vessel, the MODU will be required to reposition away from the drill centre to allow the installation vessel to install the xmas tree. Once the xmas tree has been installed, the tree-to-wellhead interface will be pressure tested to confirm integrity. The MODU BOP will then be reconnected to continue with drilling and completions activities.

The xmas tree will be installed with a preservation mixture in the production and annulus bore.

3.11.1.8 Completions Activities

Once the well has been drilled, well completion activities will be performed which may include the installation of the lower completion, intermediate completion, production tubing and subsea tree. The well is then pressure tested for integrity before well suspension.

The well will be completed with a conventional upper completion. The well will be suspended with two crown plugs installed in the tubing hanger. Crown plugs will be individually pressure tested to verify suspension barriers before removing the BOP.

3.11.1.9 Well Unload

3.11.1.9.1 General Description

During well unloading activities, all completion and reservoir fluids will be directed through the Pluto facility to the onshore LNG plant.

In the event fluids from well unloading cannot be directed to the Pluto facility, they may be flared or discharged to the environment via the well test package onboard the MODU. The base oil column, completion fluid, hydrocarbons and produced/condensed water will be measured, handled, separated, treated for overboard discharge (non-hydrocarbon) and flared/burned (hydrocarbon) through the temporary production system on the MODU. Note that the opportunity to unload to the Pluto facility is Woodside's preferred option, which could eliminate or reduce well unloading to the MODU.

3.11.1.9.2 Produced/Reservoir Water Disposal

If fluids from well unloading are directed to the MODU, the well test water treatment package will be used to treat produced/reservoir water before discharge. Prior to discharging, the fluids are cycled through an onboard filtration system and gauge tank. Water filtration is standard practice for well unloading operations. Fluids that cannot be treated or flared will be sent onshore in tanks for disposal.

3.11.1.9.3 Emissions

If well unloading is performed to the MODU, it is expected that condensate, diesel and methanol in the wellbore will be flared. The flare may be extinguished due to water ingress, lack of fuel (propane), weather impact or equipment failure resulting in cold venting of gas from the flare for several minutes before the flare can be restarted or venting stopped. After the objectives of the well testing and flowback are achieved, the flow is stopped and the well may be cleaned using a brine that can include several chemicals, such as biocide and surfactant.

3.11.2 Drilling Fluid System

In addition to the base fluid, drilling muds contain a variety of chemicals, incorporated into the selected drilling fluid system to meet specific technical requirements (e.g., mud weight required to manage pressure, or for borehole stability). All chemicals selected for use will be assessed under Woodside's internal guidelines so that potential impacts are acceptable, ALARP and meet Woodside's expectation for environmental performance.

3.11.2.1 Water-based Mud System

A water-based drilling fluid system is the preferred option for the Petroleum Activities Program.

In addition to the base fluid, drilling muds contain a variety of chemicals, incorporated into the selected drilling fluid system to meet specific technical requirements (e.g., mud weight required to manage pressure, or for borehole stability). The WBM drilling fluid will either be mixed on the MODU or received pre-mixed, then stored and maintained aboard the MODU. The top hole sections are drilled riserless with seawater containing pre-hydrated gel sweeps. The bottom hole sections may be drilled using WBM in a closed circulation system which enables reuse of the WBM drilling fluids.

WBM drilling fluids that cannot be reused (e.g., due to bacterial deterioration or if they do not meet required drilling fluid properties) or are mixed in excess of required volumes, may be operationally discharged to the ocean under the MODU's Permit to Work (PTW) system.

A number of factors unique to each drilling program will determine the quantities of WBM drilling fluids required and subsequent discharge volumes if no suitable reuse option is available.

3.11.2.2 Mud Pits

There are typically a number of mud pits (tanks) on the MODU that provide a capacity to mix, maintain and store fluids required for drilling activities. The mud pits form part of the drilling fluid circulating system. The mud pits and associated equipment/infrastructure are cleaned out at the end of drilling and completions operations. Mud pit wash residue is discharged overboard with less than 1% oil contamination by volume. Mud pit residue over 1% oil volume is sent to shore for disposal.

3.11.2.3 Drill Cuttings

Drill cuttings generated from the well are expected to range from very fine to very coarse (<1 cm) particle/sediment sizes. Cuttings generated during drilling of the top hole sections are discharged at the seabed. Estimated volumes of drill cuttings that may be discharged during the PAP are presented in Section 6.7.8.

The bottom hole sections are drilled with a marine riser that enables cuttings and drilling fluid to be circulated back to the MODU, where the cuttings are separated from the drilling fluids by the SCE. The SCE comprises, but is not limited to, shale shakers, cuttings dryers and centrifuges. The SCE uses shale shakers to remove coarse cuttings from the drilling mud. After being processed by the shale shakers, the recovered mud from the cuttings may be directed to centrifuges, which are used to remove fine solids (4.5 to 6 µm). The cuttings are usually discharged below the water line and the mud is recirculated into the fluid system.

If contingency NWBM is needed to drill a well section, the cuttings which are separated from the NWBM via the shakers will also pass through a cuttings dryer and associated SCE to reduce the average oil on cuttings for the entire well (only sections using NWBM) to 6.9% wt or less on wet cuttings prior to discharge. Woodside is not planning to use NWBM, and their use is retained as a contingency only. The approval process within Woodside to permit the use of NWBM is described in Section 3.11.5.4.

3.11.2.4 Cement, Barite and Bentonite Discharge

Excess cement, barite and bentonite (dry bulk) after well operations are completed, will either be held onboard and used for subsequent wells, provided to the next operator at the end of the program, or if these options are not feasible, discharged to the marine environment. Toward the end of the campaign, if re-use, transfer or on-sale of the dry bulk stocks becomes not feasible, Woodside will implement stock reduction measures to reduce the volume dry bulk stock requirement, to that necessary for well control, as defined in relevant well control procedures.

Excess cement, barite and bentonite that does not meet technical requirements during the PAP may also be bulk discharged to the environment. Bulk discharges of cement, barite and bentonite may occur as a slurry through the usual cement discharge line or blown as dry bulk and discharged. Woodside requires that mercury and cadmium concentration in stock barite be below 1 mg/kg and 3 mg/kg, respectively. Documentation of heavy metal analysis is planned to be undertaken for all individual batches of barite and used to verify compliance with these concentrations.

3.11.3 Subsea Installation and Pre-commissioning Activities

The subsea installation scope of work will include installing and pre-commissioning the infrastructure summarised in Table 3-17. The PAP includes directly installing infrastructure from the installation vessels in the relevant location. During hook-up and pre-commissioning of the new and existing facilities there is potential for discharges associated with the testing and connection activities of the subsea systems. The pre-commissioning associated with subsea infrastructure generally includes leak testing of the flexibles, subsea control systems verification and function-testing of valves to verify that the electric and hydraulic flying leads are ready for entry into the commissioning phase.

Table 3-17: Subsea installation component summary

Description	Detail	Dimensions (Approximate)
Well (Xena-03)	1 wellhead and xmas tree system	6.0 m (L) × 4.0 m (W) × 6.0 m (H) (typical)
Subsea flowline	10” ID flexible flowline	3000 m
Subsea control	1 electrohydraulic umbilical (EHU)	2500 m
	2 umbilical termination assemblies	4 m × 3m
Stabilisation	~10 concrete mattresses	6 m × 3 m

3.11.3.1 Underwater Acoustic Positioning

Long baseline (LBL) transponders and ultra short baseline transponders (USBL) are commonly used acoustic positioning methods and may be installed on the seabed as required by the installation

activities. The USBL subsea transponder transmits an acoustic pulse back to the vessel receiver, hence providing an accurate positioning of the subsea transponder location. The LBL array provides accurate positioning by measuring ranges to three or more transponders deployed at known locations on the seabed and structures.

These transponders are utilised for the correct positioning of the subsea infrastructure. Transmissions are not continuous but consist of short 'chirps' with a duration that ranges from three to 40 milliseconds. If used, the LBL transponders are installed in stands on the seabed. Both the transponders and stands are recovered after installation. The USBL transponders are mounted on the subsea infrastructure and removed post installation.

Transponders may also be installed in stands on the seabed for vessel positioning. Both transponders and stands shall be removed post installation.

3.11.3.2 Installation of Structures

Subsea structures (i.e., subsea distribution unit, mudmats) are lowered to the seabed using the main crane positioned on an installation vessel to a pre-determined depth before engaging an ROV to guide it to the correct position.

As described above, the structures may be positioned using LBL array or USBL. Additional pre-deployed clump weights or sandbags can potentially be used to provide further assurance that the structures are positioned in the correct location and orientation.

3.11.3.3 Flexible Flowline Initiation/Initiation Anchor Deployment

Commencement of the flowline installation may require using an initiation anchor to pull against in order to provide the required tension to the flexible flowline as it transitions from the installation vessel to the seabed. The initiation anchor, which will be recovered after use, may consist of a clump weight.

Installation aids such as sandbag markers or concrete mattresses may be used for positioning aids or wet storage as required.

3.11.3.4 General Flexible Flowline and Flying Leads Installation

The installation contractor will mobilise an installation vessel to the field to install the flexible flowline and flying leads to the seabed. The installation vessel will operate in DP during installation activities.

The optimum flowline route is selected by considering seabed bathymetry, pre-installation surveys and installation risk management, including dropped object risks.

The indicative installation methodology and principle applied when installing the flowline is as follows:

- The flexible flowline is reeled onto either horizontal or vertical reels.
- VLS are installed on the vessel to lay the flexible flowline.
- During installation, a hydraulically driven centre reel drive is engaged to the reel to rotate the reel in synchronised speed with the VLS.

Installation sequence for flexible flowline is as follows:

- Prepare universal connection system and VLS onboard the vessel.
- Fit applicable subsea components (anodes, bend restrictors) to flexible flowline, perform tests and pre-deployment checks.
- Deploy flexible flowline, ROV guide tail end to initiation point and land out.
- Continue flexible flowline lay as per lay route while monitoring touchdown with ROV.
- Land out second end to final location and disconnect.

The flexible flowline may also be installed using a lighter installation spread on the installation vessel, via a deck-mounted powered reel system in combination with a deployment chute mounted on the side of the installation vessel and temporary installation aids placed on the seabed.

The flying leads are configured into deployment basket(s) and landed on the seabed using a crane. ROVs will complete the final subsea tie-in. Small volumes of MEG and HW443 will be released to subsea environment during HFL removal and installation.

3.11.3.5 Span/Scouring Rectification and Stabilisation

Spans are undulations in the seabed that do not provide sufficient support to the flowline. Spans are generally mitigated by installing structures, such as concrete mattresses, before installing the flowline. Engineering validation will determine if concrete mattresses need to be installed to mitigate spans. The dimensions for each concrete mattress are typically 6 m by 3 m by 0.3 m.

Post-lay span rectification may also be required after flexible flowline installation. This process typically involves placing grout bags under the span section. The empty bag is moved into position using ROV, then filled with grout supplied from a mixing and pumping spread on the vessel via a downline. Typical grout volumes depend on the size of the span and may vary from about 200 kg to 2000 kg per span.

If grout bags are used, the downline recovery time risks exceeding the grout curing time. If grout cures within the downline and pump, the equipment is likely to be rendered unserviceable, as well as the downline not being safely recoverable in the normal way. Therefore, after grouting activities at each span site, the downline and pump will need to be purged using seawater. This results in an amount of grout, approximately equivalent to the downline volume (5 m^3), being discharged to the ocean. This flushing is required once per grout site. The actual number is not known until the line is laid and need for span rectification determined, if any.

Scouring is the movement of seabed sediment (e.g., silt, sand and gravel) from around the base of a subsea structure to further afield due to prevailing hydrodynamic conditions, potentially compromising the integrity of a structure. Scouring is generally mitigated by installing mattresses along the perimeter of the installed structure. Concrete mattresses may be installed pending engineering verification.

Stabilisation is a post-lay activity to ensure that items, such as the flying leads remain at their installed positions, i.e., not being shifted due to strong seabed current. Stabilisation of flying leads is generally mitigated by installing sandbags on top of flying leads at a predetermined distance apart. Sandbags generally come in a standard size with 20 kg to 25 kg weight. Concrete mattresses may be used to stabilise the flexible flowline. Sandbags or concrete mattresses may also be used to provide temporary stability of wet stored items if wet storage proves necessary.

Sandbags or concrete mattresses may be installed for crossings over existing umbilicals or jumpers/flowlines.

3.11.3.6 Pre-commissioning of the Flexible Flowline

Leak testing is performed to test the integrity of subsea infrastructure, test isolations and identify any leaks. Pressure may be applied via a downline from the installation vessel or via ROV. Failure of testing equipment or integrity of the tested infrastructure may lead to a loss of leak test fluids to the marine environment. After the leak testing is completed, the system pressurisation volume may be released to the environment to mitigate the risk of hydrocarbons returning to the installation vessel.

During tie-in and pre-commissioning activities, any subsea connection breakouts will be preserved with chemical sticks. A small amount of chemically treated MEG/water may be discharged to the environment from the structure and tie-in flexible prior to final makeup of the connection. All chemicals used in pre-commissioning activities will be subject to the chemical selection assessment process described in Section 3.9.

3.11.3.6.1 Flooding

The flexible flowline will be installed filled with chemically treated ~50 wt% MEG/water. MEG is used to prevent formation of hydrates during start-up. Topping up of the flowline will occur when the pulling head is removed to install diverless connectors.

3.11.3.6.2 Leak Testing

Leak test/system pressure tests are performed to confirm the integrity of subsea connections and flowline. During leak testing there may be small volumes of test fluids discharged to environment during connection and disconnection of hot stabs.

3.11.3.7 Tie-in of Flowlines at Pluto Manifold

Prior to tie-in of the Xena-03 flowline to the Pluto manifold, verification testing of any leakage from the manifold isolation valves may be undertaken. This testing will verify that suitable isolations for safe tie-in are available, thereby preventing a major hydrocarbon release during tie-in. This verification may result in the release of hydrocarbons to the environment. The hydrocarbons are predominately gas with a small quantity of condensate. Additionally, when the flowline tie-ins take place, a quantity of hydrocarbons may be released. A conservative estimate of hydrocarbons that may be released during the flowline tie-in at the manifold is up to 400 L of condensate and residual gas over a 48-hour period. Water jetting and/ or acid injection may be used to clean the connections on the infrastructure prior to tie-in.

3.11.3.8 Cold Commissioning of Subsea Infrastructure

The commissioning associated with subsea infrastructure prior to the introduction of hydrocarbons (referred to as cold commissioning) generally includes subsea control systems verification and function testing of valves to verify that the hydraulic flying leads (HFLs) and electric flying leads (EFLs) are ready for entry into the start-up phase.

During cold commissioning, an ROV is deployed from the installation vessel (or similar support vessel) to provide visual confirmation of xmas tree valve actuation. This activity is typically less than 12 hours in duration.

3.11.3.9 Wet Storage of Equipment

Wet storage of infrastructure may be required intermittently throughout the duration of subsea installation activities as part of the Petroleum Activities Program. There are two categories of equipment that may require wet storage as part of the Petroleum Activities Program, as summarised in Table 3-18. At completion of Xena-03 Tie-back activities there will be no wet stored infrastructure remaining on the seabed.

Table 3-18: Wet storage that may be required as part of Xena-03 Tie-back activities

Wet Storage Category	Reason for Wet Storage	Typical Equipment	Retrieval Method
Installation aids	To facilitate safe installation of infrastructure	Predominately installation aids (subsea/ROV baskets, clump weights, grout bags and concrete mattresses (if used for temporary stabilisation), etc)	Retrieval will be undertaken using project vessels (Section 3.12) and associated equipment such as cranes, ROV, etc
Subsea installation	Prior to connection of infrastructure, wet storage may be necessary to optimise project schedule and support SIMOPS	Items may include flexible flowline, flying leads and wet parking/deployment frames, etc	Retrieval is not required, as infrastructure will be used for production operations and once connected is no longer considered wet stored

3.11.3.10 Maintenance of Subsea Infrastructure

All subsea structures installed during the PAP have been designed for full removal. The stored items will be removed during the subsea installation activities. Due to the design of equipment, the materials selected and short duration of subsea installation activities, all wet-stored equipment will be in a condition that allows for removal. The as-built survey will confirm that structures installed for production operations are in good condition and repair.

3.11.3.11 Site Surveys

Site surveys will be undertaken at various stages throughout the installation of subsea infrastructure. An initial pre-lay survey will be undertaken by the flexible flowline installation contractor before starting installation activities. The pre-lay survey may be performed by a dedicated pre-lay survey vessel which is typically similar in size to support vessels, or potentially by the installation vessel.

The pre-lay survey is a debris and hazard identification survey and not a full geophysical survey along the pre-determined route or proposed design route. While it is not anticipated that any significant debris may need to be removed before flexible flowline installation, if required, these activities will fall under this EP and will be performed by an installation vessel, a support vessel or similar.

Additional surveys, with an ROV, will be undertaken throughout the installation activities. These surveys will identify the location of all items placed on the seabed (including wet stored items and installed infrastructure). The survey data will be input into a computer program to track all subsea equipment and displayed on the 'survey screen' (comprising an AutoCAD file). This file will be progressively updated throughout the activities as items are placed and removed from the seabed (and in the title).

An as-built survey will be conducted by ROV at the completion of the installation campaign so that installation of equipment is in the designed location. This data will be used to update the 'survey screen' to develop the as-built report, which is considered the inventory of items remaining on the seabed (and in the title). In addition, any material items dropped to the marine environment and not recovered (see Section 6.9.8) will be added to the inventory for the title.

3.11.4 Xena-03 Commissioning (Initial Start-up) Activities

The commissioning (initial start-up) activities of the Xena-03 well and associated subsea infrastructure are planned to commence in 2025. All activities may be subject to rescheduling, including delay, based on operational requirements of the Pluto platform or other production scheduling reasons as well as project schedule changes. Topsides modifications on the Pluto facility are limited to controls updates.

Once hydrocarbons have been introduced into the system, preservation fluids are displaced to the Pluto platform, where they are processed, and wells are cleaned up to maximum rates. Performance testing may be undertaken such as Multi-Rate Testing, simulated ESD of Xena-03 well only, then Pressure Build-up testing. MEG of up to 100%, or a combination of MEG/treated water initially in the Xena-03 flowline arrives at the separator and is discharged via the produced water (PW) discharge route, along with residual completions fluids and fines from the well as part of well clean-up.

3.11.5 Contingent Activities for the Xena-03 Tie-back

The following sections present contingencies that may be required, if operational or technical issues occur during the Petroleum Activities Program. These contingencies have been considered within the relevant impact assessment sections and do not represent significant additional risks or impacts but may generate additional volumes of drilling fluids and cuttings being discharged operationally.

3.11.5.1 Respud

A respud may be required for a number of reasons, such as if the conductor or well head slumps or fails installation criteria (typically during top hole drilling). Re-spudding involves moving the MODU to a suitably close location (e.g., ~50 m from the original location) to recommence drilling. A respud activity would result in repeating top hole drilling (Section 3.11.1).

The environmental aspects of re-spudding are the same as those for drilling and are considered to be adequately addressed by this EP (Section 6.7), with no significant changes to existing environmental risks or any additional environmental risks likely. The net environmental effect will be limited to an increase in the volume of cuttings generated (Section 6.7.8) and increased volumes discharged.

3.11.5.2 Sidetrack

The option of a sidetrack instead of a respud may be required if operational issues are encountered. The environmental aspects of a sidetrack well are the same as those for routine drilling activities, which are considered to be adequately addressed by this EP (Section 6.7), with no significant changes to existing environmental risks or any additional environmental risks likely. The net environmental effect will be limited to an increase in the volume of cuttings generated (Section 6.7.8), potential increase in the use of drilling fluids and the additional emissions (atmospheric and waste) associated with an extended drilling program.

3.11.5.3 Workover

A workover may be performed on the Xena-03 well. A workover or intervention may be required to restore production or integrity due to a failed completion or component in the well. The environmental aspects of a workover operation are the same as those for well completion activities and are considered to be adequately addressed by this EP, with no significant changes to existing environmental risks or any additional environmental risks likely.

3.11.5.4 Non-water-based Mud System

The Xena-03 well is planned to be drilled entirely using WBM, however NWBM may be required for bottom hole sections as a contingency. The decision to use NWBM drilling fluids for the bottom hole sections of a well is based on a variety of technical factors relevant to wellbore conditions, such as well temperature, well shape and depth, reactivity of formation to water and well friction. The technical justification to use NWBM includes environment, health, safety and waste management considerations.

The use of NWBM drilling fluids is subject to a formal written commercial and/or technical justification approved in accordance with the Best Practice – Overburden Drilling Fluids Environmental Requirements. The main ingredient of NWBM is base oil, and similar to a WBM system, a range of standard solid and liquid additives may be added in the pits to alter specific mud properties for each section of the well, dependent on the conditions encountered while drilling.

The NWBM drilling fluid will be primarily mixed onshore (new or reuse of existing stock) and transferred to the MODU by a support vessel, where it is stored and maintained in the mud pits. During drilling operations, the NWBM drilling fluid, like the WBM, is pumped by high pressure pumps down the drill string and out through the drill bit, returning via the annulus between the drill string and the hole/casing back to the MODU via the riser.

The used NWBM pumped back to the MODU contains drill cuttings and is pumped to the solid control equipment (SCE), where the drill cuttings are removed before the NWBM is pumped back to the pits ready for reuse. The technical properties of the NWBM drilling fluids are maintained/altered (e.g., to increase weight) using additives as required when in the mud pits.

The NWBM drilling fluids that cannot be re-used (i.e., do not meet required drilling fluid properties or are mixed in excess of required volumes) are recovered from the mud pits and returned to the shore base for onshore processing, recycling and/or disposal. The mud pits and associated equipment/infrastructure are cleaned when NWBM is no longer required, with wash water treated onboard through SCE before discharge with mud pit washings, or returned to shore for disposal if discharge criteria cannot be achieved (refer to Section 3.5).

3.11.5.5 Well Suspension

During drilling activities, a well may need to be temporarily suspended. Suspension involves establishing suitable barriers, removing the riser and disconnecting the MODU from the well. The BOP may be left in place to act as a barrier. Suspension may be short term (e.g., in the case of a cyclone) or longer term (more than one year). On return to a well after suspension, the MODU reconnects to the well via the riser, and with BOP in place, barriers are removed and drilling and completions activity resumes.

3.11.5.6 Wireline Logging

Wireline contingencies that may be in place for development drilling include gamma ray and casing collar locator for depth correlation, ultrasonic imaging tool and cement bond log to measure cement integrity, formation pressures (XPT), density, neutron and resistivity and punch perforators/tubing cutters suitable for all tubing sizes. Wireline contingency work will be performed with appropriate isolation barriers in place, i.e., an overbalanced fluid column. If wireline work is required to occur in a live well, or where there is a risk of barrier failure, the operation will be performed with full pressure control equipment at the surface.

Some logging tools may contain low activity radiation sources. Radiation fields are not generally detectable outside the tool when the tool is not energised; therefore, they do not present an environmental risk.

3.11.5.7 Well Intervention

An intervention may be performed on the Xena-03 well. Interventions may be performed due to down-hole equipment failure or to address underperformance of a well. Key well intervention methods include wireline and coiled tubing. Potential environmental impacts from intervention activities have been included in this EP, including discharge of suspension fluids and brines and small volume gas releases subsea due to removal of a tree cap which may be in place if the well was previously suspended.

3.11.5.8 Well Abandonment

The PAP covers the drilling and intervention of the Xena-03 well, which is not envisaged to be abandoned until the end of the production field life. For technical reasons, the lower section of a well may need to be abandoned, before side-tracking, or if a respud is required.

Well abandonment activities are conducted in accordance with Woodside's internal standards. Base oil may be used for inflow testing before abandonment, to verify barrier integrity. Base oil would be pumped down the drill string and reverse circulated back to the rig, with fluids collected for disposal onshore. If stored in a mud pit, the base oil and other fluids associated with the test may result in pit wash water contaminated with hydrocarbons. If this is the case, mud pit wash water would be discharged in accordance with requirements in this EP; with a hydrocarbon content <1% by volume.

If required, wells will be abandoned with abandonment cement plugs, including verification of cement plug by tagging and/or pressure testing through a prescribed program. A lower section of a well may also be abandoned before side-tracking.

After abandonment activity, the marine riser and BOP will be removed and every reasonable attempt made to retrieve the wellhead. Conventional wellheads are removed by deploying a cutting device

on drill pipe which then cuts through the casing and conductor, allowing the wellhead to be retrieved to the surface. Backup cutting equipment is sent offshore as a contingency should the primary set of equipment fail. The conductor cutting equipment is very reliable with a high success rate of cutting wellheads.

If these recognised removal techniques are ineffective, the wellhead may be left in-situ. The integrity of the wellbore is not affected by the wellhead assembly remaining in-situ.

3.11.5.9 Wellhead Assembly Left In-situ

If a well is abandoned due to the requirement to respud, the wellhead assembly may be left in-situ if recognised removal techniques are ineffective. Well abandonment activities would be performed as outlined in Section 3.11.5.8 but the well assembly would remain. The integrity of the wellbore is not affected by the wellhead assembly remaining in-situ. The environmental aspects of the wellhead assembly remaining in-situ as a contingent activity are considered to be adequately addressed by this EP (Section 6.7.2) with no significant changes to existing environmental risks or any additional environmental risks likely.

Final decommissioning of the development wellhead assembly and other subsea infrastructure at the end of field life will be subject to a separate EP. Woodside's Decommissioning Framework is discussed further in Section 7.5.

3.11.5.10 Sediment Mobilisation and Relocation

If required, an ROV-mounted suction pump/dredging unit may be used to relocate sediment/cuttings around the wellhead or other infrastructure, to keep the area clear and safe for operations and equipment. This activity has the potential to generate plumes of suspended sediment during pumping and disturb benthic fauna in the immediate area.

3.11.5.11 Venting

During drilling of the well, a kick may occur. A kick is an undesirable influx of formation fluid into the wellbore. To maintain well integrity in this situation, a small volume of greenhouse gas is released to the atmosphere via the degasser, in a well control operation known as 'venting'.

3.11.5.12 Emergency Disconnect Sequence

An emergency disconnect sequence (EDS) may be implemented if the MODU is required to rapidly disengage from the well. The EDS closes the BOP (i.e., shutting in the well) and disconnects the riser to break the conduit between the wellhead/BOP and MODU. Common examples of when this system may be initiated include the movement of the MODU outside of its operating circle (e.g., due to a failure of the DP system) or the movement of the MODU to avoid a vessel collision (e.g., third-party vessel on collision course with the MODU). EDS aims to leave the wellhead and BOP in a secure condition but will result in loss of the drilling fluids/cuttings in the riser after disconnection.

3.12 Vessel-based Activities for the Xena-03 Tie-back

During the Xena-03 Tie-back activities, vessel-based activities will involve the MODU, subsea installation vessels and support vessels such as anchor handling vessels (AHVs).

For power generation, vessels may use diesel-powered generators and/or LNG. All vessels will display navigational lighting and external lighting, as required for safe operations. The MODU and support vessels will be lit to maintain operational safety on a 24-hour basis. Vessel activities while in transit to the PAA are not included in the scope of this EP.

3.12.1 Mobile Offshore Drilling Unit

The Xena-03 well will be drilled by a moored, or hybrid MODU. Contingent well intervention activities may also be performed by a moored or hybrid MODU. Typical specifications for a moored and hybrid MODU are provided in Table 3-19 and Table 3-20, respectively. Moored and hybrid MODU types are collectively referred to as MODU for the remainder of the document unless specific risks for different MODU types have been identified. Due to variabilities such as contractual and operational matters, the MODU used may be subject to change.

Table 3-19: Typical moored MODU specifications for Ocean Apex

Component	Specification Range
Rig Type/Design/Class	Semi-submersible MODU
Accommodation	120 to 200 personnel
Station Keeping	Eight-point or twelve-point mooring system
Bulk Mud and Cement Storage Capacity	283 to 770 m^3
Liquid Mud Storage Capacity	576 to 2500 m^3
Fuel Oil Storage Capacity	966 to 1400 m^3
Drill Water Storage Capacity	3500 m^3

Table 3-20: Typical hybrid MODU specifications for Transocean Endurance

Component	Specification
Rig Type/Design/Class	Semi-submersible MODU
Accommodation	130 persons (maximum persons on board)
Station Keeping	Eight-point or twelve-point mooring system with thrusters for Dynamic Positioning (DP3)
Bulk Mud and Cement Storage Capacity	340 m^3
Liquid Mud Storage Capacity	1445 m^3
Fuel Oil Storage Capacity	2600 m^3
Drill Water Storage Capacity	1508 m^3

3.12.2 Installation Vessels

The PAP subsea installation scopes of work may require various installation vessels, with sufficient capacity to accommodate hardware and equipment such as flowlines, flexible flowlines, umbilicals and the cold commissioning/dewatering spreads.

A typical installation vessel for subsea and flowline installation would be a DP vessel (usually DP2 Class) equipped with a primary differential global surface positioning system (DGPS) and an independent secondary DGPS backup. The specification of a typical subsea installation vessel is provided in Table 3-21.

Installation vessels are typically equipped with various material handling equipment, which includes cranes, winches, remotely operated vehicles (ROVs) and ROV launch and recovery systems, vertical lay system (VLS) with either vertical reel drive or horizontal reel drive (carousel) and cold commissioning spread.

Lifting operations may involve loading and unloading equipment from support and supply vessels onto the installation vessel and subsequently onto the seabed. Cranes are typically equipped with active heave compensation and auto tension, modes and have lifting capacities in excess of lifting loads expected to be encountered during operations.

Table 3-21: Typical DP2 Class subsea installation vessel for Deep Orient

Component	Specification Range
Vessel Type	DP2 Class as a minimum
Crane Capacity	250 T active heave compensation crane as minimum
ROVs	Two Work Class ROVs
Deck Space	Approximately 1900 m²
Deck Strength	Approximately 15 T/m²
Accommodation	Approximately 120 people
Fuel Oil	Approximately 2200 m³
Potable Water	Approximately 800 m³

3.12.3 Support and Other Vessels

During the PAP, the MODU and installation vessel will be supported by other vessels, such as general support vessel(s)and AHVs.

General support vessels are used to transport equipment and materials between the MODU/installation vessel and port (e.g., Dampier, Onslow, Exmouth). When required, a support vessel will perform standby duties at the MODU. During this time, support vessels will make regular trips between the Xena-03 Operational Area to port for routine, non-routine and emergency operations. Subsea Support vessels as described in Section 3.8.2 may also be used.

Support vessels will be using their DP system within the Xena-03 Operational Area. The support vessels are also available to assist in implementing the Oil Pollution First Strike Plan, should an environmental incident occur (e.g., spills).

3.12.4 Subsea Support Vessel for Light Well Intervention Activities

During the Petroleum Activities Program, a subsea support vessel for light well intervention operations may be used as an option for contingent well intervention, subsea installation and other activities. An example of this vessel type is the Sapura Constructor, which is a 117 m long subsea support vessel equipped with a saturation dive system, two Work Class ROVs, well intervention equipment, a helideck, moon pool and accommodation for 120 persons. The final vessel selection, if required, will be subject to commercial and/or operational considerations.

3.12.5 Holding Station: Mooring Installation and Anchor Hold Testing/Soil Analysis

Mooring uses a system of chains/ropes and anchors, which may be pre-laid before the MODU arrives at the location, to maintain position when drilling. Mooring analysis will be undertaken to determine the appropriate mooring system for the PAP. The mooring analysis will identify whether the mooring systems are pre-laid or set by the rig, proof tension values, and if synthetic fibre mooring ropes are required. Pre-laid systems are often selected and designed to withstand higher sea states than the rig's mooring system or to provide additional clearance/protection of subsea infrastructure when deemed necessary in the mooring analysis.

Installation and proof tensioning of anchors involves some disturbance to the seabed. Anchor handling vessels (AHVs) are used in the deployment and recovery of the mooring system.

As part of mooring preparations, anchor hold testing may be conducted at the well locations. Anchor hold testing would be undertaken if Woodside determines that further assurance is required to ensure a robust mooring design.

Anchor hold testing may involve an AHV or similar vessel deploying an anchor at a potential mooring location. The AHV would then tension the anchor to determine its ability to hold, embed and not drag at location. This may have to be repeated several times at each location. An ROV may also be used

to evaluate how deep the anchor has embedded and independently verify the seabed condition. Anchor hold testing activities would occur prior to the MODU arriving on location.

Soil analysis may also be necessary to provide data on composition and rock/substrate strength as input into the mooring design and to verify seabed conditions for anchor holding. Soil analysis could include taking a physical sample of the seabed using ROV or other tools or using measuring devices such as a cone penetrometer. These tests would be carried out up to several months prior to MODU arriving on location and may occur from a support vessel or an AHV.

3.12.6 Holding Station: Rig Anchor Release Mobile Offshore Drilling Unit

The hybrid MODU scenario is such that the MODU is DP capable though predominantly holds station via a pre-laid mooring system. If a hybrid MODU is used to conduct drilling, it will likely have a rig anchor release (RAR) system integrated as a contingency case for cyclone season. A traditional arrangement with no RAR (for lines passing over subsea assets) and rig- or prelay-lines (for lines clear of subsea assets) will likely be used as the base case in non-cyclone seasons.

The moorings are typically pre-laid in an eight-point arrangement, with a RAR device connecting the MODU mooring components with the anchor mooring components. The RAR is an acoustic release connecting link that can be installed in a mooring line to enable a rapid disconnection of a MODU from the mooring system. Each mooring leg would have one RAR installed in the mooring line.

The acoustic release process is instigated from a command unit on the MODU that, when activated, transmits a low frequency signal (9–11 kHz) that is received by the RAR transducer in the mooring line and activates the primary hydraulic actuator. The hydraulic actuator then releases the locking mechanism of the RAR, and the mooring line is disconnected. The MODU then recovers the MODU wire/chain ready for transit (on DP) and the subsea mooring leg remains on the seabed. Anchor lines crossing subsea infrastructure, will be buoyed to maintain clearance from the subsea assets after a disconnection (either on the surface or suspended in the water column).

To reconnect the MODU with the mooring system after a disconnection, the AHV will recover the MODU mooring line (including RAR and the trigger sleeve) from the MODU before connecting to the pre-laid line, which is recovered from the seabed or water column by the AHV using an ROV.

3.12.7 Mobile Offshore Drilling Unit and Support Vessel Activities

A variety of materials are routinely bulk transferred from support vessels to the MODU including drilling fluids (e.g., muds), base fluids, cements and drill water. A range of dedicated bulk transfer stations and equipment are in place to accommodate the bulk transfer of each type of material. There is also a capacity to bulk transfer waste oil from the MODU to the support vessel, for back loading and disposal on shore.

The loading and back-loading of equipment, materials and wastes is one of the most common supporting activities conducted during drilling programs. Loading and back-loading is performed using cranes on the MODU to lift materials in appropriate offshore rated containers (e.g., ISO tanks, skip bins, containers) between the MODU and support vessel.

Seawater is pumped on board and used as a heat exchange medium for cooling machinery engines and high temperature drilling fluid on the MODU. It is subsequently discharged from the MODU at the sea surface at potentially a higher temperature. Alternately, MODUs may use closed loop cooling systems.

Potable water, primarily for accommodation and associated domestic areas, may be generated on vessels using a reverse osmosis plant. This process will produce brine, which is diluted and discharged at the sea surface.

The MODU and support vessels will also discharge deck drainage from open drainage areas, bilge water from closed drainage areas, putrescible waste and treated sewage and grey water. Solid hazardous and non-hazardous wastes generated during the PAP are disposed of onshore by support

vessels. The MODU and support vessels may also take on or discharge ballast water to maintain vessel stability.

3.12.8 Subsea Installation and Support Vessel Activities

An installation vessel may be used for various subsea installation activities such as pre- and post-installation survey, installation of subsea structures, installation of the flowline, installation of interconnecting HFL, EFL and MEG jumper, tie-in to existing infrastructure, and cold commissioning activities. Other support vessels may also be used to transport equipment, hardware and MEG from shore to the installation vessel.

3.12.9 Refuelling

The MODU will be refuelled via support vessels approximately once a month, or as required. Refuelling will occur within the Xena-03 Operational Area and has been included in the risk assessment for this EP. Other fuel transfers that may occur on board the MODU may include refuelling of cranes, helicopters or other equipment as required. As the base case, refuelling of installation vessels is planned to occur outside of the Operational Area during interim mobilisation/demobilisation.

4. DESCRIPTION OF THE EXISTING ENVIRONMENT

4.1 Overview

In accordance with Regulations 21(2) and 21(3) of the Environment Regulations, this section describes the existing environment that may be affected by the activity (planned and unplanned, as described in Section 2.4), including details of the particular relevant values and sensitivities of the environment, which were used for the risk assessment.

The EMBA is the largest spatial extent where unplanned events could have an environmental consequence on the surrounding environment. For this EP, the EMBA is the potential spatial extent of surface and in-water hydrocarbons at concentrations above ecological impact thresholds, for this EP a loss of well integrity (from drilling of Xena-03 and an operational well), potential marine diesel loss of containment release in the offshore area, and a nearshore subsea loss of containment scenario. The ecological impact thresholds used to delineate the EMBA are defined in Section 6.8.2.2.The EMBA also includes any areas that are predicted to experience shoreline contact with hydrocarbons above threshold concentrations.

Woodside recognises that hydrocarbons may be visible beyond the EMBA at lower concentrations than the ecological impact thresholds defined in Section 6.8.2.2. These visible hydrocarbons are not expected to cause ecological impacts. In respect of this, an additional socio-cultural EMBA is defined, as the potential spatial extent within which social-cultural impacts may occur from changes to the visual amenity of the marine environment. Receptors relevant to the socio-cultural EMBA include cultural values and heritage, Commonwealth and State marine protected areas (MPAs), National and Commonwealth Heritage Listed places, areas of tourism and recreation, and commercial and traditional fisheries. The EMBA and socio-economic EMBA are shown in

Figure 4-1 and described in Table 4-1.

The EMBA presented does not represent the predicted coverage of any one hydrocarbon spill or a depiction of a slick or plume at any particular point in time. Rather, the areas are a composite of a large number of theoretical paths, integrated over the full duration of the simulations under various metocean conditions.

Table 4-1: Hydrocarbon spill thresholds used to define the EMBA for surface and in-water hydrocarbons

<table>
<tr><th>Hydrocarbon Type</th><th>EMBA[1]</th><th>Socio-cultural EMBA[1]</th><th>Planning Area for Scientific Monitoring</th></tr>
<tr><td>Surface</td><td>10 g/m²
This represents the minimum oil thickness (0.01 mm) at which ecological impacts (e.g., to birds and marine mammals) are expected to occur.</td><td colspan="2">1 g/m²
This represents a wider area where a visible sheen may be present on the surface and, therefore, the concentration at which socio-cultural impacts to the visual amenity of the marine environment may occur. However, it is below concentrations at which ecological impacts are expected to occur.
This low exposure value also establishes the planning area for scientific monitoring (NOPSEMA Environment bulletin: A652993, April 2019).</td></tr>
<tr><td>Dissolved</td><td colspan="2">50 ppb
This represents potential toxic effects, particularly sublethal effects to highly sensitive species (NOPSEMA Environment bulletin: A652993, April 2019). As dissolved hydrocarbons are within the water column and not visible, impacts to socio-cultural receptors are associated with ecological impacts. Therefore, dissolved hydrocarbons at this threshold also represent the level at which socio-cultural impacts may occur.</td><td rowspan="2">10 ppb
This low exposure value establishes the planning area for scientific monitoring (based on potential for exceedance of water quality triggers) (NOPSEMA Environment bulletin: A652993, April 2019). This area is described in Appendix H: Oil Spill Preparedness and Response Mitigation Assessment.
In the event of a spill, DNP will be notified of AMPs which may be contacted by hydrocarbons at this threshold.</td></tr>
<tr><td>Entrained</td><td colspan="2">100 ppb
This represents potential toxic effects, particularly sublethal effects to highly sensitive species (NOPSEMA Environment bulletin: A652993, April 2019). As entrained hydrocarbons are within the water column and not visible, impacts to socio-cultural receptors are associated with ecological impacts. Therefore, entrained hydrocarbons at this threshold also represent the level at which socio-cultural impacts may occur.</td></tr>
<tr><td>Shoreline</td><td>100 g/m²
This represents the threshold that could impact the survival and reproductive capacity of benthic epifaunal invertebrates living in intertidal habitat.</td><td>10 g/m²
This represents the volume where hydrocarbons may be visible on the shoreline but is below concentrations at which ecological impacts are expected to occur.</td><td>N/A.</td></tr>
</table>

[1] *Further detail, including the source of the thresholds used to define the EMBA in this table, are provided in Section 6.8.2.2*

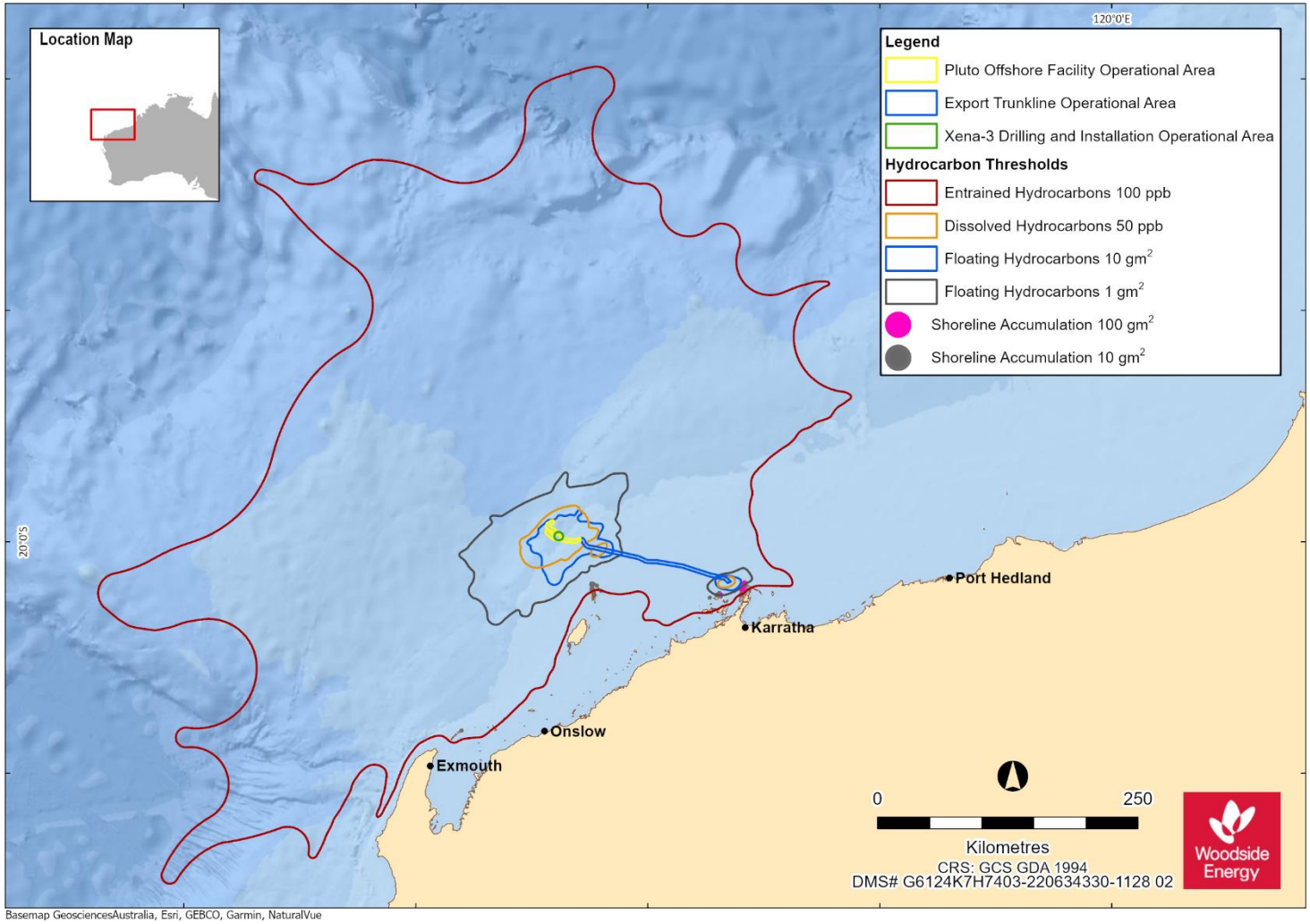


Figure 4-1: EMBA by the Petroleum Activities Program

4.2 Regional Context

The PAA is located in Commonwealth waters within the North-west Marine Region (NWMR), as defined under the Integrated Marine and Coastal Regionalisation of Australia (IMCRA v4.0) (Commonwealth of Australia, 2006). Within the NWMR, the Export Trunkline Operational Area lies within the North West Shelf Province, while the Pluto Facility and Xena-03 drilling and installation Operational Areas lie across the boundary of the North West Shelf Province and the Northwest Province. Woodside's Master EE (Appendix K) summarises the characteristics for the relevant marine bioregions.

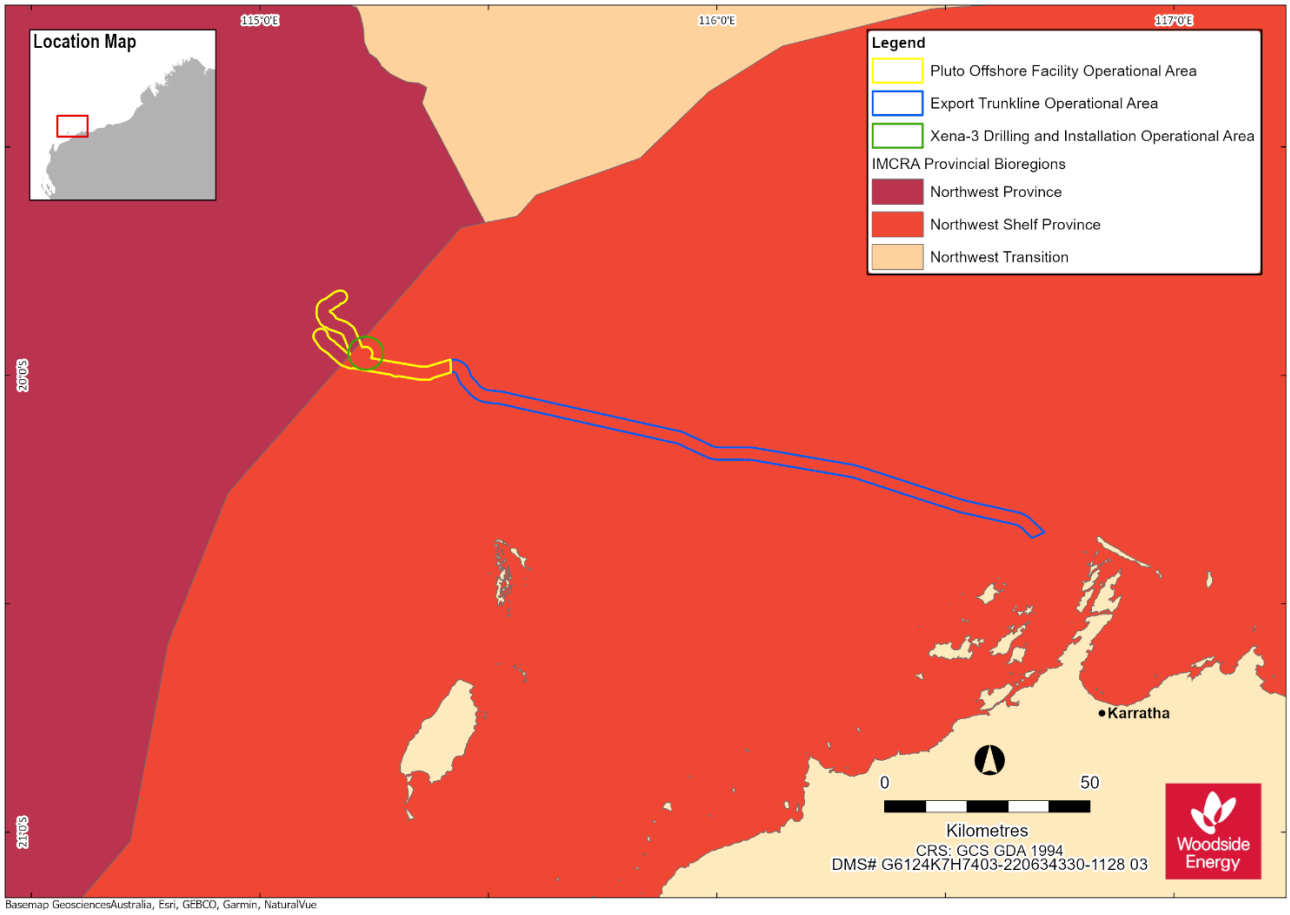


Figure 4-2: Location of the Petroleum Activities Area and relevant marine bioregions

4.3 Matters of National Environmental Significance (EPBC Act)

Table 4-2 and Table 4-3 summarise the MNES overlapping the PAA and EMBA, respectively, according to Protected Matters Search Tool (PMST). It should be noted that the EPBC Act PMST is a general database that conservatively identifies areas in which protected species have the potential to occur. The PMST conducts searches to determine the presence/absence of MNES based on a conservative grid-based search function. Marine areas >30 km from the coast are subject to 32 km × 32 km grid cells to determine the spatial overlap with listed MNES. It is therefore possible that the PMST report (Appendix D) overestimates the presence of MNES within the Operational Area or EMBA. So that any impacts from the Petroleum Activity on MNES are accurately considered, shapefiles (provided by DCCEEW) are also assessed using Geographic Information System software to determine the actual presence and distance to MNES.

Additional information on these MNES is provided in subsequent sections of this chapter and described in detail in Appendix K.

Table 4-2: Summary of MNES identified by the EPBC Act Protected Matters Search Tool as potentially occurring within the PAA

MNES	Number	Relevant Section
World Heritage Properties	0	Section 4.9.9
National Heritage Places	0	Section 4.9.9
Wetlands of International Importance (Ramsar)	0	Appendix K
Commonwealth Marine Area	0	Appendix K
Listed Threatened Ecological Communities	0	Appendix K
Listed Threatened Species	24	Section 4.6
Listed Migratory Species	41	Section 4.6

Table 4-3: Summary of MNES identified by the EPBC Act Protected Matters Search Tool as potentially occurring within the EMBA

MNES	Number	Relevant Section
World Heritage Properties	1	Section 4.9.9
National Heritage Places	2	Section 4.9.9
Wetlands of International Importance (Ramsar)	0	Appendix K
Commonwealth Marine Area	3	Appendix K
Listed Threatened Ecological Communities	0	Appendix K
Listed Threatened Species	53	Section 4.6
Listed Migratory Species	62	Section 4.6

4.4 Physical Environment

The PAA is characterised by both the continental shelf and the continental slope of the NWMR. The export pipeline lies entirely in continental shelf waters from the State waters boundary to the facility. Water depth along the export pipeline is between 40 and 85 m. Water depth at the Pluto offshore facility (at the riser platform) is 85 m and the subsea gathering system extends downslope to depths of ~960 m.

The bathymetry within the continental shelf section of the PAA is generally flat, which is consistent with the broader NWS Province (Baker et al., 2008). Bathymetry around the riser platform is relatively flat and featureless (Woodside, 2006). Across the shelf, the seabed has a gentle (approximately 0.05°) seaward gradient to where it transitions to a steep distal slope approximately 200 to 300 km offshore, in water depths of around 200 m (Dix et al., 2005). The continental slope descends relatively rapidly from the shelf edge to depths greater up to 5,000 m within the Northwest Province (James et al., 2004; Woodside, 2006).

Within the broader Northwest Province, the continental slope comprises seven major geomorphic features, including plateaus, deeps/holes/valleys, terraces, trenches/troughs and canyons (Baker et al., 2008). Key features overlapping the subsea hydrocarbon gathering system section of the facility include:

- a number of canyon systems which trend east-west across the continental slope and have an increased seafloor gradient of up to 80°

- approximately 20 m high cliff-like structures at 1000 m depth where the continental slope meets the abyssal plain
- mudstone outcrops at 900 to 1000 m
- a field of rock pinnacles (2 to 3 m tall and 1 m wide and in an area covering approximately 4 × 1 km) of biogenic origin located at a depth of 300 to 500 m on the continental slope within WA-34-L.

Appendix K provides a summary of the physical characteristics of the environment within the EMBA.

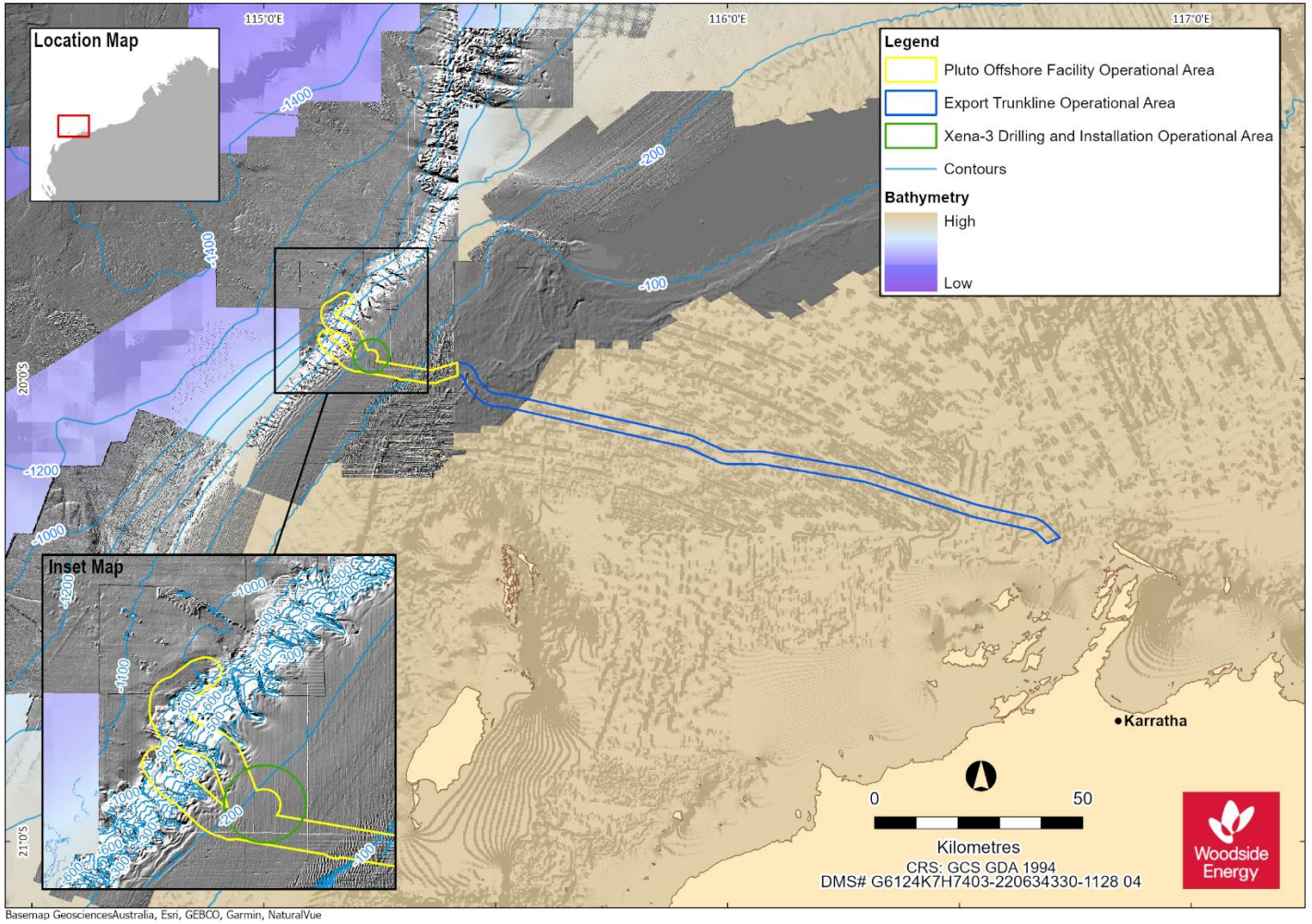


Figure 4-3: Location and bathymetry for the Petroleum Activities Area

4.5 Habitats and Biological Communities

Sediments in the outer NWMR are relatively homogenous and are typically dominated by sands and a small portion of gravel (Baker et al., 2008). Sediments sampled in 2021 around the facility were predominately well sorted, medium to coarse sands with very low TOC content (BMT 2022). Fine sediment size classes (e.g., muds) increase with proximity to the shoreline and the shelf break but are less prominent in the intervening continental shelf (Baker et al., 2008). Carbonate sediments typically account for the bulk of sediment composition, with both biogenic and precipitated sediments present on the outer shelf (Dix et al., 2005). Beyond the shelf break within the NWMR (200 m depth contour), the proportion of fine sediments increases along the continental slope towards the abyssal plain (Baker et al., 2008).

Prior to commissioning of the facility, seabed surveys of the Facility Operational Area were completed. The survey revealed that the seabed around the riser platform comprised soft sediments, with surface layer of sand between 1–4 m thick overlying cemented sands, typical of the region (SKM, 2007; Woodside, 2006). Seabed surveys along the export pipeline route found sediments were predominantly fine sand with variable proportions of coarser sand fractions, silt, shells and shell fragments, coral cemented materials (including calcarenite gravel and cobbles) (SKM, 2006; Woodside, 2006). In 2021, a survey of the benthic habitats around the facility was completed and results showed habitats predominantly comprised of unconsolidated (soft) sand and mud of possible biogenic origins containing shell fragments and a low cover (<20%) of biota that mostly consisted of a mixed community of poriferans (erect, crust, cup-like and massive forms) and cnidarians (sea whips, sea pens, sea fans, soft corals and hydroids) (BMT 2022).

Within WA-34-L on the continental slope, sediments ranged from fine sands to silts, with sediments generally becoming finer with increasing water depth down to 600 m for both slope and canyon transects. Below 600 m, sediment became slightly coarser, but still relatively fine compared to continental shelf sediments (between 150–200 m) (SKM, 2007). This is expected to be characteristic of the sediment across the subsea hydrocarbon gathering system section of the facility.

While the PAA comprises of mainly soft sediments, two Key Ecological Features (KEFs) overlap the Facility Operational Area, including the Ancient Coastline at 125 m Depth Contour KEF and the Continental Slope Demersal Fish Communities KEF (Figure 4-10). The Xena-03 Operational Area also overlaps the Continental Slope Demersal Fish Communities KEF. Areas of hard substrate may be associated with these KEFs, which are considered to support more diverse benthic communities that are characteristic of the wider region. Refer to Section 4.7 and Appendix K for information on the environmental values of KEFs overlapping the PAA and EMBA.

Key habitats and ecological communities within the EMBA are identified in Table 4-4 and described in Appendix K.

Table 4-4: Key sensitive habitats and communities within the EMBA (distance calculated from PAA)

Habitat/Community	Key Locations Within the EMBA
Seabed characteristics	
Ancient Coastline at 125 m depth contour	Several steps and terraces as a result of Holocene Sea level changes occur in the region with the most prominent of these features occurring as an escarpment along the NWMR and Sahul Shelf at a water depth of 125 m, which forms the Ancient Coastline at 125 m depth contour KEF (the Ancient Coastline). The Ancient Coastline KEF overlaps the Facility Operational Area, extending along a line approximated by the 125 m isobath Section 4.7. The Ancient Coastline is not continuous throughout the NWMR and coincides with a well-documented eustatic stillstand at approximately 130 m worldwide (Falkner et al., 2009). Where the Ancient Coastline provides areas of hard substrate, it may contribute to higher diversity and enhanced species richness relative to soft sediment habitat (Falkner et al., 2009). Parts of the Ancient Coastline, represented as rocky escarpment, are considered to provide biologically important habitat in an area predominantly made up of soft sediment. The escarpment type features may also potentially facilitate mixing within the water column due to upwelling, providing a nutrient rich environment. Although the Ancient Coastline adds additional habitat types to a representative system, the habitat types are not unique to the coastline as they are widespread on the upper shelf (Falkner et al., 2009). Detail regarding these features is provided in Section 4.7 and Appendix K.
Continental slope demersal fish communities	The continental slope demersal fish communities in the region have been identified as a KEF of the NWMR (DSEWPaC, 2012) and overlaps the Facility Operational Area and Xena-03 Operational Area. The continental slope between North West Cape and the Montebello Trough has been identified as one of the most diverse slope assemblages in Australian waters, with over 508 fish species and the highest number of endemic species (76) of any Australian slope habitat (DEWHA, 2008). Detail regarding these features is provided in Section 4.7 and Appendix K.
Marine primary producers (distances from the PAA)	
Coral	Rankin Bank (29 km north-east) Montebello Islands State Marine Park (25 km south) Barrow Island State Nature Reserve (43 km south) Dampier Archipelago Island Reserves – Rosemary Island (13 km south) Lowendal Islands (61 km south-west) Muiron Islands (195 km south-west) Ningaloo Coast World Heritage Area (WHA) (incl. Muiron Islands) (195 km south-west)
Seagrass beds and macroalgae	Montebello Islands (25 km south-west) Barrow Island (67 km south-west) Muiron Islands (195 km south-west) Ningaloo Coast (195 km south-west) Exmouth Gulf (225 km south-west)
Mangroves	Montebello Islands (32 km south) Ningaloo Coast (195 km south-west) Exmouth Gulf (225 km south-west)

Habitat/Community	Key Locations Within the EMBA
Other communities and habitats	
Plankton	Plankton within the PAA and EMBA are expected to be representative of the wider NWMR, as detailed in Appendix K Primary productivity of the NWMR appears to be largely driven by offshore influences (as reported by Brewer et al., 2007), with periodic upwelling events and cyclonic influences driving coastal productivity with nutrient recycling and advection. There is a tendency for offshore phytoplankton communities in the NWMR to be characterised by smaller taxa (e.g. bacteria), whereas shelf waters are dominated by larger taxa such as diatoms (Hanson et al., 2007). Within the wider EMBA, peak primary productivity occurs in late summer/early autumn, along the shelf edge of the Ningaloo Reef. It also links to a larger biologically productive period in the area that includes mass coral spawning events, peaks in zooplankton and fish larvae abundance (Department of Conservation and Land Management, 2005) with periodic upwelling throughout the year.
Pelagic and demersal fish populations	Pelagic and demersal fish populations within the PAA and EMBA are expected to be representative of the NWMR (described in Appendix K). The presence of subsea infrastructure with the facility and export pipeline has likely resulted in the development of demersal fish communities that would otherwise not occur within the PAA (McLean et al., 2017). Given continental shelf waters overlap the majority of the Operational Area, pelagic species will also be present. The Continental Slope Demersal Fish Communities KEF and Ancient Coastline at 125 m Depth Contour KEF overlap the Facility Operational Area. These KEFs include areas of hard substrate that are known or likely to support a higher diversity of demersal fish assemblages. Rankin Bank (29 km north-east of the PAA) has also been identified as supporting high demersal fish richness and abundance (Australian Institute of Marine Science, 2014). Further information KEFs is provided in Section 4.7. Fish species in the NWMR (including the PAA and the EMBA) comprise small and large pelagic and demersal species. Small pelagic fish inhabit a range of marine habitats, including inshore and continental shelf waters. They feed on pelagic phytoplankton and zooplankton and represent a food source for a wide variety of predators including large pelagic fish, sharks, seabirds and marine mammals (Mackie et al., 2007). Large pelagic fish in the NWMR include commercially targeted species such as mackerel, wahoo, tuna, swordfish and marlin. Large pelagic fish are typically widespread, found mainly in offshore waters (occasionally on the shelf) and often travel extensively. Detail regarding these features is provided in Appendix K.
Epifauna and infauna	Filter feeders such as sponges, ascidians, soft corals and gorgonians are animals that feed by actively filtering suspended matter and food particles from water by passing the water over specialised filtration structures (DEWHA, 2008). Filter feeders within the EMBA are expected to be representative of the NWMR, with notable areas of high sponge diversity occurring in the Commonwealth Waters of Ningaloo Marine Park and at shoals within the EMBA. Filter feeders generally live in areas that have strong currents and hard substratum and are closely associated with substrate type, with areas of hard substrate typically supporting more diverse epibenthic communities (Heyward et al., 2001a). Conversely, higher diversity infauna is mainly associated with soft unconsolidated sediment and infauna communities are considered widespread and well represented along the continental shelf and upper slopes of the NWMR (Brewer et al., 2007a; Rainer, 1991; SKM, 2007b; Woodside Energy Limited, 2004). A number of targeted surveys investigating epibenthos and infauna within offshore NWSP shelf and slope environments have been carried out by Woodside. Woodside has collected survey data from numerous sampling locations within and surrounding the Operational Area using ROV/video investigations of benthic habitats and infauna and epifauna sampling using sediment grabs and epibenthic sled (SKM, 2007). Elsewhere on the NWSP, surveys have included grab samples of seabed sediments from around North Rankin Complex, Goodwyn A, Angel facilities and their export pipeline routes (SKM, 2007), as well as additional sampling throughout the broader region (SKM, 2007b). In 2021, a survey of the benthic habitats around the Pluto A offshore facility was completed

Habitat/Community	Key Locations Within the EMBA
	and results showed habitats predominantly comprised of unconsolidated (soft) sand and mud of possible biogenic origins containing shell fragments and a low cover (<20%) of biota that mostly consisted of a mixed community of poriferans (erect, crust, cup-like and massive forms) and cnidarians (sea whips, sea pens, sea fans, soft corals and hydroids) (BMT 2022). Benthic grab sampling in the vicinity of the continental slope region of the Operational Area revealed a sparse abundance, high variability and high diversity of infauna dominated by polychaetes with other fauna including nemerteans and sipunculids and crustaceans (mainly amphipods) (SKM, 2007). Higher, albeit low, infauna density was reported at the shelf break (200 m) compared to deeper areas on the continental slope. Epifaunal sled samples to 800 m depth including from inside and outside the canyon systems on the continental slope found deepwater solitary cnidarians were the most common fauna in samples, followed by crustaceans (mostly decapods), bony fish and sponges, with urchins, sea stars and brittle stars also recorded (SKM, 2007). Epifauna, cnidarians and demersal fish were also more common in samples taken at 200 m compared to deeper depths and it was noted other epifauna groups showed some variation in abundance with depth (SKM, 2007). These survey findings at the facility were typical of other surveys in the region which revealed deep water habitats consist primarily of bare unconsolidated carbonate sediments supporting a sparse assemblage of deposit and filter feeding organisms, including glass sponges, urchins, sea cucumbers, sea stars and crustaceans (Mobil, 2011; Heyward et al., 2001; URS, 2010). Only limited areas of deepwater hard substrate have been observed over the continental slope, namely rock pinnacles on the upper continental slope and exposed cliff-like features and relatively soft expanses of mudstone outcrops on the mid continental slope. Benthic fauna is closely associated with substrate type, with areas of hard substrate typically supporting more diverse epibenthic communities (Heyward et al., 2001a). Rock pinnacles possibly formed by the deep-water coral Lophelia spp. (few live specimens were observed with low cover) were found in a small portion of the Pluto reservoir (4 × 1 km area) at a depth of 300–500 m and observed to provide habitat for fish, shrimp, hydroids and anemones (SKM, 2007). Exposed cliff-like features of banded sedimentary rock (approximately 20 m in height) were observed at around 1000 m deep. ROV survey findings showed no epifauna on exposed rock, possibly due to their vertical orientation and water flow which may impede settlement (SKM, 2007). However, anemones and fish were observed in areas on more sloping areas among the cliff-like features where sediment had accumulated. At approximately 900–1000 m, mudstone outcrops were also observed dominated by glass sponges. Discrete areas of hard substrate hosting sessile filter feeding communities may also be associated within the Ancient Coastline at the 125 m Depth Contour KEF, which overlaps the PAA. However, Falkner et al. (2009) concluded the Ancient Coastline may not represent different habitat type compared to the surrounding areas and suggested that associated faunal communities may be similar. Refer to Section 4.7 for additional information on KEFs overlapping the Operational Area and wider EMBA. Filter feeder communities within the PAA are present on the subsea infrastructure and Pluto platform, which provides hard substrate for attachment (Jacobs, 2014). Within the wider EMBA, the NWMR has been identified as a sponge diversity hotspot with a variety of areas of potentially high and unique sponge biodiversity, particularly in the Commonwealth waters of Ningaloo Marine Park (CALM, 2005b; Rees et al., 2004). Detail regarding these features is provided in Appendix K.

4.6 Protected Species

A total of 100 EPBC Act listed species considered to be MNES were identified as potentially occurring within the EMBA, of which a subset of 47 species were identified as potentially occurring within the PAA. The full list of marine species identified from the PMST reports is provided in Appendix C,. The PMST report is produced from a grid-based search, which can cause species outside of the search area to be detected, such as terrestrial species. Species identified in the PMST that are not known to inhabit shorelines, nor rely on the marine environment for their diet, are not included assessed.

Species identified as potentially occurring within the PAA and EMBA, and relevant Biologically Important Areas (BIAs) and Habitat Critical to their Survival (Habitat Critical) are listed in Table 4-4 to Table 4-13. A description of these species is included in Appendix K, which also shows the spatial overlap with relevant BIAs and Habitat Critical areas and the PAA and EMBA.

4.6.1 Fish, Sharks and Rays

A total of eight EPBC-listed Threatened and an additional seven Migratory fish species have been identified to potentially occur within the EMBA, of which 14 occur in the PAA (Table 4-5). For additional detail, the PAA is presented here in two parts: the Export Pipeline Operational Area, and the combined Facility and Xena-03 Drilling Operational Areas. Two threatened species, identified in the PMST were identified to occur within the EMBA, however, are not considered to inhabit shorelines, or rely on the marine environment for their diet, and therefore are not included. There are also 35 EPBC-listed Marine species in the EMBA, which do not have a Threatened or Migratory status and include a variety of pipefish and sea dragons. These species are described in Appendix K.

The PAA overlaps the foraging BIA for the whale shark as outlined in Figure 4-4. The BIAs are detailed further in Appendix K.

Table 4-5: Threatened and Migratory fish, shark and ray species predicted to occur within the PAA and the EMBA

Species Name	Common Name	Threatened Status	Migratory Status	Potential for Interaction		
				Export Pipeline Operational Area	***Facility and Xena-03 Operational Areas***	***EMBA***
Carcharadon carcharias	White shark	Vulnerable	Migratory	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat known to occur within area
Pristis clavata	Dwarf sawfish	Vulnerable	Migratory	Species or species habitat known to occur within area	Species or species habitat known to occur within area	Species or species habitat known to occur within area
Pristis zijsron	Green sawfish	Vulnerable	Migratory	Species or species habitat known to occur within area	Species or species habitat known to occur within area	Species or species habitat known to occur within area
Pristis pristis	Freshwater sawfish	Vulnerable	Migratory	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat likely to occur within area
Rhincodon typus	Whale shark	Vulnerable	Migratory	Foraging, feeding or related behaviour known to occur within area	Foraging, feeding or related behaviour known to occur within area	Foraging, feeding or related behaviour known to occur within area
Carcharias taurus	Grey nurse shark	Vulnerable	N/A	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area
Sphyrna lewini	Scalloped hammerhead	Conservation Dependant	N/A	Species or species habitat known to occur within area	Species or species habitat known to occur within area	Species or species habitat known to occur within area
Thunnus maccoyii	Southern bluefin tuna	Conservation Dependent	N/A	Breeding known to occur within area	Breeding known to occur within area	Breeding known to occur within area
Anoxypristis cuspidata	Narrow sawfish	N/A	Migratory	Species or species habitat likely to occur within area	Species or species habitat may occur within area	Species or species habitat known to occur within area

Species Name	Common Name	Threatened Status	Migratory Status	Potential for Interaction		
				Export Pipeline Operational Area	***Facility and Xena-03 Operational Areas***	***EMBA***
Carcharhinus longimanus	Oceanic whitetip shark	N/A	Migratory	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area
Isurus oxyrinchus	Shortfin mako	N/A	Migratory	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area
Isurus paucus	Longfin mako	N/A	Migratory	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area
Manta alfredi	Reef manta ray	N/A	Migratory	Species or species habitat known to occur within area	Species or species habitat likely to occur within area	Species or species habitat known to occur within area
Manta birostris	Giant manta ray	N/A	Migratory	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area	Species or species habitat known to occur within area
Lamna nasus	Porbeagle shark	N/A	Migratory	N/A	N/A	Species or species habitat may occur within area

Table 4-6: Fish, shark and ray BIAs within the PAA and EMBA

Species	BIA Type	Approximate Distance (Closest) and Direction of BIA from PAA (km)
Whale shark	Foraging (northward from Ningaloo along 200 m isobath)	Overlaps the Facility and Xena-03 Operational Areas and Export Pipeline Operational Area
	Foraging (high density prey) (Ningaloo Marine Park and adjacent Commonwealth waters)	228 km south-west (Facility and Xena-03 Operational Areas)

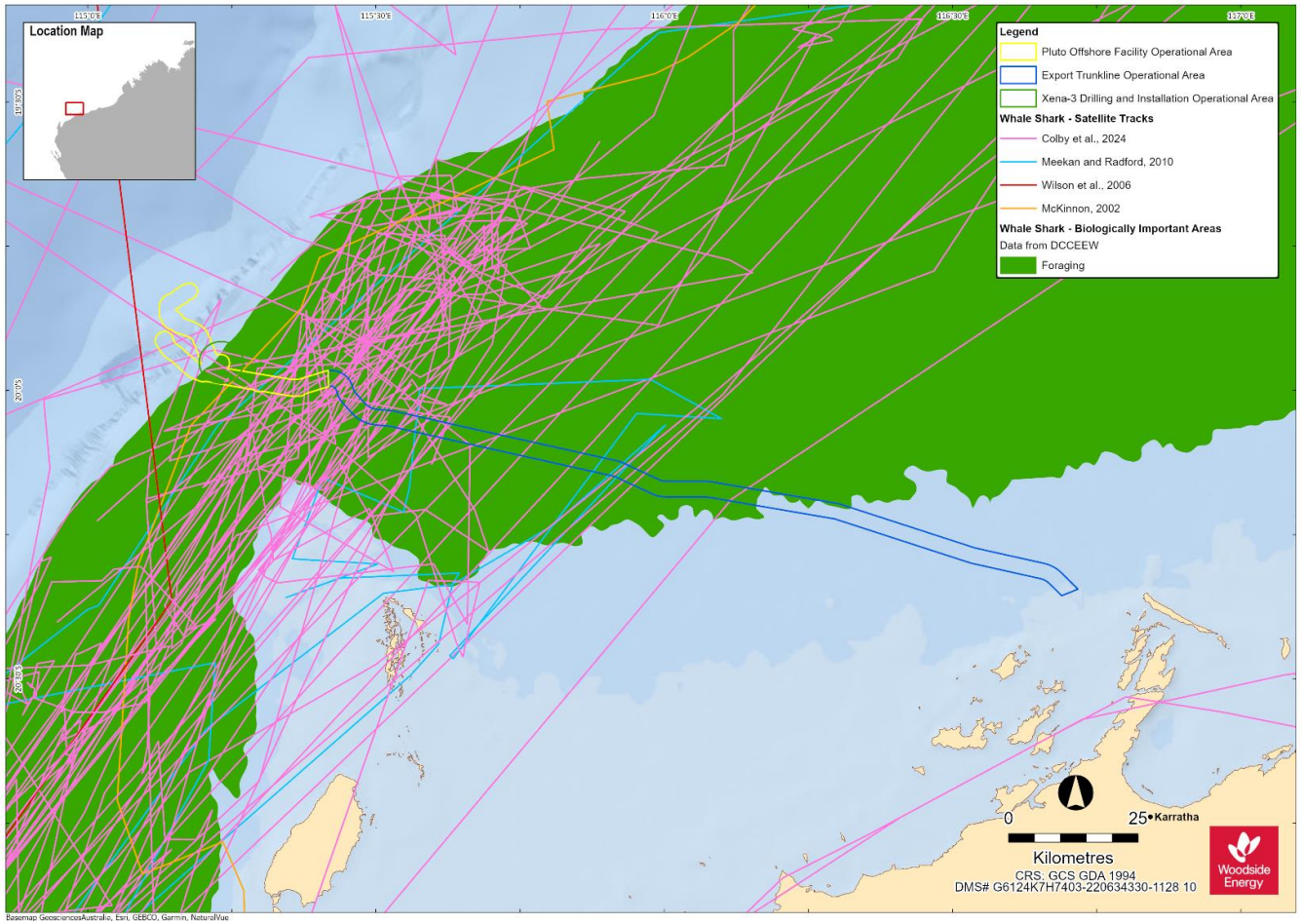


Figure 4-4: Whale shark BIAs overlapping the PAA and satellite tracks of whale sharks tagged between 2002 and 2024 (McKinnon, 2002, Wilson *et al* 2006, Meekan and Radford 2010, Colby *et al* 2024)

4.6.2 Marine Reptiles

All seven EPBC listed marine reptiles are and five of these are also listed Migratory species (Table 4-7). For additional detail, the PAA is presented here in two parts: the Export Pipeline Operational Area, and the combined Facility and Xena-03 Drilling Operational Areas. Two threatened species identified in the PMST were identified to occur within the EMBA, however, are not considered to inhabit shorelines, or rely on the marine environment for their diet, and therefore are not included in Table 4-7.

BIAs for the green turtle, hawksbill turtle and flatback turtle overlap the PAA; the loggerhead turtle only overlaps the Export Pipeline Operational Area as described in Table 4-7 and shown in Figure 4-5.

Habitat critical to the survival of the green turtle, hawksbill turtle, and loggerhead turtle is overlapped by, or adjacent to the PAA as shown in Figure 4-5. An additional 16 EPBC-listed Marine reptiles species occur in the EMBA, which do not have Threatened or Migratory status. The majority of these are sea snake species. These listed Marine species are described in the Appendix K.

Table 4-7: Threatened and Migratory marine reptile species predicted to occur within the PAA and the EMBA

Species Name	Common Name	Threatened Status	Migratory Status	Potential for Interaction		
				Export Pipeline Operational Area	Facility and Xena-03 Operational Areas	EMBA
Caretta caretta	Loggerhead turtle	Endangered	Migratory	Congregation or aggregation known to occur within the area	Species or species habitat known to occur within the area	Breeding known to occur within area
Dermochelys coriacea	Leatherback turtle	Endangered	Migratory	Species or species habitat likely to occur within the area	Species or species habitat likely to occur within the area	Species or species habitat known to occur within area
Chelonia mydas	Green turtle	Vulnerable	Migratory	Congregation or aggregation known to occur with the area	Species or species habitat known to occur within the area	Breeding known to occur within area
Eretmochelys imbricata	Hawksbill turtle	Vulnerable	Migratory	Congregation or aggregation known to occur with the area	Species or species habitat known to occur within the area	Breeding known to occur within area
Natator depressus	Flatback turtle	Vulnerable	Migratory	Congregation or aggregation known to occur with the area	Congregation or aggregation known to occur with the area	Breeding known to occur within area
Aipysurus apraefrontalis	Short-nosed seasnake	Critically Endangered	N/A	Species or species habitat likely to occur within the area	Species or species habitat may occur within the area	Species or species habitat known to occur within area
Aipysurus foliosquama	Leaf-scaled seasnake	Critically Endangered	N/A	Species or species habitat known to occur within the area	N/A	Species or species habitat known to occur within area

Table 4-8: Marine turtle BIAs within the EMBA

Species	BIA Type (Closest Location)	Approximate Distance and Direction of BIA from PAA (km)
Flatback turtle	Internesting Buffer (Montebello Island, Hermite Island, NW Island, Trimouille Island; Dampier Archipelago (islands to the west of the Burrup Peninsula); Intercourse Island; Legendre Island, Huay Island; Delambre Island; Dixon Island; West of Cape Lambert; Thevenard Island – South coast)	Overlaps the Facility Operational Area Overlaps the Xena-03 Operational Area Overlaps the Export Pipeline Operational Area
	Mating (Dampier Archipelago (islands to the west of the Burrup Peninsula); Montebello Island, Hermite Island, NW Island, Trimouille Island; coral reef habitat west of the Montebello group (extends the entire length of Montebello Islands); Barrow Island; Coral reef habitat west of the Montebello group (extends the entire length of the Montebello's)	39 km south-east of the Facility Operational Area 48 km south-east of the Xena-03 Operational Area 10 km south-of the Export Pipeline Operational Area
	Nesting (Dampier Archipelago (islands to the west of the Burrup Peninsula); Legendre Island, Huay Island; Delambre Island; Montebello Island, Hermite Island, NW Island, Trimouille Island)	39 km south-east of the Facility Operational Area 48 km south-east of the Xena-03 Operational Area 10 km south of the Export Pipeline Operational Area
	Foraging (Dampier Archipelago (islands to the west of the Burrup Peninsula); Legendre Island, Huay Island; Montebello Island, Hermite Island, NW Island, Trimouille Island; coral reef habitat west of the Montebello)	39 km south-east of the Facility Operational Area 48 km south-east of the Xena-03 Operational Area 10 km south of the Export Pipeline Operational Area
	Aggregation (Coral reef habitat west of the Montebello group. Extends the entire length of Montebello Islands)	46 km south of the Facility Operational Area 53 km south of the Xena-03 Operational Area 40 km south of the Export Pipeline Operational Area

Species	BIA Type (Closest Location)	Approximate Distance and Direction of BIA from PAA (km)
	Migration corridor (Dampier Archipelago (islands to the west of the Burrup Peninsula)	128 km east of the Facility Operational Area 143 km east of the Xena-03 Operational Area 10 km south-east of the Export Pipeline Operational Area
Green turtle	Internesting Buffer (Dampier Archipelago (islands to the west of the Burrup Peninsula); Legendre Island, Huay Island; Montebello Islands, Hermite Island, NW Island, Trimouille Island; Delambre Island; north and south Muiron Island; north-west Cape)	16 km south-east of the Facility Operational Area 24 km south-east of the Xena-03 Operational Area Overlaps the Export Pipeline Operational Area
	Mating (Dampier Archipelago (islands to the west of the Burrup Peninsula); Montebello Islands; Hermite Island, NW Island, Trimouille Island; coral reef habitat west of the Montebello group (extends the entire length of Montebello Islands)	36 km south-east of the Facility Operational Area 44 km south-east of the Xena-03 Operational Area 10 km south of the Export Pipeline Operational Area
	Nesting (Dampier Archipelago (islands to the west of the Burrup Peninsula); Legendre Island, Huay Island; Montebello Islands; Hermite Island, NW Island, Trimouille Island; north and south Muiron Island)	36 km south-east of the Facility Operational Area 44 km south-east of the Xena-03 Operational Area 10 km south of the Export Pipeline Operational Area
	Foraging (Dampier Archipelago (islands to the west of the Burrup Peninsula); Legendre Island, Huay Island; Delambre Island; Montebello Islands, Hermite Island, NW Island, Trimouille Island; coral reef habitat west of the Montebello group (extends the entire length of Montebello Islands)	36 km south-east of the Facility Operational Area 44 km south-east of the Xena-03 Operational Area 10 km south of the Export Pipeline Operational Area

Species	BIA Type (Closest Location)	Approximate Distance and Direction of BIA from PAA (km)
	Aggregation (Coral reef habitat west of the Montebello group (extends the entire length of Montebello Islands)	47 km south of the Facility Operational Area 53 km south of the Xena-03 Operational Area 40 km south of the Export Pipeline Operational Area
	Migration corridor (Dampier Archipelago (islands to the west of the Burrup Peninsula)	128 km east of the Facility Operational Area 143 km east of the Xena-03 Operational Area 10 km south of the Export Pipeline Operational Area
Hawksbill turtle	Internesting Buffer (Rosemary Island; Dampier Archipelago (islands to the west of the Burrup Peninsula); Delambre Island; Montebello Islands; Hermite Island, NW Island, Trimouille Island; Ah Chong and South East Island; Lowendal Island; Thevenard Island; Ningaloo coast and Jurabi coast)	39 km south-east of the Facility Operational Area 48 km south-east of the Xena-03 Operational Area Overlaps the Export Pipeline Operational Area
	Foraging (Dampier Archipelago (islands to the west of the Burrup Peninsula); Montebello Islands, Hermite Island, NW Island, Trimouille Island	39 km south-east of the Facility Operational Area 48 km south-east of the Xena-03 Operational Area 11 km east of the Export Pipeline Operational Area
	Mating (Dampier Archipelago (islands to the west of the Burrup Peninsula); Montebello Islands; Hermite Island; NW Island; Trimouille Island)	39 km south-east of the Facility Operational Area 48 km south-east of the Xena-03 Operational Area 11 km east of the Export Pipeline Operational Area

Species	BIA Type (Closest Location)	Approximate Distance and Direction of BIA from PAA (km)
	Nesting (Delambre Island (and other Dampier Archipelago Islands); Dampier Archipelago (islands to the west of the Burrup Peninsula); Rosemary Island; Montebello Islands; Hermite Island; NW Island; Trimouille Island; Ah Chong and South East Island)	39 km south-east of the Facility Operational Area 48 km south-east of the Xena-03 Operational Area 9 km east of the Export Pipeline Operational Area
	Migration corridor (Dampier Archipelago (islands to the west of the Burrup Peninsula))	128 km east of the Facility Operational Area 143 km east of the Xena-03 Operational Area 10 km east of the Export Pipeline Operational Area
Loggerhead turtle	Internesting Buffer (Rosemary Island; Montebello Islands; Muiron Island; Ningaloo coast and Jurabi coast)	29 km south-east of the Facility Operational Area 37 km south-east of the Xena-03 Operational Area Overlaps the Export Pipeline Operational Area
	Nesting (Cohen Island; Rosemary Island; Montebello Islands; Muiron Island)	48 km south-east of the Facility Operational Area 56 km south-east of the Xena-03 Operational Area 13 km south of the Export Pipeline Operational Area
Leatherback turtle	No BIAs within the EMBA or PAA	

Table 4-9: Habitat critical to the survival of marine turtle species occurring within the EMBA

Species	Genetic Stock	Nesting Locations	Approximate Distance and Direction from PAA (km)	Inter-nesting buffer	Nesting period	Hatching period
Flatback turtle	North West Shelf	Dampier Archipelago (including Delambre Island and Huay Island), Barrow Island, Montebello Islands, coastal islands from Cape Preston to Locker Island, Cemetery Beach, Port Hedland, Mundabullangana Beach	Overlaps the Facility and Xena-03 Operational Areas and Export Pipeline Operational Area	60 km	All year (peak: Aug–Sep)	All year
Green turtle	North West Shelf	Dampier Archipelago (including Delambre Island and Rosemary Island, Barrow Island, Montebello Islands, Serrurier Island and Thevenard Island, Cape Preston to north of Exmouth Gulf (including Montebello Islands and Lowendal Islands)	Overlaps Export Pipeline Operational Area only	20 km	Nov–Mar (peak: Dec–Jan)	Jan–May (peak: Feb–Mar)
Hawksbill turtle	North West Shelf	Dampier Archipelago (including Rosemary Island and Delambre Island), Cape Preston to north of Exmouth Gulf (including Montebello Islands and Lowendal Islands)	Overlaps Export Pipeline Operational Area only	20 km	All year (peak: Nov–May)	All year (peak: Dec–Feb)
Loggerhead turtle	North West Shelf	Exmouth Gulf and Ningaloo coast, Gnaraloo Bay and beaches	200 km south-west (Facility and Xena-03 Operational Areas)	20 km	Nov–Mar (peak: Jan)	Jan–May
Leatherback turtle	No overlap – nesting located within the EMBA and PAA					

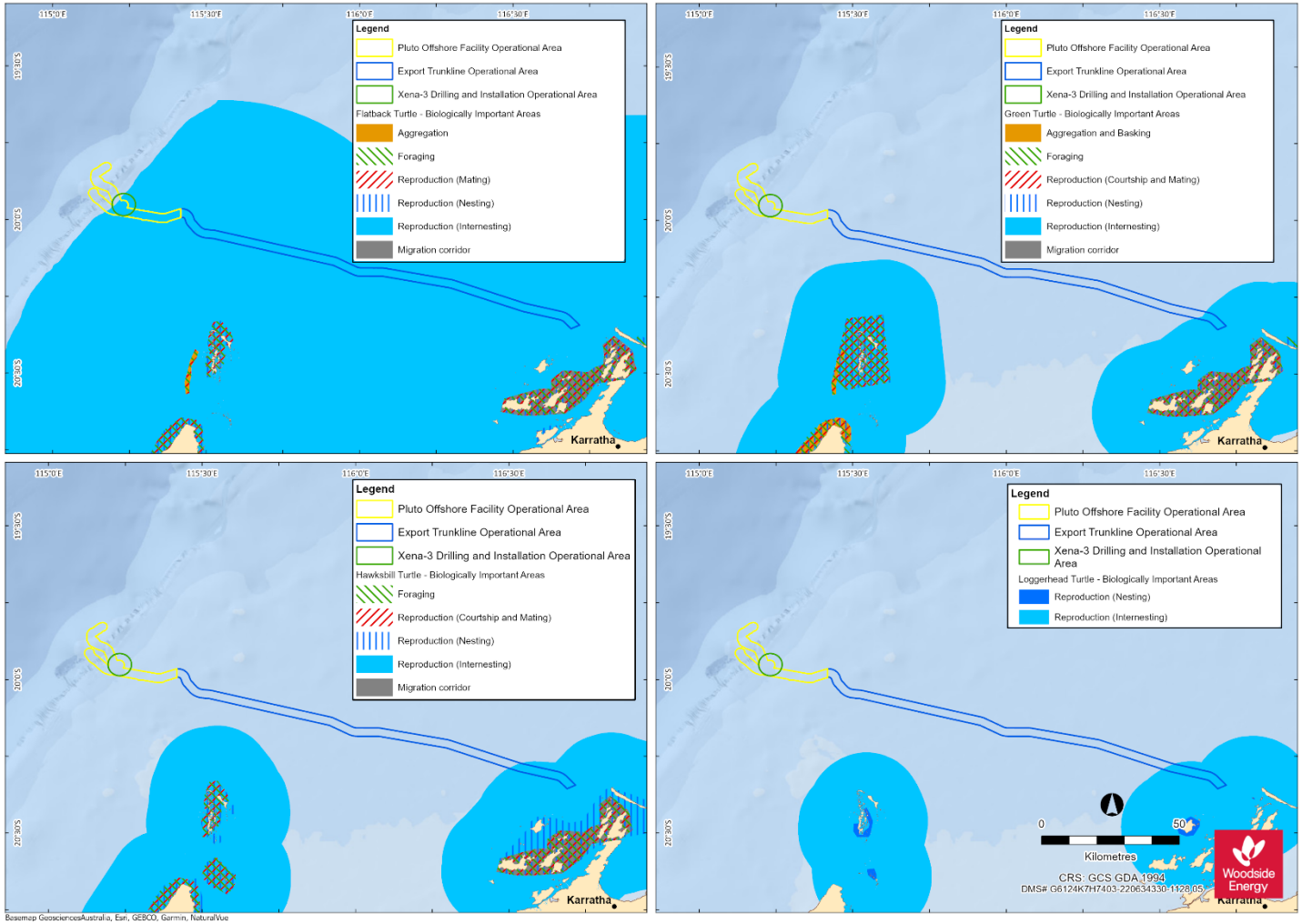


Figure 4-5: Marine reptile BIAs overlapping the PAA

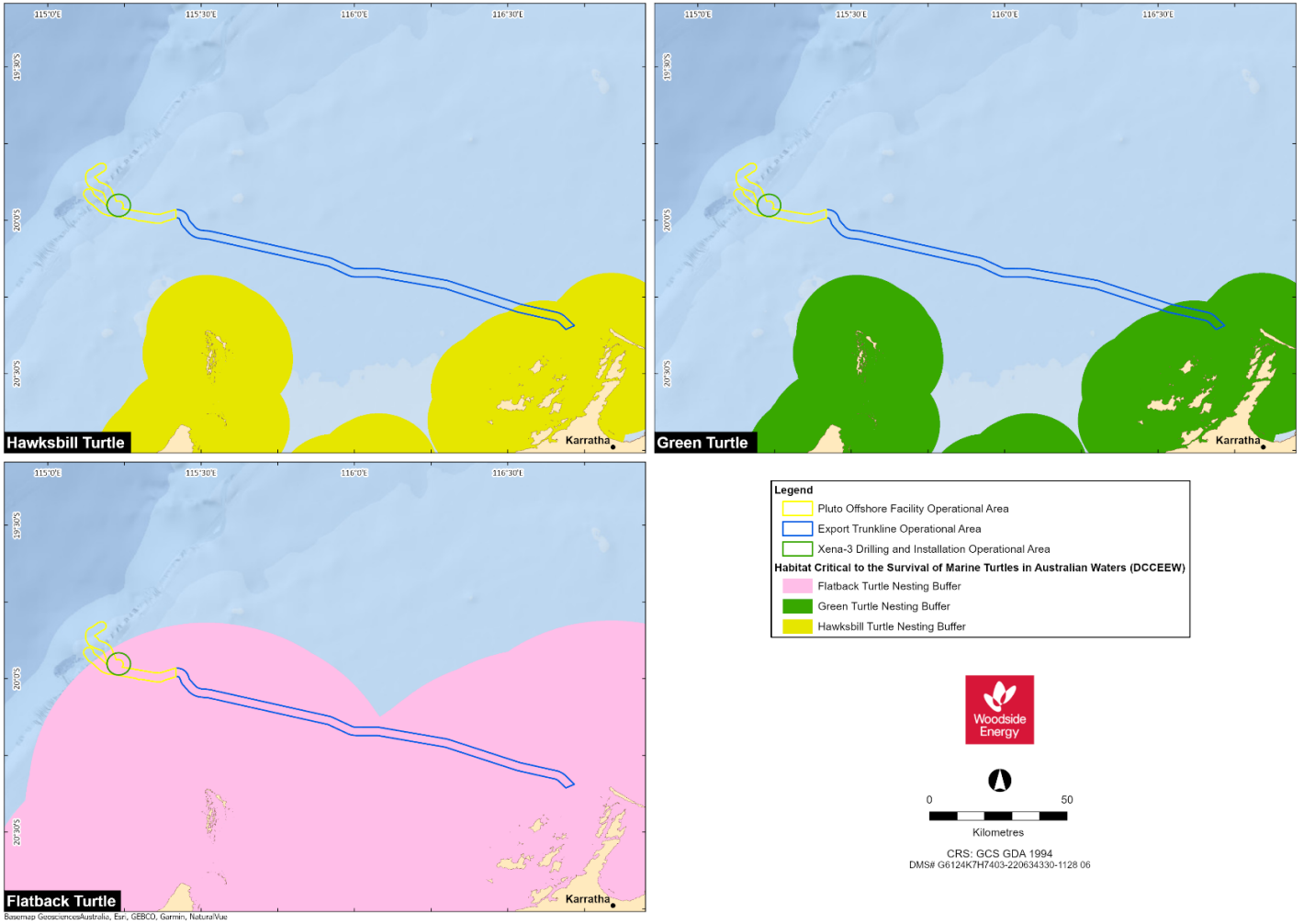


Figure 4-6: Habitat critical to the survival of marine turtles overlapping the PAA

4.6.3 Marine Mammals

A total of four EPBC Listed Threatened and an additional nine Migratory marine mammal species have been identified to potentially occur within the EMBA, of which 11 occur in the PAA (**Error! Reference source not found.**). For additional detail, the PAA is presented here in two parts: the Export Pipeline Operational Area, and the combined Facility and Xena-03 Drilling Operational Areas. Nine threatened species, identified in the PMST were identified to occur within the EMBA, however, are not considered to inhabit shorelines, or rely on the marine environment for their diet, and therefore are not included.

The PAA overlaps with the distribution and migration BIAs for the pygmy blue whale and migration (north and south) BIA for the humpback whale. Two other species of marine mammal species have BIAs within the EMBA and are described in **Error! Reference source not found.**.

Table 4-10: Threatened and Migratory marine mammal species predicted to occur within the PAA and the EMBA

Species Name	Common Name	Threatened Status	Migratory Status	Potential for Interaction		
				Export Pipeline Operational Area	***Facility and Xena-03 Operational Areas***	***EMBA***
Balaenoptera musculus	Blue whale	Endangered	Migratory	Migration route known to occur within the area	Migration route known to occur within the area	Migration route known to occur within area
Balaenoptera physalus	Fin whale	Vulnerable	Migratory	Species or species habitat likely to occur within the area	Species or species habitat likely to occur within the area	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera borealis	Sei whale	Vulnerable	Migratory	Species or species habitat likely to occur within the area	Species or species habitat likely to occur within the area	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni	Bryde's whale	N/A	Migratory	Species or species habitat likely to occur within the area	Species or species habitat likely to occur within the area	Species or species habitat likely to occur within area
Dugong dugon	Dugong	N/A	Migratory	Species or species habitat known to occur within the area	N/A	Breeding known to occur within area
Megaptera novaeangliae	Humpback whale	N/A	Migratory	Breeding known to occur with in the area	Breeding known to occur with in the area	Breeding known to occur within area
Orcaella heinsohni	Australian snubfin dolphin	N/A	Migratory	Species or species habitat may occur within the area	Species or species habitat may occur within the area	Species or species habitat known to occur within area
Orcinus orca	Killer whale	N/A	Migratory	Species or species habitat may occur within the area	Species or species habitat may occur within the area	Species or species habitat may occur within area
Physeter macrocephalus	Sperm whale	N/A	Migratory	Species or species habitat may occur within the area	Species or species habitat may occur within the area	Species or species habitat may occur within area

Species Name	Common Name	Threatened Status	Migratory Status	Potential for Interaction		
				Export Pipeline Operational Area	***Facility and Xena-03 Operational Areas***	***EMBA***
Sousa chinensis	Australian humpback dolphin	N/A	Migratory	Species or species habitat may occur within the area	Species or species habitat may occur within the area	Species or species habitat known to occur within area
Tursiops aduncus (Arafura/Timor Sea populations)	Spotted bottlenose dolphin	N/A	Migratory	Species or species habitat likely to occur within the area	Species or species habitat likely to occur within the area	Species or species habitat known to occur within area
Eubalaena australis	Southern right whale	Endangered	Migratory	N/A	N/A	Species or species habitat likely to occur within area
Balaenoptera bonaerensis	Antarctic minke whale	N/A	Migratory	N/A	N/A	Species or species habitat likely to occur within area

Table 4-11: Marine mammal BIAs within the EMBA

Species	BIA Type	Approximate Distance and Direction from PAA (km)
Dugong	Calving (Exmouth Gulf)	207 km south-west (Facility and Xena-03 Operational Areas)
	Nursing (Exmouth Gulf)	207 km south-west (Facility and Drilling Operational Area)
	Breeding (Exmouth Gulf)	207 km south-west (Facility and Xena-03 Operational Areas)
	Foraging (high density seagrass beds) (Exmouth Gulf)	207 km south-west (Facility and Xena-03 Operational Areas)
Pygmy blue whale	Migration (Augusta to Derby) (Tend to pass along the shelf edge at depths of 500 m to 1000 m; appear close to coast in the Exmouth-Montebello Islands area on southern migration)	Overlaps the Facility and Xena-03 Operational Areas 20 km north-west of the Export Pipeline Operational Area Approximately 17 km from the Pluto Facility
	Distribution	Overlaps the Facility and Xena-03 Operational Areas and Export Pipeline Operational Area
	Foraging (Ningaloo)	232 km south-west (Facility and Xena-03 Operational Areas)
Humpback whale	Migration (north and south) (The migration corridor extends from the coast to out to approximately 100km offshore in the Kimberley region extending south to North-west Cape; from North-west Cape to south of Shark Bay, the migration corridor is reduced to approximately 50 km)	20 km from the Facility and Xena-03 Operational Area Overlaps the Export Pipeline Operational Area Approximately 24 km from the Pluto Facility
Southern right whale	Reproduction (Exmouth Gulf and Ningaloo)	Abuts the EMBA

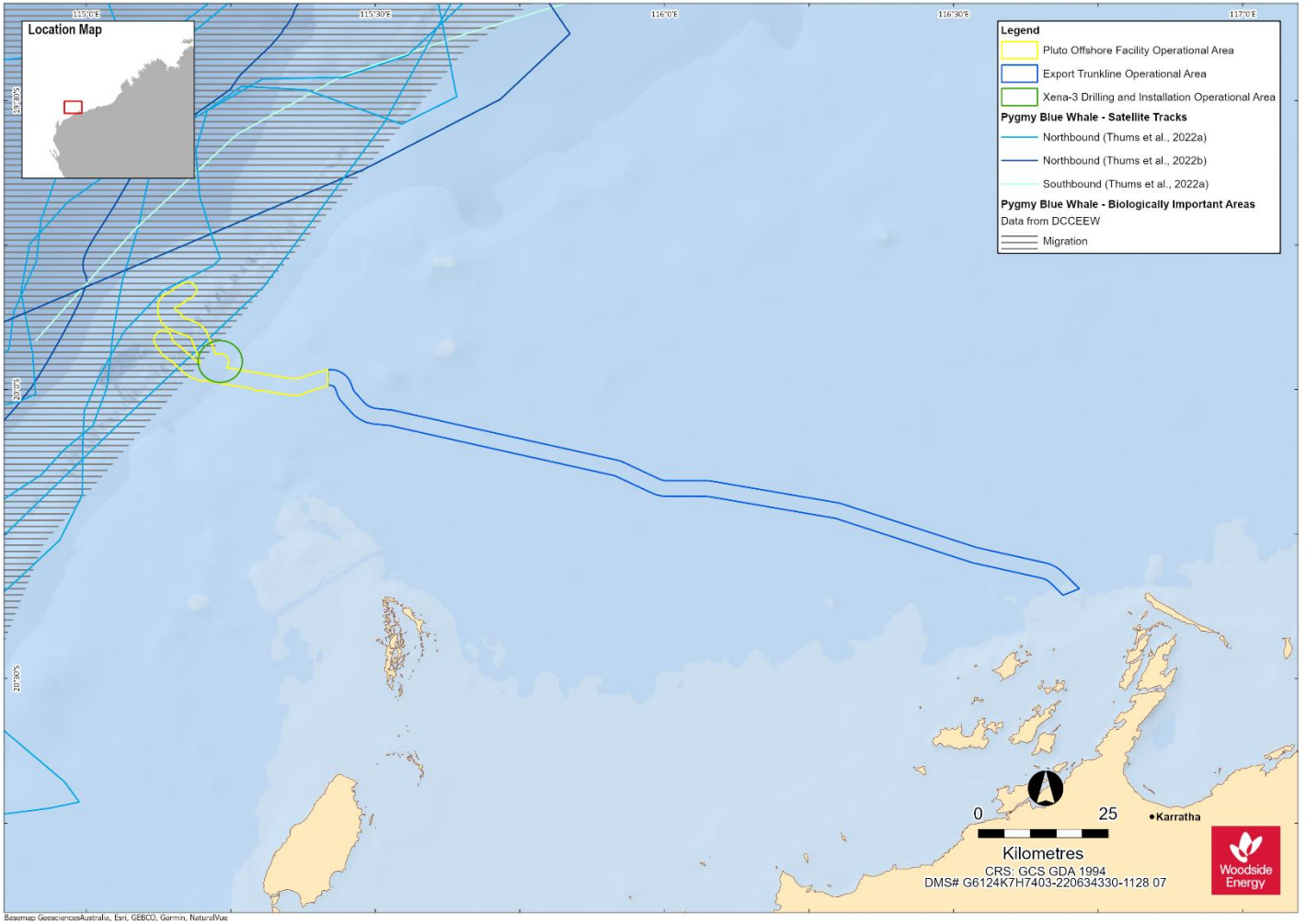


Figure 4-7: Pygmy blue whale BIAs overlapping the PAA and satellite tracks of tagged whales (Thums et al., 2022)

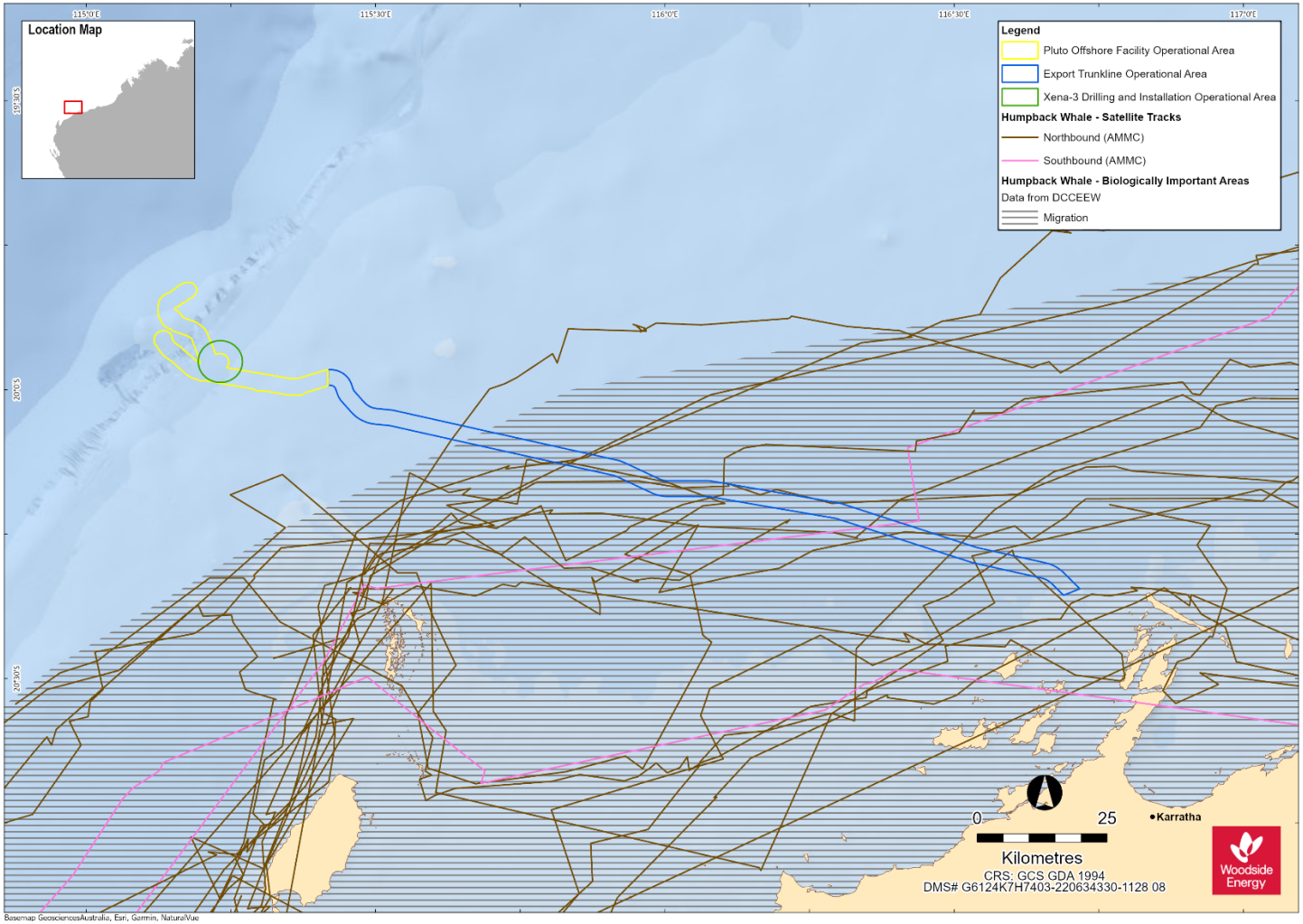


Figure 4-8: Humpback whale BIAs overlapping the PAA and satellite tracks of tagged whales (

4.6.4 Seabirds and Migratory Shorebirds

A total of 17 EPBC-listed Threatened and additional 21 Migratory seabird and shorebird species have been identified to potentially occur within the EMBA, of which 15 occur in the PAA (Table 4-12). For additional detail, the PAA is presented here in two parts: the Export Pipeline Operational Area, and the combined Facility and Xena-03 Drilling Operational Areas. There are 2 migratory bird species (fork-tailed swift and roseate turn) occurring within the Export Pipeline Operational Area that are not present within the Facility and Xena-03 Drilling Operational Areas. An additional 6 EPBC-listed Marine bird species are identified to occur within the EMBA, none of which are listed as Threatened or Migratory.

The PAA overlaps the BIA (Breeding) for the wedge-tailed shearwater. The roseate tern, and fairy tern only overlap the Export Pipeline Operational Area, as shown in Figure 4-9. The lesser crested tern breeding BIA is overlapped by the EMBA. Seabird and Migratory shorebirds which BIAs within the PAA and EMBA are outlined in Table 4-13.

Table 4-12: Threatened and Migratory seabird and Migratory shorebird species predicted to occur within the PAA and the EMBA

Species Name	Common Name	Threatened Status	Migratory Status	Potential for Interaction		
				Export Pipeline Operational Area	***Facility and Xena-03 Operational Areas***	***EMBA***
Calidris ferruginea	Curlew sandpiper	Critically Endangered	Migratory	Species or species habitat may occur within the area	Species or species habitat may occur within the area	Species or species habitat known to occur within area
Numenius madagascariensis	Eastern curlew	Critically Endangered	Migratory	Species or species habitat may occur within the area	Species or species habitat may occur within the area	Species or species habitat known to occur within area
Macronectes giganteus	Southern-giant petrel	Endangered	Migratory	Species or species habitat may occur within the area	Species or species habitat may occur within the area	Species or species habitat may occur within area
Calidris acuminata	Sharp-tailed sandpiper	Vulnerable	Migratory	Species or species habitat may occur within the area	Species or species habitat may occur within the area	Species or species habitat known to occur within area
Calidris canutus	Red knot	Vulnerable	Migratory	Species or species habitat may occur within the area	Species or species habitat may occur within the area	Species or species habitat known to occur within area
Phaethon lepturus fulvus	Christmas Island white-tailed tropicbird	Endangered	N/A	Species or species habitat may occur within the area	Species or species habitat may occur within the area	Species or species habitat may occur within area
Phaethon rubricauda	Red-tailed tropicbird	Endangered	N/A	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area	Species or species habitat known to occur within area
Sternula nereis nereis	Australian fairy tern	Vulnerable	N/A	Breeding known to occur within the area	Foraging, feeding or related behaviour likely to occur within the area	Breeding known to occur within area

Species Name	Common Name	Threatened Status	Migratory Status	Potential for Interaction		
				Export Pipeline Operational Area	***Facility and Xena-03 Operational Areas***	***EMBA***
Actitis hypoleucos	Common sandpiper	N/A	Migratory	Species or species habitat may occur within the area	Species or species habitat may occur within the area	Species or species habitat known to occur within area
Anous stolidus	Common noddy	N/A	Migratory	Species or species habitat may occur within the area	Species or species habitat may occur within the area	Species or species habitat likely to occur within area
Apus pacificus	Fork-tailed swift	N/A	Migratory	Species or species habitat likely to occur within the area	N/A	Species or species habitat likely to occur within area
Ardenna pacifica	Wedge-tailed shearwater[14]	N/A	Migratory	Breeding known to occur within the area	Breeding known to occur within the area	Breeding known to occur within area
Calidris melanotos	Pectoral sandpiper	N/A	Migratory	Species or species habitat may occur within the area	Species or species habitat may occur within the area	Species or species habitat may occur within area
Calonectris leucomelas	Streaked shearwater	N/A	Migratory	Species or species habitat likely to occur within the area	Species or species habitat likely to occur within the area	Species or species habitat likely to occur within area
Fregata ariel	Lesser frigatebird	N/A	Migratory	Species or species habitat likely to occur within the area	Species or species habitat likely to occur within the area	Species or species habitat known to occur within area
Fregata minor	Great frigatebird	N/A	Migratory	Species or species habitat may occur within the area	Species or species habitat may occur within the area	Species or species habitat may occur within area

[14] The wedge-tailed shearwater was not captured in the PMST but will interact with the PAA.

Species Name	Common Name	Threatened Status	Migratory Status	Potential for Interaction		
				Export Pipeline Operational Area	***Facility and Xena-03 Operational Areas***	***EMBA***
Phaethon lepturus	White-tailed tropic bird	N/A	Migratory	Species or species habitat may occur within the area	Species or species habitat may occur within the area	Species or species habitat known to occur within area
Sterna dougallii	Roseate tern	N/A	Migratory	Breeding likely to occur within the area	N/A	Breeding known to occur within area
Tringa nebularia	Common greenshank	Endangered	Migratory	N/A	N/A	Species or species habitat likely to occur within area
Limnodromus semipalmatus	Asian dowitcher	Vulnerable	Migratory	N/A	N/A	Species or species habitat may occur within area
Thalassarche impavida	Campbell albatross	Vulnerable	Migratory	N/A	N/A	Species or species habitat may occur within area
Thalassarche carteri	Indian, yellow-nosed albatross	Vulnerable	Migratory	N/A	N/A	Species or species habitat may occur within area
Charadrius leschenaultii	Greater sand plover	Vulnerable	Migratory	N/A	N/A	Species or species habitat known to occur within area
Limosa lapponica menzbieri	Northern Siberian bar-tailed godwit	Endangered	N/A	N/A	N/A	Species or species habitat known to occur within area
Rostratula australis	Australian painted snipe	Endangered	N/A	N/A	N/A	Species or species habitat likely to occur within area

Species Name	Common Name	Threatened Status	Migratory Status	Potential for Interaction		
				Export Pipeline Operational Area	***Facility and Xena-03 Operational Areas***	***EMBA***
Papasula abbotti	Abbott's booby	Endangered	N/A	N/A	N/A	Species or species habitat may occur within area
Pterodroma mollis	Soft-plumaged petrel	Vulnerable	N/A	N/A	N/A	Foraging, feeding or related behaviour likely to occur within area
Ardenna carneipes	Flesh-footed shearwater	N/A	Migratory	N/A	N/A	Species or species habitat likely to occur within area
Charadrius veredus	Oriental plover	N/A	Migratory	N/A	N/A	Species or species habitat may occur within area
Glareola maldivarum	Oriental pratincole	N/A	Migratory	N/A	N/A	Species or species habitat may occur within area
Hirundo rustica	Barn swallow	N/A	Migratory	N/A	N/A	Species or species habitat may occur within area
Hydroprogne caspia	Caspian tern	N/A	Migratory	N/A	N/A	Breeding known to occur within area
Limosa lapponica	Bar-tailed godwit	N/A	Migratory	N/A	N/A	Species or species habitat known to occur within area
Motacilla flava	Yellow wagtail	N/A	Migratory	N/A	N/A	Species or species habitat may occur within area

Species Name	Common Name	Threatened Status	Migratory Status	Potential for Interaction		
				Export Pipeline Operational Area	***Facility and Xena-03 Operational Areas***	***EMBA***
Onychoprion anaethetus	Bridled tern	N/A	Migratory	N/A	N/A	Breeding known to occur within area
Pandion haliaetus	Osprey	N/A	Migratory	N/A	N/A	Breeding known to occur within area
Sternula albifron	Little tern	N/A	Migratory	N/A	N/A	Species or species habitat may occur within area
Thalasseus bergii	Greater crested tern	N/A	Migratory	N/A	N/A	Breeding known to occur within area

Table 4-13: Seabird and shorebird BIAs within the PAA and EMBA

Species	BIA Type	Approximate Distance (closest) and Direction of BIA from PAA (km)
Wedge-tailed shearwater	Breeding (Kimberley, Pilbara and Gascoyne coasts and islands including Ashmore Reef)	Overlaps the Facility and Xena-03 Operational Areas and Export Pipeline Operational Area
Roseate tern	Breeding (Kimberley, Pilbara and Gascoyne coasts and islands including Ashmore Reef)	Overlaps Export Pipeline Operational Area only
Fairy tern	Breeding (Pilbara and Gascoyne coasts and islands)	Overlaps Export Pipeline Operational Area only
Lesser crested tern	Breeding (Kimberley, Pilbara and Gascoyne coasts and islands including Ashmore Reef)	30 km south (Export Pipeline Operational Area)

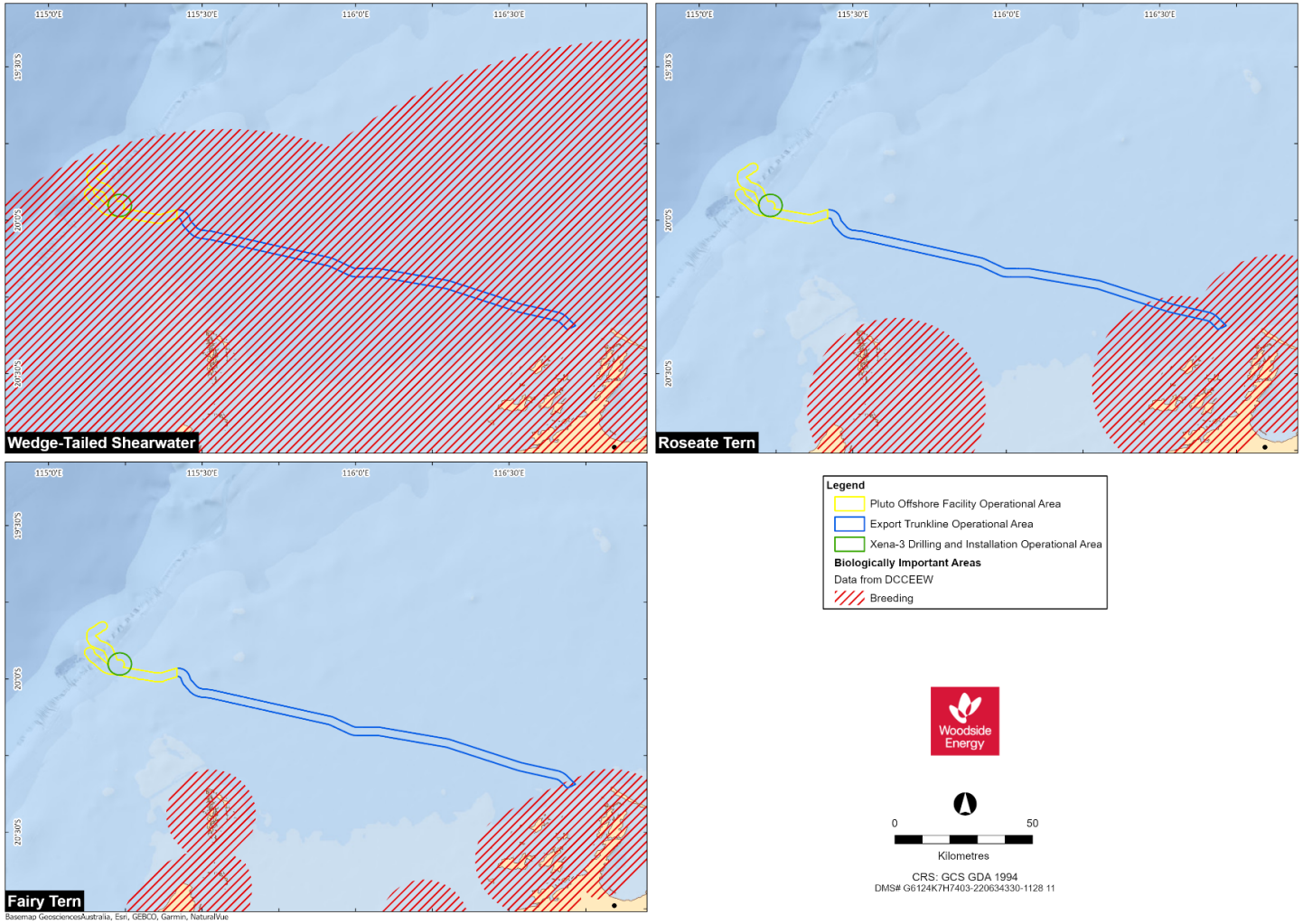


Figure 4-9: Seabird BIAs overlapping the PAA

4.6.5 Seasonal Sensitivities for Protected Species

Seasonal sensitivities for protected migratory species identified as potentially occurring within the PAA are identified in Table 4-14. Movement patterns of all protected species identified in Section 4.6 are described in Appendix K

Table 4-14: Key seasonal sensitivities for protected migratory species identified as occurring within the PAA and EMBA

Species	January	February	March	April	May	June	July	August	September	October	November	December
Fish, sharks and rays												
Whale shark – northern and southern migration (NWMR)[15]												
Whale shark – foraging/ aggregation (Ningaloo Coast)[15]												
Great white shark – northern migration (to Northwest Cape)[16]												
Marine reptiles[17]												
Flatback turtle, Pilbara Coast genetic stock – nesting												
Flatback turtle, Pilbara Coast genetic stock – hatching												
Green turtle, Northwest Shelf genetic stock – nesting												
Green turtle, Northwest Shelf genetic stock – hatching												
Hawksbill turtle Western Australia genetic stock – nesting												
Hawksbill turtle Western Australia genetic stock – hatching												
Loggerhead turtle – nesting												
Loggerhead turtle – hatchling												
Mammals												
Fin whale												

[15] TSSC, 2015d.
[16] DSEWPaC, 2013a.
[17] Information regarding seasonal occurrence of marine turtles has been taken from the Recovery Plan for Marine Turtles in Australia 2017-2027 (Commonwealth of Australia, 2017).

Species	January	February	March	April	May	June	July	August	September	October	November	December
Humpback whale – northern migration [18] [19]												
Humpback whale – southern migration [18]												
Sei whale – migration (DEH, 2005)												
East Indian Ocean (EIO) pygmy blue whale – northern migration[20]												
East Indian Ocean (EIO) pygmy blue whale – southern migration [20]												
Seabirds and shorebirds												
Curlew sandpiper – non-breeding (NWMR) [21]												
Eastern curlew – non-breeding (NWMR) [22]												
Red knot – non-breeding season (NWMR) [23]												
Wedge-tailed shearwater – various breeding sites [24] [25] *Synchronised exodus				*								
Roseate tern - breeding												
Fairy tern - breeding												

	Species may be present in the PAA
	Peak period. Presence of animals is reliable and predictable each year
	Species not likely to be present or undertaking biologically important behaviour

[18] TSSC, 2015a.
[19] Double et al., 2010.
[20] Double et al., 2012; 2014.
[21] DCCEEW, 2023c.
[22] DoE, 2015b.
[23] TSSC, 2016a.
[24] DSEWPaC, 2012.
[25] Environment Australia, 2002.

4.7 Key Ecological Features

Two KEFs overlap the PAA (Figure 4-10). KEFs within the PAA and EMBA are identified in Table 4-15 and described in Appendix K. Figure 4-10 shows the spatial overlap with KEFs and the PAA and EMBA.

Table 4-15: KEFs within the PAA and EMBA

Key Ecological Feature	Distance (Closest) and Direction from PAA to KEF (km)
Ancient Coastline at the 125 m Depth Contour	Overlaps (Facility Operational Area)
Continental Slope Demersal Fish Communities	Overlaps (Facility and Xena-03 Operational Areas)
Glomar Shoal KEF	56 km north-east (Export Pipeline Operational Area)
Exmouth Plateau	74 km west (Facility and Xena-03 Operational Areas)
Canyons Linking the Cuvier Abyssal Plain and the Cape Range Peninsula	164 km south-west (Facility and Xena-03 Operational Areas)
Commonwealth Waters Adjacent to Ningaloo Reef	207 km south-west (Facility and Xena-03 Operational Areas)

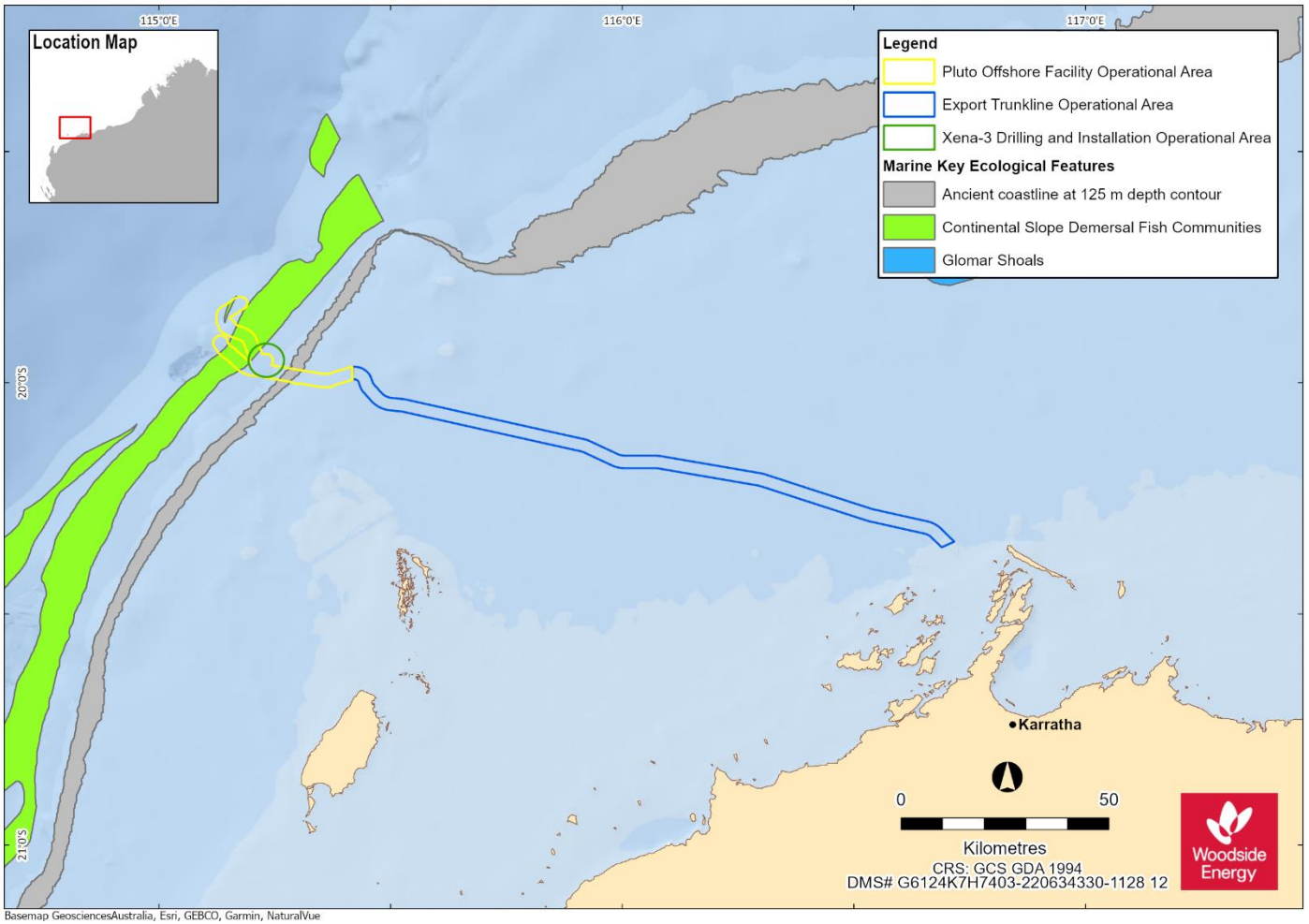


Figure 4-10: KEFs overlapping and near the PAA

4.8 Protected Places

The Montebello Marine Park overlaps the PAA, specifically the Facility and Export Pipeline Operational Areas. The Montebello Marine Park is located offshore of Barrow Island and 80 km west of Dampier extending from the Western Australian State water boundary and is adjacent to the Western Australian Barrow Island and Montebello Islands Marine Parks. This Marine Park covers an area of 3413 km² and water depths from less than 15 m to 150 m. The perimeter of the Montebello Marine Park is 420 m from the Pluto facility.

Protected places within the EMBA are identified in Table 4-16 and presented in Figure 4-11 and Figure 4-12. The Master EE (Appendix K) outlines the values and sensitivities of protected places and other sensitive areas in the EMBA.

Table 4-16: Established protected places and other sensitive areas overlapping the EMBA

Protected Places and Other Sensitive Areas	Distance (Closest) and Direction from PAA to Protected Place or Sensitive Area (km)	Park Zone and IUCN Category* Overlapping PAA and/or EMBA
AMPs		
NWMR		
Montebello	Overlaps Facility and Export Pipeline Operational Area ~420 m from the Pluto Facility ~5.8 km from the Xena-03 well	Multiple Use Zone – VI
Dampier	13 km east (Export Pipeline Operational Area)	Habitat Protection Zone – IV National Park Zone – II Multiple Use Zone – IV
Argo-Rowley Terrace	254 km north-east (Facility and Xena-03 Operational Areas)	Multiple Use Zone – VI
Gascoyne	160 km south-west (Facility and Xena-03 Operational Areas)	Multiple Use Zone – VI Habitat Protection Zone – IV
Ningaloo	206 km south-west (Facility and Xena-03 Operational Areas)	Recreational Use Zone – IV
State Marine Parks and Nature Reserves		
Marine Parks		
Barrow Island	43 km south-west (Export Pipeline Operational Area)	Sanctuary Zone –Ia
Montebello Islands	25 km south (Export Pipeline Operational Area)	Sanctuary Zone – Ia General Use Zone – II Special Purpose Zone (Benthic Protection) – IV Special Purpose Zone (Pearling) Recreational Zone –II
Ningaloo	207 km south-west (Facility and Xena-03 Operational Areas)	General Use Zone – II Special Purpose Zone (Benthic Protection) – IV Sanctuary Zone – Ia Recreational Area – II
Conservation Park		

Protected Places and Other Sensitive Areas	Distance (Closest) and Direction from PAA to Protected Place or Sensitive Area (km)	Park Zone and IUCN Category* Overlapping PAA and/or EMBA
Montebello Islands	32 km south-west (Export Pipeline Operational Area)	N/A
Marine Management Areas		
Barrow Island	42 km south-west (Export Pipeline Operational Area)	N/A
Muiron Islands	190 km south-west (Facility and Xena-03 Operational Areas)	N/A
Nature Reserves		
Muiron Islands	179 km south-west (Export Pipeline Operational Area) 172 km south-west (Facility and Xena-03 Operational Areas)	Ia
Bessieres Island	172 km south-west (Facility and Xena-03 Operational Areas)	Ia
Round Island`	186 km south-west (Export Pipeline Operational Area)	Ia
Serrurier Island	182 km south-west (Facility and Xena-03 Operational Areas)	Ia
5(1)(h) Reserve		
Unnamed WA40828	36 km south-west (Export Pipeline Operational Area)	N/A
Unnamed WA40877	16 km south-west (Export Pipeline Operational Area)	N/A
Unnamed WA36910	18 km south (Export Pipeline Operational Area)	N/A
Unnamed WA36909	20 km south (Export Pipeline Operational Area)	N/A
Unnamed WA44665	173 km south-west (Facility and Xena-03 Operational Areas)	N/A
Unnamed WA41080	32 km south (Export Pipeline Operational Area)	N/A

**Conservation objectives for IUCN categories include:*

Ia: Strict Nature Reserve

Ib: Wilderness Area

II: National Park

III: Natural Monument or Feature

IV: Habitat/Species Management Area

V: Protected Landscape

VI: Protected area with sustainable use of natural resources – allow human use but prohibits large scale development.

IUCN categories for the marine park are provided and, in brackets, the IUCN categories for specific zones within each Marine Park as assigned under the North-west Marine Parks Network Management Plan 2018 and South-west Marine Parks Network Management Plan 2018.

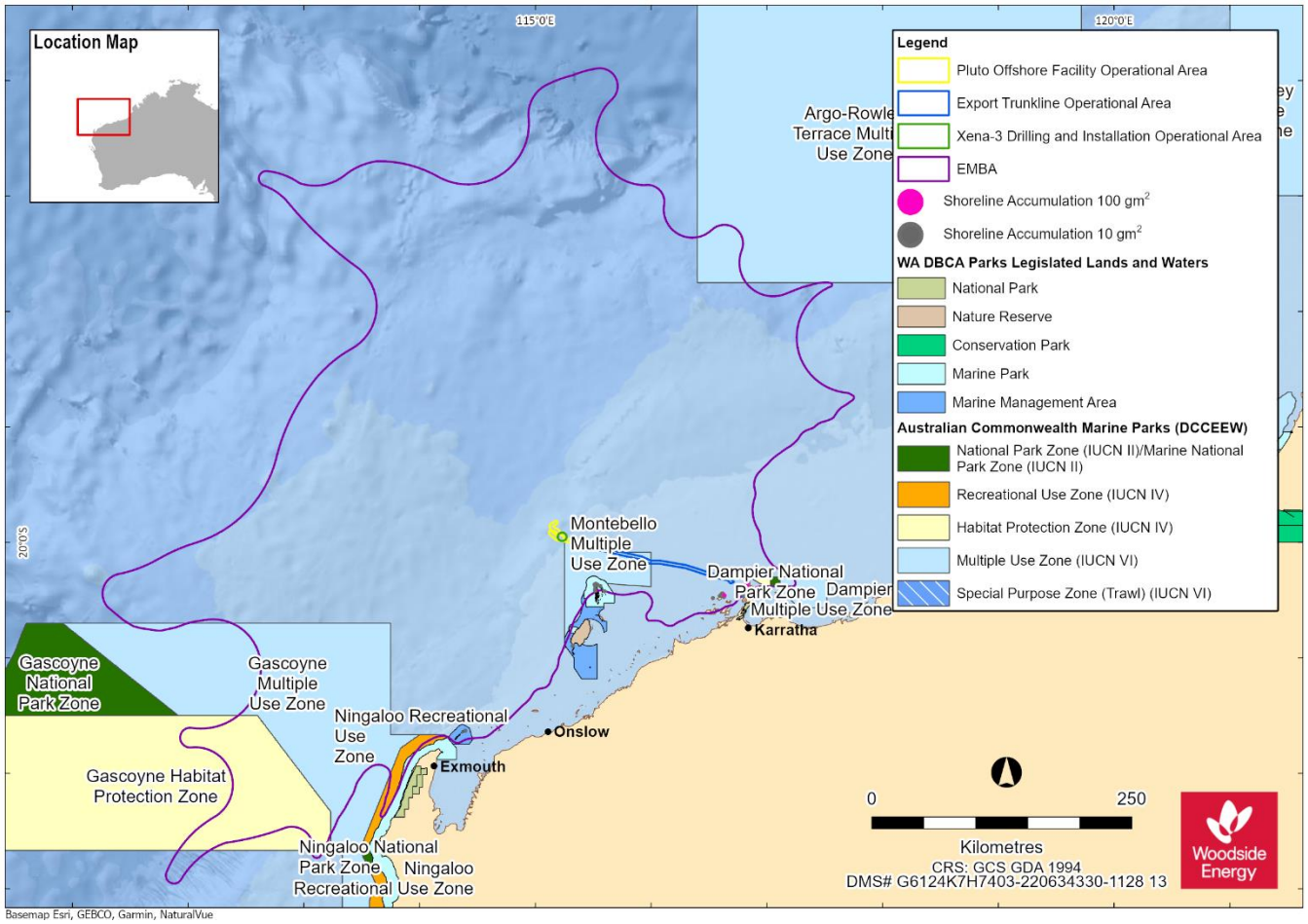


Figure 4-11: Protected areas adjacent to the PAA and EMBA

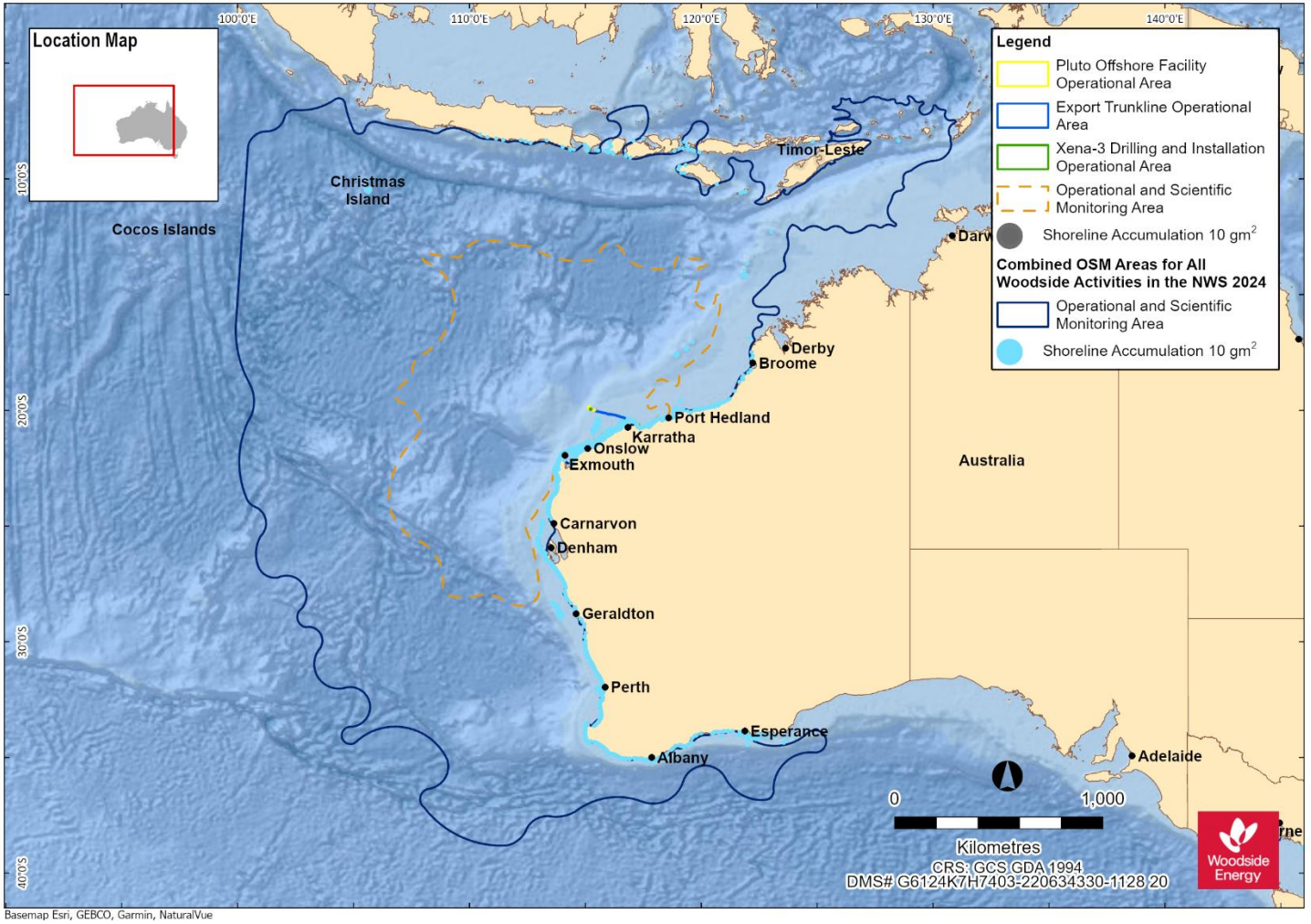


Figure 4-12: Australian Marine Parks adjacent to the PAA, Scientific Monitoring Area and EMBA

4.9 Cultural Features and Heritage Values

4.9.1 Background

Woodside recognises the 'environment' for the purpose of the evaluation required under the Environment Regulations includes:

- the heritage value of places
- the social, economic, and cultural features of the broader environment.

In this section, the heritage value of places within the PAA and EMBA and the cultural features of the PAA and EMBA are described.

In line with The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance (Australia ICOMOS, 2013) (Burra Charter) and associated practice notes, Woodside understands heritage value to refer to the cultural significance of a place to an individual or group. A cultural feature, by contrast, is understood to be comparable to the Burra Charter term “fabric” and refer to a place’s elements, fixtures, contents and objects which have cultural values. Although these features are necessarily physical, the place they inhabit or comprise may have tangible or intangible dimensions (Australia ICOMOS, 2013). Woodside has undertaken heritage assessment to identify potential cultural values or features that may be impacted by the PAA. This assessment has not identified heritage places, objects or values that will be impacted by the activities planned under this EP (discussed in Section 6.11). However, Woodside recognises the deep spiritual and cultural connection to the environment[26] that First Nations peoples hold and is committed to ensuring appropriate management through on-going consultation.

4.9.2 First Nations People

Woodside uses established systems managed and maintained by government at State and/or Federal level where possible to identify First Nations groups that may have functions, interests or activities that may be affected by the PAP. Woodside identifies native title representative bodies and nominated representative entities, as well as native title claims, determinations and Indigenous Land Use Agreements (ILUAs) which the EMBA overlaps. Native title claims, determinations and ILUAs are defined under the Native Title Act 1993 (Cth). While acknowledging that cultural features and heritage values may exist outside of the native title framework, Woodside considers this to be the broadest extent over which Indigenous groups have claimed native title rights and interests.

Native title claims are applications made to the Federal Court under the Native Title Act 1993 for a determination or decision about native title in a particular area. A claim is made by a native title claim group which asserts it holds native title rights and interests in an area of land and/or water, according to its traditional laws and customs. By making a claim, the native title claim group seeks a decision that native title exists so that its native title rights and interests are recognised by the common law of Australia. This is called a native title determination. A determination is a decision by a recognised body, such as the Federal Court or High Court of Australia, that native title either does or does not exist in relation to a particular area (National Native Title Tribunal).

A requirement to establishing a positive determination of native title in court is proving that there is an organised society that occupied the land and/or waters at the time of British annexation. The

[26] Definition of ‘Environment’ in Regulation 4 of the OPGGS (Environment) Regulations are defined as:
- ecosystems and their constituent parts, including people and communities
- natural and physical resources
- the qualities and characteristics of locations, places and areas
- the heritage values of places, and includes
- the social, economic and cultural features of the matters mentioned in paragraphs (a), (b), (c) and (d).

requirement of an 'organised society' is set out by Justice Toohey in the historic judgment of Mabo versus Queensland (No 2) [1992] HCA 23; (1992) 175 CLR 1 ('Mabo'). Justice Toohey had the following to say (at 187):

"it is inconceivable that indigenous inhabitants in occupation of land did not have a system by which land was utilized in a way determined by that society. There must, of course, be a society sufficiently organised to create and sustain rights and duties…"

Therefore, Woodside understands that native title rights and interests are held communally by an organised society, that native title claims are understood to represent the area over which First Nations groups are claiming these rights and interests, and that native title determinations provide clarity on where native title rights and interests are found to either exist or not exist. Where native title rights or interests are determined to exist, they will be held by a Registered Native Title Body Corporate (section 57, Native Title Act 1993) in trust or as agent for native title holders.

ILUAs are voluntary agreements between native title parties and other people or bodies about the use and management of land and/or waters and are registered by the Native Title Registrar in the Register of ILUAs. An ILUA can be made over areas where:

- native title has been determined to exist in at least part of the area, or
- a native title claim has been made, or
- where no native title claim has been made.

While registered, ILUAs operate as a contract between the parties, including relevant native title holders (National Native Title Tribunal).

The Native Title Act 1993 provides for a Representative Aboriginal/Torres Strait Islander Body (Native Title Representative Body) to be recognised by the Commonwealth Minister for an area. Native Title Representative Bodies have specialist functions set out in the Native Title Act 1993 within the area for which they are the Native Title Representative Body. However, the functions of a Native Title Representative Body are such that they do not hold details on the cultural features or heritage values of an area and therefore do not inform Woodside's understanding of heritage values or cultural features.

For the activity in this EP, there are no native title claims or determinations, ILUAs overlapping the PAA and therefore also no native title rights or interests and/or cultural values identified over the PAA (Figure 4-13).

There are three native title claims overlapping the EMBA and areas of potential shoreline accumulation. A further two native title claims are coastally adjacent to the EMBA. There are three ILUAs overlapping the in-water EMBA and areas of potential shoreline accumulation. A further 9 ILUAs are coastally adjacent to the EMBA (Figure 4-13).

4.9.3 Coastally Adjacent First Nations Groups

Woodside understands that First Nations groups are keenly aware of the extent of their rights, interests and responsibilities for Country, and these are generally discrete, defined areas, including areas of sea (Smyth, 2007). To identify cultural features and heritage values which may exist outside of native title claim, determination and ILUA areas, Woodside considers native title claims, determinations and ILUAs coastally adjacent to the EMBA to be an instructive means of identifying potentially relevant First Nations groups to be consulted.

Woodside understands from engagement with relevant persons and/ or organisations, that extending a native title group's responsibility to areas which those groups have elected to not include in their claims or ILUAs can have significant cultural consequences for First Nations groups and individuals. This may also, over time, build expectations in the broader First Nations community that a group is

responsible for maintaining environmental values in areas for which they do not hold traditional knowledge. Woodside also acknowledges that a First Nations group's relative proximity to any PAA or EMBA is not necessarily a meaningful indicator of the connection of First Nations groups to the area, and providing advice over such areas can be culturally dangerous. As a result, caution must be used when conducting broader engagement.

A summary of native title claims, determinations and ILUAs overlapping or coastally adjacent to the EMBA is set out in Table 4-17. Claims and determinations have not been differentiated in this table, as it is acknowledged that either of these may indicate the existence of rights and interests.

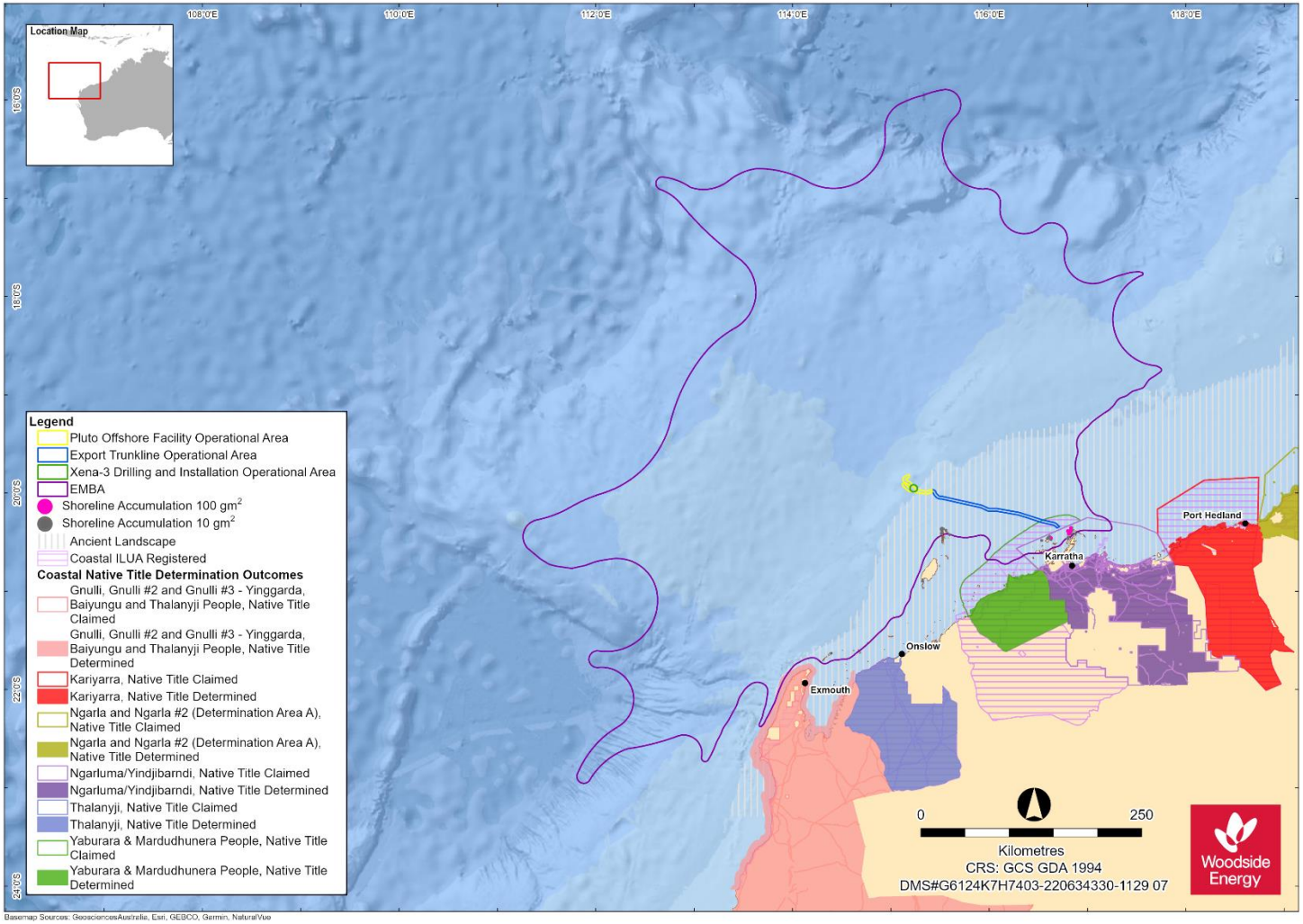


Figure 4-13: PAA and EMBA in relation to Native Title Claims, Determinations and ILUAs

Table 4-17: Summary of Native Title Claims, Determinations and ILUAs that overlap or are coastally adjacent to the EMBA

Claim/ Determination/ILUA	Registered Native Title Body Corporate	Overlap with EMBA	Coastally Adjacent to EMBA
Claim/Determination			
Gnulli, Gnulli #2 and Gnulli #3 – Yinggarda, Baiyungu and Thalanyji People	Nganhurra Thanardi Garrbu Aboriginal Corporation, Yinggarda Aboriginal Corporation	Yes	Yes
Kariyarra	Kariyarra Aboriginal Corporation	No	Yes
Ngarluma/Yindjibarndi	Yindjibarndi Aboriginal Corporation, Ngarluma Aboriginal Corporation	Yes	Yes
Thalanyji	Buurabalayji Thalanyji Aboriginal Corporation	No	Yes
Yaburara and Mardudhunera People	Wirrawandi Aboriginal Corporation	Yes	Yes
Ngarla People	Wanparta Aboriginal Corporation	No	Yes
ILUA			
Alinta-Kariyarra Electricity Infrastructure ILUA	No representative body specified.	No	Yes
Anketell Port, Infrastructure Corridor and Industrial Estates Agreement	NAC	No	Yes
Cape Preston Project Deed (YM Mardie ILUA)	WAC	Yes	Yes
Cape Preston West Export Facility	WAC	No	Yes
FM – Kariyarra Land Access ILUA	No representative body specified.	No	Yes
Kariyarra and State ILUA	Kariyarra Aboriginal Corporation	No	Yes
KM and YM Indigenous Land Use Agreement 2018	WAC, Robe River Kuruma Aboriginal Corporation	Yes	Yes
Kuruma Marthudunera and Yaburara and Coastal Mardudhunera Indigenous Land Use Agreement	No representative body specified.	Yes	Yes
Macedon ILUA	BTAC	No	Yes
Ningaloo Conservation Estate ILUA	NTGAC	No	Yes
RTIO Kuruma Marthudunera People ILUA	Robe River Kuruma Aboriginal Corporation	No	Yes
RTIO Ngarluma Indigenous Land Use Agreement (Body Corporate Agreement)	NAC	No	Yes

4.9.4 Sea Country Values

Woodside recognises the potential for marine ecosystems to include cultural features as well as environmental values. This is one aspect of the broader concept of "Sea Country", which can be defined as the area of sea over which a First Nations group has interests, cultural value, connection and use. It has been noted that "the saltwater peoples of the north-west are associated with discrete clan estates or tribal areas, often referred to in contemporary Aboriginal English as 'saltwater country' or 'Sea Country'. 'Country' refers to more than just a geographical area: it is shorthand for all the values, places, resources, stories and cultural obligations associated with that geographical area." (Smyth, 2007). It necessarily follows that an impact to marine ecosystems has the potential to impact cultural values where the impact is detectable within Sea Country – the seascape that Traditional Custodians view, interact with or hold knowledge of. The link between environmental protection and cultural heritage protection is illustrated in the Australian Government's Indigenous Protected Areas Program. The Indigenous Protected Areas program provides for "areas of land and sea managed by Indigenous groups as protected areas for biodiversity conservation…IPAs deliver environmental benefits…Managing IPAs also helps Indigenous communities protect the cultural values of their country for future generations…" (NIAA, 2024).

McNiven (2004) suggests that "For those mainland groups whose exploitation of the sea was limited to littoral resources, it is likely that seascapes extended no more than c. 20–30km out to sea, out to the horizon and the limit of human visibility. ... However, in some coastal places, clouds that can be seen well over 100 km out to sea are imbued with spiritual significance. For those groups with elaborate canoe technology, seascapes extend well over the horizon." While there is some evidence of traditional watercraft in Australia's North West, the recorded evidence is limited to travel across inland rivers (e.g., Barber and Jackson, 2011) or travel between coastal islands (Paterson et al., 2019). The process for identifying First Nations groups who may have interests and connection in Sea Country are set out in Section 4.9.4.1. The scope of advice Traditional Custodians were encouraged to provide through project consultation was not limited by reference to any particular boundaries or limits of Sea Country.

Cultural features of coastal areas may include marine species that may travel many thousands of kilometres through areas with similar cultural values to multiple First Nations groups. Some species may travel as far as 5000 km from Antarctica to the Kimberley region of Western Australia (Double et al., 2010, 2012), passing First Nations groups along the entire west coast of Australia. For a further description of whale distribution and whale migration patterns, see Section **Error! Reference source not found.**. For a further description on turtles, see Section 4.6.2.

As set out above, an impact to marine ecosystems has the potential to impact cultural values where the impact is detectable within Sea Country. Woodside considers that impact to cultural values of marine species will be adequately managed in areas of traditional Sea Country, and therefore management of the environmental values will preserve the cultural values of environmental receptors, as assessed in Section 6.

Sea country values have been defined using multiple lines of evidence, including:

- desktop assessment of Sea Country values from publicly available sources
- Indigenous archaeological heritage assessments
- consultation with First Nations groups and individuals.

4.9.4.1 Desktop Assessment of Sea Country Values

4.9.4.1.1 Cultural Features and Heritage Values Identified in Publicly Available Literature

Publicly available sources were assessed for any records of previously identified Sea Country values or cultural features that may overlap with the EMBA or PAA. Where cultural features or Sea Country

values were identified, these are summarised in Table 4-18 according to the First Nations groups (where identified or inferable) who hold these values.

All cultural features and heritage values restricted to onshore locations or inland waters have been excluded in Table 4-18, noting that the closest boundary of the PAA is approximately 13 km to islands of the Dampier Archipelago and 22 km north-west of the coastal mainland, while the boundary of the EMBA is about 6 km from closest landfall with no shoreline contact. Where the geographical extent is not specified or unclear it has been included for completeness.

Table 4-18: Cultural features and heritage values identified in publicly available literature

First Nations Group	Features and Values	Source	Potential for Overlap	
			PAA	***EMBA***
Gnulli (Baiyungu, Thalanyji, Yinggarda)	Feature: resources including marine animals. Value: traditional knowledge holds that ancestors live on the land and in the water. Therefore, people have obligations to access and care for these places (e.g., keeping them clean).	Peck on behalf of the Gnulli Native Title Claim Group v State of Western Australia [2019] FCA 2090	Possible (unspecified) Possible (unspecified)	Possible (unspecified) Possible (unspecified)
	Feature: resources including mangrove crabs, gastropods, shellfish, dugong, turtle.	Morse, 1993	Possible (turtle) No (other resources)	Possible (all)
	Feature: heritage sites in the Ningaloo region include shell middens, artefact scatters, skeletal material/burial sites, camps, meeting places, hunting places and water sources.	Deloitte, 2020	No	Possible (Shoreline accumulation areas on offshore islands)
	Feature: resources including gajalbu (emu), bundgurdi (kangaroo), bardurra (bush turkey), majun (marine turtles), turtle eggs, bilygurumarda (osprey), fish, shellfish and plants.		Possible (turtles, fish) No (other resources)	Possible (turtles, turtle eggs, fish, shellfish) No (other resources)
	Feature: mudflats, mangroves and sand dunes provide a critical breeding ground for marine and terrestrial wildlife.		No	Possible (mangroves)
	Value: the Ningaloo region contains cultural heritage dating back at least 32,000 years, including ceremonial Thalu sites.		No	Possible (unspecified, but likely refers to onshore areas outside the EMBA)
	Value: connection to Country is important to the Traditional Owners' spirituality and religion.		Possible Unspecified	Possible (unspecified, but likely due to location of EMBA)
	Value: caring for Country – "The southern coastal reserves along the Ningaloo Coast are jointly managed by Traditional Owners and the DBCA. The Joint Management Body ensures that the Traditional Owners have an opportunity to make decisions about environmental management and land use". This document also includes information that is marked that cannot be copied, reproduced or used without consent.		No	Possible
Kariyarra	Value: traditional knowledge recalls that a salt water serpent lives in the sea and brings fish to shore.	Zaunmayr, 2016	Possible (unspecified)	Possible (unspecified)

First Nations Group	Features and Values	Source	Potential for Overlap	
			PAA	***EMBA***
Ngarda-Ngarli (Mardudhunera, Ngarluma, Wong-Goo-Tt-Oo, Yaburara and/or Yindjibarndi)	Feature: Archaeological sites on Murujuga.	Department of the Environment and Heritage, 2006	No	Possible (submerged)
	Feature: Ceremonial sites.		No	No
	Feature: Dreaming sites.		Possible (unspecified)	Possible (unspecified)
	Value: Traditional knowledge recalls that the sea is a source of creation for flying foxes.	DEC, 2013	Possible (unspecified)	Possible (unspecified)
	Value: Petroglyphs are understood as permanent signs left by ancestral beings.		No	Possible (submerged)
	Value: Petroglyphs depict the law.		No	Possible (submerged)
	Value: Cultural obligations to look after places of special potency.		Possible (unspecified) – unlikely given distance offshore	Possible (unspecified) – unlikely given distance offshore
	Value: Petroglyphs are important in initiation and education.		No	Possible (submerged)
	Value: The sea is acknowledged as a starting point for songlines, including the flying fox songline.	MAC, 2023a	Possible (unspecified)	Possible (unspecified)
	Feature: Resources including fishes, turtles and dugong.	Water Corporation, 2019	Possible	Possible
	Value: Traditional knowledge recalls a sea serpent which travelled from the coast to inland pools.		Possible (unspecified)	Possible (unspecified)
	Value: Traditional knowledge recalls a water serpent from the ocean now lives in an inland pool. He created many sites and punishes law breakers.	Barber and Jackson, 2011	Possible (unspecified)	Possible (unspecified)
	Value: In a separate account, a sea serpent punishing people was driven back to the sea by a freshwater serpent.		Possible (unspecified)	Possible (unspecified)
	Value: Traditional knowledge recalls Manggan created the seas.	NAC n.d.	Yes	Yes
	Value: Traditional knowledge recalls Pannawonica Hill being carried from the sea near Barrow Island or Murujuga by a spirit bird.	Hook et al., 2004	Possible (unspecified)	Possible (unspecified)
	Value: Traditional knowledge recalls Murujuga is where ancestral beings emerged from the sea and brought the Law.	Australian Heritage Council, 2012	Possible (unspecified)	Possible (unspecified)

First Nations Group	Features and Values	Source	Potential for Overlap	
			PAA	***EMBA***
	Feature: Submerged First Nations archaeological sites in Cape Bruguieres channel.	Benjamin et al., 2020	No	Possible
	Feature: Submerged First Nations archaeological sites in Flying Foam Passage.		No	No
	Feature: Submerged First Nations archaeological sites in Cape Bruguieres channel.	Benjamin et al., 2023	No	Possible
	Feature: Submerged First Nations archaeological sites in Flying Foam Passage.		No	No
	Value: Traditional knowledge recalls Maarga (creation ancestors) lifted the land and sky out of the ocean.	Milroy and Revell, 2013	Possible (unspecified)	Possible (unspecified)
	Value: Traditional knowledge recalls Maarga (creation ancestors) lifted the land and sky out of the ocean.	Japingka Aboriginal Art Gallery, 2023	Possible (unspecified)	Possible (unspecified)
	Feature: Submerged waterholes related to the Kangaroo songline.	Kearney et al., 2023	Possible	Possible
	Value: Traditional knowledge holds that Songlines continue beyond the current coast and across the submerged landscape.		No	Possible (unspecified)
	Value: Songlines are captured through storytelling, rock art, songs and dance, and in the landmarks themselves.	Bainger, 2021	No	Possible
	Value: Murujuga is the start of many songlines, including the Seven Sisters.		No	Possible (unspecified)
	Value: Songlines at Murujuga date back to times when the sea-level was lower.	MAC, 2023b	No	Possible (unspecified)
	Feature: Rock art.	Weerianna Street Media Production, 2017	No	Possible (submerged)
	Feature: Sacred sites.		Possible (unspecified)	Possible (unspecified)
	Feature: Resources including fish, turtles.	Leach, 2020	Possible	Possible
	Feature: Fish traps exist throughout the archipelago.		No	Possible
	Feature: Shell middens exist on coastal margins.		No	Possible
	Feature: Submerged archaeological sites.		Possible	Possible
	Value: Law emerged from the sea and travelled inland.		Possible (unspecified)	Possible (unspecified)

First Nations Group	Features and Values	Source	Potential for Overlap	
			PAA	***EMBA***
	Feature: Archaeological sites on Murujuga.	McDonald, 2023	No	Possible (submerged)
	Feature: Archaeological sites on Murujuga.	McDonald, 2015	No	Possible (submerged)
	Feature: Archaeological sites on Enderby Island.	McDonald et al., 2022a	No	No
	Feature: Archaeological sites on Rosemary Island.	McDonald et al., 2022b	No	No
	Feature: Petroglyphs on Murujuga.	Mulvaney, 2015	No	Possible (submerged)
	Feature: Resources including mangrove seeds, turtles, turtle eggs). Value: It is recalled that ceremonies were conducted on islands.	Smyth, 2007	Possible (turtle) No (other resources) No (onshore)	Possible (turtle) No (other resources) No (onshore)
	Feature: Petroglyph and other archaeological sites at Murujuga.	Dortch et al., 2019	No	Possible (submerged)
Thalanyji	Feature: Resources including fish, shellfish, crabs, crustaceans, sea urchins, turtle, dugong and flora and fauna associated with mangrove communities. Feature: Archaeological sites on Barrow Island. Value: Connection to Country.	Commonwealth of Australia, 2002	Possible (turtle; fish) No (other resources) No Possible (unspecified)	Possible (all resources) No Possible (unspecified)
	Feature: Resources include turtles, eggs, fish, shellfish and plants.	DBCA et al., 2002	Possible (turtle; fish) No (other resources)	Possible
	Value: Traditional knowledge recalls a water snake is located in inland waters.	Hayes on behalf of the Thalanyji People v State of Western Australia [2008] FCA 1487	No (inland waters)	No (inland waters)
	Value: Connection to Country. Value: Transfer of knowledge. Value: Access to Country.	DBCA, 2022	Possible (unspecified) Possible (unspecified) Possible (unspecified)	Possible (unspecified) Possible (unspecified) Possible (unspecified)
	Value: Access to Barrow and possibly Montebello Islands.	Hook et al., 2004	No	Possible (Montebello Islands)
	Feature: Artefact scatters are located in coastal sand dunes.	Hook, 2020	No	No (no shoreline accumulation areas)

First Nations Group	Features and Values	Source	Potential for Overlap	
			PAA	***EMBA***
	Feature: Burials are located in coastal sand dunes. Value: Traditional knowledge recalls a water snake is located in inland waters.		No No	No (No shoreline accumulation areas) No (inland waters)
	Feature: Archaeological sites are located on Barrow Island.	Ditchfield et al., 2018	No	No
	Feature: Thalu ceremonial sites for the increase of turtle, shark, ray, fish, squid, octopus, hill kangaroo and emu. Feature: ceremonies. Value: Connection to Country. Value: Transfer of knowledge. Value: Access to Country.	DBCA, 2022	No No Possible Possible Possible	No (ceremonial use) Possible (submerged Thalu sites, e.g., petroglyphs) No Possible Possible Possible
	Feature: Archaeological sites are located at Barrow and Montebello Islands. Feature: Archaeological evidence of the use of resources including fish, turtles, marine mammals, crocodiles, crabs and sea urchins.	Dortch et al., 2019.	No No	Possible (Montebello Islands) Possible (submerged, highly unlikely for most evidence of faunal use to survive inundation)
	Feature: Archaeological sites are located on Barrow Island.	Paterson, 2017	No	No
Unspecified	Feature: The ocean can include sacred sites and songlines. Value: People have kin relationships to important animals, plants tides and currents.	Smyth, 2008	Possible (unspecified) Possible (unspecified)	Possible (unspecified) Possible (unspecified)
	Feature: Archaeological sites in submerged landscapes.	Bradshaw, 2021	No	Possible
	Value: Sea country has customary law defining ownership and management rights and responsibilities.	Muller, 2008	Possible (unspecified)	Possible (unspecified)
	Value: Knowledge of Sea Country. Value: Connection to Sea Country.	Kearney et al., 2023	Possible (unspecified) Possible (unspecified)	Possible (unspecified) Possible (unspecified)

First Nations Group	Features and Values	Source	Potential for Overlap	
			PAA	***EMBA***
	Value: Care for Sea Country. Value: The extent of Sea Country is determined by the travels of dreaming ancestors. This is recorded and conveyed through songlines.		Possible (unspecified) Possible (unspecified)	Possible (unspecified) Possible (unspecified)
	Value: Sea country includes values, places, resources, stories and cultural obligations. Value: Activities relating to resources included: • dugong hunting • turtle hunting • turtle egg collecting • seabird egg collecting • spearing fish • reef trapping fish • herding fish • line fishing • collecting fish in stone fish traps • poisoning fish • gathering shellfish and other marine resources.	Smyth, 2007	Possible Possible	Possible Possible
	Feature: Archaeological sites indicate that islands were occupied prior to sea level rise.	DBCA, 2020	No	Possible
	Value: People have kinship relationships with every plant and animal. Value: Certain species, including fish and seafood, must not be eaten during initiation rituals due to their sacredness to the creation being Barrimirndi. Breaking this law may lead to cyclones.	Juluwarlu, 2004	Likely No	Likely No
	Feature: Tangible and intangible heritage. Feature: Archaeological evidence of varied occupation and adaptation.	Macfarlane and McConnell, 2017	Possible (unspecified) No	Possible (unspecified) Possible (submerged, highly unlikely for most

First Nations Group	Features and Values	Source	Potential for Overlap	
			PAA	***EMBA***
				evidence of faunal use to survive inundation)
	Value: a distinct way of life centred around the use of limited water and coastal resources.		No	Possible (unspecified)

4.9.4.1.2 First Nations Archaeological Heritage Assessment

Woodside understands communal cultural connection may exist between Traditional Custodians and land and waters. It is understood from the onshore archaeological record that Aboriginal people have occupied the Australian continent for at least 65,000 years (Clarkson et al., 2017) and in many places maintain a strong continuing connection that is said to extend back in Indigenous cosmology to the beginning of time.

It is understood that the sea level has risen significantly during the 65,000 years of Indigenous occupation, and areas that were once inhabited are now submerged on the continental shelf (Veth et al., 2019; UWA, 2021). Woodside also understands that, at its lowest level during First Nations occupation, sea level was between 125 m (O'Leary et al., 2020; Veth et al., 2019; Williams et al., 2018) and 130 m below current levels (Benjamin et al., 2020; Benjamin et al., 2023; UWA, 2021). Archaeological material preserved on the Ancient Landscape has the potential to provide further information about the earliest periods of human occupation (Veth et al., 2019; UWA, 2021).

Recent archaeological discoveries demonstrate that the now submerged landscape was occupied and inhabited and can retain archaeological material from this time (Benjamin et al., 2020; Benjamin et al., 2023; see Ward et al., 2021 for an opposing view).

In recognition of this, Woodside considers the Ancient Landscape between the mainland and the Ancient Coastline KEF as an area where potential First Nations archaeological material may exist on the seabed, as this covers the full extent of this possible First Nations occupation. Known Indigenous heritage places including archaeological sites may be protected subject to declarations under the Aboriginal and Torres Strait Islander Heritage Protection Act 1984, Underwater Cultural Heritage Act 2018 or EPBC Act 1999. However, these Acts only extend protection to heritage places specified by declaration or otherwise included on a statutory list. Woodside understands that there is no First Nations archaeology known to exist anywhere within Commonwealth waters and no declarations or prescriptions under these Acts are located within the EMBA.

The PAA is located beyond the Ancient Landscape. The EMBA overlaps the ancient landscape, but no impacts to the seabed are anticipated. Archaeological material on the Ancient Landscape is not a relevant matter for the proposed activity as there is no overlap between the PAA or areas of potential seabed disturbance and the Ancient Landscape.

The Department of Planning, Lands and Heritage (DPLH) Aboriginal Heritage Inquiry system was searched for the EMBA, which indicated 55 Registered Aboriginal Sites and Other Heritage Places (Appendix D). The exact location, access, and traditional practices for a number of these sites may not be disclosed and if required, such as in the event of a major oil spill, would involve prioritising further consultation with key contacts within DPLH and relevant local Aboriginal communities.

No sites of significance within the PAA or EMBA were identified by Traditional Custodians during the course of preparing the EP.

Should feedback be received (including any relevant new information on cultural values), it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process.

Where Indigenous archaeological material is identified within the EMBA, Woodside will discuss the management of this material with appropriate Traditional Custodian group(s), starting with any adjacent Native Title Body Corporate.

4.9.4.1.3 Consultation Feedback to Inform Existing Environment

First Nations cultural values are communally held. This is reflected in Vision 3 of Dhawura Ngilan that "Aboriginal and Torres Strait Islander heritage is managed according to community ownership" (Heritage Chairs of Australia and New Zealand, 2021). Dhawura Ngilan also specifically notes that "Aboriginal and Torres Strait Islander... intangible knowledge systems, which are held in songlines and language, are endangered. This knowledge is held by Elders and the community..." Through

consultation with relevant persons, Registered Native Title Bodies Corporate have identified or raised topics relating to environmental values of cultural interest. These include a broad interest in the marine fauna.

Additional cultural values and broader interests in the environment are known and have been shared with Woodside in the course of consultation on this activity and other Environment Plans. These cultural values and broader interests that are known to exist within the EMBA are identified below:

The marine ecosystem description (Section 4.5) encompasses the description of the cultural features and Section 4.6 describes turtles and marine cetaceans.

Woodside has committed to ongoing engagement to further understand these values. The Program of Ongoing Engagement with Traditional Custodians provides a mechanism for ongoing dialogue between Woodside and Traditional Custodians. The program enables Woodside to manage uncertainty on the impacts and risks to cultural values which may be identified at any time during Woodside's activities via ongoing dialogue with Traditional Custodians. Should feedback be received (including any relevant new information on cultural values), it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process.

A summary of the topics/interests and values raised by First Nations groups through consultation relevant to this PAP or raised in context of general Project activities or other activities are provided in Table 4-19.

Table 4-19: Summary of Sea Country values raised during consultation

First Nations Group / Individuals	Context	Description of Value / Feature / Interest	Potential for Overlap	
			PAA	EMBA
Buurabalayji Thalanyji Aboriginal Corporation	Raised during the course of consultation for another EP	Value: Connection to Sea Country Enduring deep connection to sea country north of Onslow, extending out to Islands off the Pilbara coast such as the Montebello islands, Barrow Island and the Mackerel Islands	Possible	Possible
Kariyarra Aboriginal Corporation	Raised during the course of consultation for another EP	Value: Turtles	Possible	Possible
		Value: Access to Sea Country (1) Accessing Sea Country for fishing, trapping, crabbing catching turtle, hunting dugong, using stingray barbs for spears and collecting shellfish. (2) Visiting offshore islands at low tide	No (all)	Possible (all)
		Value: Marine species resources Resource species of cultural interest to Kariyarra people include marine mammals, fish, molluscs including bivalves, gastropods and cephalopods.	Possible	Possible
		Value: The existence of intangible cultural heritage including the Yinta (associated with Sea Country). From Kariyarra Native Title documents it is clear that Yinta are significant cultural/spiritual sites, often a pool or water source but possibly a hill or other feature. These are, at least generally, associated with creation beings and are	Possible	Possible

First Nations Group / Individuals	Context	Description of Value / Feature / Interest	Potential for Overlap	
			PAA	EMBA
		a core part of cultural rights to land in determining who can use or speak for an area.		
		Interest: Coastal Landforms (Cultural interest)	No	Possible
		Interest: Coastal Native Vegetation (Cultural interest)	No	Possible
		Feature: Cultural interest in cultural heritage sites associated with the coast and the ocean.	Possible	Possible
		Value: Traditional fishing and gathering rights in the ocean	Possible	Possible
		Value: Cultural interest in intangible cultural heritage associated with the coast and the ocean. (1) Presence of mythic snakes	Possible	Possible
		Value: Intergenerational Knowledge In addition to their immediate value as sustenance, the gathering and preparation of these resources are informed by cultural knowledge, and an inability to use these resources may result in a loss of ability to transfer that knowledge to future generations. Direct impact to communities using these resources will inherently occur when the resource disappears, is displaced or suffers a reduction in population. Therefore, these communities may be impacted where there is an impact at the species/population level. Impacts to resource collection would be limited to temporary exclusion in areas where there are hydrocarbons present, including shoreline accumulation. Relevant cultural authorities will be engaged in the event of a spill that may affect them.	Possible	Possible
		Value: Cultural obligations to care for Country, including Sea Country. Value: Secret Habitat Totems associated with Sea Country	Possible	Possible
		Interest: Assertion of sea rights in native title claim area Interpreted as general connection to country, assertion of rights to access country and cultural obligation to care for environmental values of sea country (1) Having duties to look after and protect all KACs Sea Country.	No (based on NT determined area)	Possible

First Nations Group / Individuals	Context	Description of Value / Feature / Interest	Potential for Overlap	
			PAA	EMBA
Murujuga Aboriginal Corporation	Raised during the course of consultation for another EP	Value: Mermaid Sound (1) The ecosystem health of Mermaid Sound	No	Possible
		Value: Whales (1) Whales and other species of totemic importance need to be protected, including their populations, biodiversity, and migration patterns. (2) A whale Thalu is an increase at the totemic site that brings whales into the beach.	Possible (all)	Possible (all)
		Value: Dolphins There are cultural ceremonies associated with communicating with dolphins	Possible	Possible
		Value: Dugongs Dugongs are a food source associated with seagrasses near Gidley Island	Possible	Possible
		Value: Fish Specific mentions of fish included There are Thalu ceremonies associated with increasing fish stocks	Possible	Possible
		Value: Sea Snakes Sea snakes were specifically mentioned as culturally important species	Possible	Possible
		Value: Turtles (1) Flatback, green, hawksbill, loggerhead and leatherback turtles; Songline The Songline associated with the turtle comes from Fortescue to Withnell Bay. This song is sung by four or five tribes for day and night without consuming food or water. (2) Flatback, green, hawksbill, loggerhead and leatherback turtles: They are culturally important species that moves through Mermaid Sound. Turtles are most often seen in shallower areas and where there are seagrasses. (3) Most beaches are nesting sites for turtles, including those on Gidley and Legendre Islands... which also identifies Rosemary Island as the most important hawksbill turtle nesting site in Western Australia.	Possible (1,2) No (3)	Possible (all)

First Nations Group / Individuals	Context	Description of Value / Feature / Interest	Potential for Overlap	
			PAA	EMBA
		Feature: Coral Concerned about coral bleaching because corals are important. Beautiful colours. They also attract a lot of other things. Fish carry coral spawn like bees pollinate flowers. If fish were looked after, the corals would get brighter and brighter (by transmitting nutrients and performing other ecosystem services, fish can be symbiotic with corals). Locations identified during consultation include Withnell Bay; Conzinc Bay; south west of Legendre Island.	No	Possible
		Feature: Seagrass (1) Seagrasses provide protection for animals. (2) Locations identified during consultation include Conzinc Island, between Angel and Gidley Islands.	No	Possible
		Feature: Mangroves (1) Mangroves would have provided shelter, crabbing, digging for shellfish, could be turtle nurseries. Locations identified during consultation include Conzinc Bay north end; Flying Foam Passage; Searipple Passage; north-east bay of West Lewis Island.	No	Possible
		Feature: Macroalgal communities Are important primary production sites, habitats, and food sources (not explicitly identified by elders).	No	Possible
		Feature: Subtidal soft-bottom communities Support invertebrate diversity (not explicitly identified by elders).	No	Possible
		Feature: Intertidal sand and mudflat communities Important primary production sites, support invertebrate diversity and provide food for shorebirds (not explicitly identified by elders).	No	Possible
		Feature: Rocky shores Habitats for intertidal organisms and provide food for shorebirds (not explicitly identified by elders).	No	Possible

First Nations Group / Individuals	Context	Description of Value / Feature / Interest	Potential for Overlap	
			PAA	EMBA
		Feature: Other areas of Mermaid Sound of importance (including Conzinc Bay) (1) Fish traps: There are known fish traps in Conzinc Bay, and others would have or do exist in coastal areas of islands, such as Angel and Gidley Islands. People still use the Conzinc Bay fish traps regularly for catching mangrove jack, trevally and other fish.	No	Possible
		Value: Squid (1) Squidding (harvesting of squid from the ocean) around Conzinc Bay	No (based on specific location)	Possible
		Value: Appropriate cultural authority for Murujuga.	No	Possible
		Interest: Management of onshore heritage sites	No	
		Interest: Submerged Heritage Engage with researchers on options to identify potential submerged heritage.	Possible	Possible
		Value: Songlines The potential impact on Jinna (Songlines) due to the lack of broader-scale bathymetric information for the submerged landscape	Possible	Possible
Nganhurra Thanardi Garrbu Aboriginal Corporation representing Baiyungu and Thalanyji people	Raised during the course of consultation for another EP	Value: Whales and Whale Sharks	Possible (both)	Possible (both)
		Feature: Marine parks	No	Possible
Ngarluma Aboriginal Corporation	Raised during the course of consultation for another EP	Interest: Management of onshore heritage sites	No	No
		Interest: Submerged Heritage Engage with researchers on options to identify potential submerged heritage.	Possible	Possible
Robe River Kuruma Aboriginal Corporation	Raised during the course of consultation for another EP	Feature: Coastline	No	Possible
		Feature: Underwater heritage	Possible	Possible
Wanparta Aboriginal Corporation	Raised during the course of consultation for another EP	Value: Connection to Sea Country The Ngarla People have a deep spiritual connection to Sea Country	Possible	Possible
		Feature: Nearshore Islands (particularly Solitary Island/ Jarrkunpungu) Value: Intangible Cultural Heritage (Dreaming Stories) (1) Wanparta stated that they are linked to the dreaming stories through the interconnecting islands	No (all)	Possible (all)

First Nations Group / Individuals	Context	Description of Value / Feature / Interest	Potential for Overlap	
			PAA	EMBA
		(2) Wanparta legal representative highlighted that there are Dreamtime stories through the nearshore island (Solitary Island/ Jarrkunpungu)		
		Value: Cultural Obligation to look after Sea Country Values Extremely important to Ngarla people, and they feel a responsibility to look after the ocean and lore.	Possible	Possible
		Feature: Sea (Fresh and Salt Water) Value: Intangible Cultural Heritage (Dreaming Stories) Comments that we are a sea people connected through both fresh and salt water with Dreamtime stories that do connect through the sea.	Possible	Possible
		Feature: Sea (Ocean/Water) (1) Wanparta noted that they feel a sense of responsibility to keep looking after the ocean. They noted that they are very connected to the health of the ocean, they have a sense of responsibility to look after the ocean (Law and culture). If impacted, this would impact future generations and how Law is practiced (2) Wanparta legal representative explained the emblems and totems reflected on the Wanparta Aboriginal Corporation logo. She noted that the dark blue on the logo represents the ocean (and that their Native Title) extends into the ocean). (3) The importance of water was emphasised by the group (4) Protection and management of marine life and healthy ocean plays a significant role in lore, culture and customs	Possible (all)	Possible (all)
		Value: Marine Species Wanparta legal representative explained the emblems and totems reflected on the Wanparta Aboriginal Corporation logo. The animals depicted on the logo are totemic species and include the (1) Kestrel, (2) Octopus, (3) Spiny Brim and (4) Sting Ray.	(1) No Possible (all)	(1) No Possible (all)
Wirrawandi Aboriginal Corporation	Raised during the course of consultation for another EP	Value: Whales (General interest around management of impacts to whales)	Possible	Possible
		Value: Turtles (General interest around management)	Possible	Possible

First Nations Group / Individuals	Context	Description of Value / Feature / Interest	Potential for Overlap	
			PAA	EMBA
		Wirrawandi asked whether turtle monitoring programs are still in place		
		Feature: Rock art Wirrawandi asked whether air emissions from activities impacts rock art & what Woodside does to minimise impacts to rock art. Wirrawandi also asked for more community information on rock art.	No	Possible
		Interest: Submerged heritage (1) Wirrawandi asked where sites of underwater heritage have been recently found (2) Wirrawandi asked about impacts to the seabed from planned activities, and what is considered in relation to submerged cultural heritage, particularly given the recent finding of artefacts.	Possible	Possible
Yindjibarndi Aboriginal Corporation	Consultation for this EP	No values raised	-	-
Yinggarda Aboriginal Corporation	Raised during the course of consultation for another EP	Value: Coastal Fishing Local communities enjoy fishing along the coast, including for (1) Shark Bay Mullet that is an important resource.	No	Possible
		Value: Ecosystem Health Plants, animals and the environment are inexorably linked to their culture	Possible	Possible
		Value: Dugongs	Possible	Possible
		Feature: Seagrass Important food source for dugongs (Shark Bay)	No	Possible
		Value: Whales 1) potential impact to migration patterns of whales; (2) and potential collisions with vessels	Possible	Possible
SELF-IDENTIFIED FIRST NATION REPRESENTATIVE GROUPS				
Ngarluma Yindjibarndi Foundation Ltd	Consultation for this EP	*No values raised*	-	-
Save Our Songlines, [Individual 2] and [Individual 1]	Consultation for this EP	*No values raised*	-	-
	Raised specific to PAP	Feature: Songlines, dreaming and energy lines (unspecified)	Possible (unspecified)	Possible (unspecified)
	Raised in context of general Scarborough	Feature: Whales – including migratory patterns	Possible	Possible
		Interest: Turtles – including migration patterns	Possible	Possible

First Nations Group / Individuals	Context	Description of Value / Feature / Interest	Potential for Overlap	
			PAA	EMBA
	Project activities	Interest: Dugongs - unspecified	Possible	Possible
		Interest: Plankton - unspecified	Possible	Possible
		Interest: Seagrass - unspecified	No	Possible
		Interest: where saltwater and freshwater meet	No	Possible
	Raised in Concise Statement and Affidavit[3] in context of Scarborough seismic activities	Value: Caring for Country [Individual 1] asserts she and [Individual 2] are holders of women's lore with cultural obligations to protect, preserve and promote the environment, animals and plants threatened by the Activity (specific to Seismic) [Individual 1] asserts the spiritual health and wellbeing of Murujuga and all the plants and animals present on Murujuga and connected to the songlines in and around Murujuga	Possible (unspecified)	Possible (unspecified)
		Feature: Whales [Individual 1] asserts the following values: "Whales carry important songlines, the whale Dreaming, and connection between land and sea" "As the biggest animal on earth, the whale has the greatest heart connection to songlines, people and animals and carries the songlines around the ocean, connecting places." "Whale Dreaming story has a strong connection to the heart centre in each person, this story helps people to open up and to realise, understand and raise awareness of the environment and everything humans are connected to." "In their own families, female whales have a caretaker or midwife role, and those who are connected to the Whale Dreaming and carry the women's lore also have obligations as caretakers of the earth." "The women's lore that [Individual 2] and [Individual 1] carry is the songline of the whale, which is important for sustaining the creation of all animals and humans." "[Individual 2] and [Individual 1] connect to the whales like this through their songlines, they sing to the whales, the whales feel that song and the connection through their hearts, regardless of the distance." "the whales tell [Individual 2] and [Individual 1] a story, and [Individual 2] and [Individual 1] are the people who feel and who are connected to that story. [Individual 2] and [Individual 1] have that feeling of connection inside them all the	Possible (whales) Possible (songlines, unspecified)	Possible (whales) Possible (songlines, unspecified)

First Nations Group / Individuals	Context	Description of Value / Feature / Interest	Potential for Overlap	
			PAA	EMBA
		time, they live and breathe it, they are in and everything about it." "Because each animal uses songlines for migration, breeding and feeding, the disruption or distortion to the songlines causes the animals to become disoriented, confused or lost."		
		Interest: Whales Interest: Pygmy Blue whales (PBW) "Potential impacts on marine species and natural environment, relevant to the natural environment, relevant to the Applicant's interests, including but not limited to ii. behavioural changes (leaving or avoiding the area where the Activity occurs) to turtles, pelagic fish (such as tuna and billfish), sharks, PBW iii. whales' sonar communications systems, particularly between mothers and calves, from sound and vibrations emitted by the Activity v. potential impacts on water quality and consequent potential impacts on marine fauna such as whales, dugongs, sharks, rays, and seabirds from the risk of unplanned chemical discharges (non-hydrocarbon); and vi. vehicle collision and/or entanglement with marine fauna"	Possible (whales)	Possible (whales)
		Interest: Turtles "Other animals, such as turtles, dolphins, dugongs, and krill follow the whale's songlines, because they're all connected together - the whale creates a path for the other animals like 'grading a road'." "Potential impacts on marine species and natural environment, relevant to the natural environment, relevant to the Applicant's interests, including but not limited to: ii. behavioural changes (leaving or avoiding the area where the Activity occurs) to turtles, pelagic fish (such as tuna and billfish), sharks, PBW v. potential impacts on water quality and consequent potential impacts on marine fauna such as whales, dugongs, sharks, rays, and seabirds from the risk of unplanned chemical discharges (non-hydrocarbon); and vi. vehicle collision and/or entanglement with marine fauna"	Possible (turtles)	Possible (turtles)
		Interest: Dugongs "Potential impacts on marine species and natural environment, relevant to the natural environment, relevant to the	Possible (dugong)	Possible (dugong)

First Nations Group / Individuals	Context	Description of Value / Feature / Interest	Potential for Overlap	
			PAA	EMBA
		Applicant's interests, including but not limited to: v. potential impacts on water quality and consequent potential impacts on marine fauna such as whales, dugongs, sharks, rays, and seabirds from the risk of unplanned chemical discharges (non-hydrocarbon)"		
		Interest: Pelagic fish "Potential impacts on marine species and natural environment, relevant to the natural environment, relevant to the Applicant's interests, including but not limited to: ii. behavioural changes (leaving or avoiding the area where the Activity occurs) to turtles, pelagic fish (such as tuna and billfish), sharks, pygmy blue whales"	Possible (fish)	Possible (fish)
		Interest: Sharks "Potential impacts on marine species and natural environment, relevant to the natural environment, relevant to the Applicant's interests, including but not limited to: ii. behavioural changes (leaving or avoiding the area where the Activity occurs) to turtles, pelagic fish (such as tuna and billfish), sharks, PBW v. potential impacts on water quality and consequent potential impacts on marine fauna such as whales, dugongs, sharks, rays, and seabirds from the risk of unplanned chemical discharges (non-hydrocarbon)"	Possible (sharks)	Possible (sharks)
		Interest: Plankton "Potential impacts on marine species and natural environment, relevant to the natural environment, relevant to the Applicant's interests, including but not limited to: i. chronic mortality to some marine organisms, including zooplankton	Possible	Possible
		Interest: Water quality "Potential impacts on marine species and natural environment, relevant to the natural environment, relevant to the Applicant's interests, including but not limited to: iv. potential operational discharges associated with the presence of ships in the area, including potential impacts to water quality v. potential impacts on water quality and consequent potential impacts on marine fauna such as whales, dugongs, sharks, rays, and seabirds from the risk of	Yes	Yes

First Nations Group / Individuals	Context	Description of Value / Feature / Interest	Potential for Overlap	
			PAA	EMBA
		unplanned chemical discharges (non-hydrocarbon)		
		Interest: Seabirds "Potential impacts on marine species and natural environment, relevant to the natural environment, relevant to the Applicant's interests, including but not limited to: v. potential impacts on water quality and consequent potential impacts on marine fauna such as whales, dugongs, sharks, rays, and seabirds from the risk of unplanned chemical discharges (non-hydrocarbon)	Possible	Possible
		Interest: Where saltwater and freshwater meet "The places where the saltwater from the sea and the freshwater from the land connect are where the biggest energy lines[1] are, and that connection is a core of creation relevant to a Dreaming story."	No	Possible
		Value: Rock Art "Rocks at Murujuga symbolise stories, the totems (the depicted artwork) - whether representing plants or animals - and tell a story of their history, and how long they've been there."	No	Possible (submerged)
		Value: Bungarra, Eagle, Kangaroo Identified totemic species	No	No
		Interest: Murujuga "When [Individual 2] and [Individual 1] and their people stand on Country they are connected to their songlines through the rocks. As holders of women's lore, [Individual 2] and [Individual 1] put healing energy into the rocks and use that to heal the songlines." "[Individual 2] and [Individual 1] connect to their bloodline, old people and songlines through Country, including the rocks at Murujuga, which are encrypted with ancient stories that keep connection to the bloodline and songlines alive and well."	No	Possible

4.9.4.2 Summary of Cultural Features and Heritage Values

Woodside has developed a robust understanding of cultural features and heritage values relevant to the activity through examination of publicly available information, studies and consultation with relevant persons under Regulation 25.

The cultural features and heritage values identified in Section 4.9.4.1 to Section 4.9.4.2.3 confirm whether there is any potential for these to exist within the PAA or EMBA. As previously described,

topics that have been raised in the context of an interest linked to the natural environment are impact and risk assessed in Section 6.

As cultural features are physical elements of a place, these can generally be assessed for impacts; where a feature is avoided, it is not impacted. Heritage values relate less to what is significant and more to why something is significant; interaction between heritage values and the PAA can only be reliably informed by consultation with Traditional Custodians where they are willing to share the necessary knowledge. Assessment of heritage values beyond cultural features alone is addressed in Section 6.11, subject to these caveats.

Table 4-20: Summary of cultural features and heritage values

Identified Cultural Features and Heritage Values	Context	EP Source		Potential for Overlap	
		Consultation Feedback	Desktop Literature Assessment	PAA	EMBA
Archaeological Heritage and Landscapes					
Coastal/island archaeological sites	Coastal archaeological sites include shell middens, artefact scatters, skeletal material/burial sites, camps, meeting places, hunting places and water sources.	×	✓	No	Possible (shoreline accumulation only)
Petroglyphs	Petroglyphs are a form of rock art. Petroglyphs are a prominent feature particularly at Murujuga where it is found on hard, volcanic rock.	×	✓	No	Possible (submerged)
Fish traps	Stone arrangements constructed in intertidal areas which fill with fish at high tide and trap them at low tide.	×	✓	No	Possible (submerged)
Submerged archaeological sites	The Ancient Landscape extends between 125m and 130m below current sea level. Ancient occupation of this area may have left traces through now submerged archaeological sites.	×	✓	No	Possible
Rivers, waterholes, tidal channels and seeps	Water sources on the Ancient Landscape which may be culturally significant or archeologically prospective. Traditional knowledge retains knowledge of some water sources on the ancient landscape and some submerged waterholes are related to a Kangaroo songline.	×	✓	No	Known to occur
Submerged hills	Hills on the Ancient Landscape which may be culturally significant or archeologically prospective. As sea level rose these hills would have become islands and eventually submerged.	×	✓	No	Possible

Identified Cultural Features and Heritage Values	Context	EP Source		Potential for Overlap	
		Consultation Feedback	Desktop Literature Assessment	PAA	EMBA
Intangible Values					
Songlines	Consultation and publicly available literature talk to songlines associated with ancestral beings that travelled Sea Country. Energy lines were raised in consultation. Energy lines are understood by Woodside to be the same as songlines.	✓	✓	Possible (unspecified)	Possible (unspecified)
Creation/ dreaming sites, sacred sites and ancestral beings	Publicly available literature talks to creation/dreaming and ancestral beings, including water serpents, connected to or originating from the sea generally.	✓	✓	Possible (unspecified)	Possible (unspecified)
Ceremonial sites	Places where ceremony (e.g., Thalu ceremonies) are performed. All identified ceremonial sites are located onshore.	×	✓	No	Possible (unspecified)
Cultural obligations to care for Country	Cultural obligation to care for the environmental values of Sea Country. Exclusion of Traditional Custodians from Sea Country or decision-making processes may inhibit ability to care for Country.	✓	✓	Possible (unspecified)	Possible (unspecified)
Cultural safety	Respecting local Lore and culturally significant areas to protect individuals from cultural harm.	×	✓	No	Possible (unspecified)
Knowledge of Country/customary law and transfer of knowledge	The preservation and transmission of knowledge is dependent on the preservation of the environment generally. Exclusion of Traditional Custodians from Sea Country may inhibit the transfer of knowledge.	✓	✓	Possible (unspecified)	Possible (unspecified)

Identified Cultural Features and Heritage Values	Context	EP Source		Potential for Overlap	
		Consultation Feedback	Desktop Literature Assessment	PAA	EMBA
Connection to Country	Connection to Country is described in publicly available literature as “important to the Traditional owners’ spirituality and religion”. Connection to Country may be damaged where people are displaced or disrupted (e.g. during colonisation) or where there is a loss of technical skills or environmental knowledge.	×	✓	Possible (unspecified)	Possible (unspecified)
Access to Country	Limitations on Traditional Custodians accessing or enjoying areas of Sea Country.	✓	✓	No	No (No limitations on access beyond the PAA)
Kinship systems and totemic species	Traditional Custodians have connection to species through kinship and totemic systems. An individual may have obligation to care for or not consume a species to which they are kin.	✓	✓	Possible	Possible
Resource collection	Fishing, hunting, trapping, crabbing, gathering of marine species including marine mammals, marine reptiles, fish and invertebrates including molluscs.	✓	✓	No	Possible
Marine Ecosystems and Species					
Marine species	Generally raised in consultation and literature as an interest.	✓	✓	Possible	Possible
Marine mammals: whales	Generally raised in consultation and identified in publicly available literature. Thalu species of totemic importance. Linked to songlines and dreaming stories. Humpback whales in particular.	✓	✓	Possible	Possible

Identified Cultural Features and Heritage Values	Context	EP Source		Potential for Overlap	
		Consultation Feedback	Desktop Literature Assessment	PAA	EMBA
Marine mammals: dugongs	Culturally important species. Used as a resource.	✓	✓	No	Possible
Marine reptiles: marine turtles	Culturally important species and migration. There are Thalu ceremonies associated with turtles. Turtles and turtle eggs as a resource.	✓	✓	Possible	Possible
Fish: fish, whale sharks, sharks and rays	Culturally important species. Used as a resource. There are Thalu ceremonies associated with increasing fish stocks. Whale sharks are known as guardians of the sea by the Mayala People. Fish, including bream and sting rays are totemic species. Fish, including sharks and rays raised as a natural environment interest.	✓	✓	Possible	Possible
Cephalopods: squid and octopus	Octopus are a species of totemic importance. Resource.	✓	✓	Possible	Possible
Intertidal communities: bivalves, gastropods, echinoderms, sea urchins, crustaceans	Resource. Bivalve and gastropod shells such as pearl shells, baler shells and trochus shells used in traditional trading practices and in resource collection. Molluscs are collected as a resource.	×	✓	No	Possible

Identified Cultural Features and Heritage Values	Context	EP Source		Potential for Overlap	
		Consultation Feedback	Desktop Literature Assessment	PAA	EMBA
Seabirds	Culturally important species. Birds (including shags, seagulls and osprey) and bird eggs as a resource. Bird feathers also used as a resource. Kestrel is a species of totemic importance.	✓	✓	Possible	Possible
Plankton	Interest only, raised as a natural environment interest.	×	×	Possible	Possible
Benthic habitats: coral and reefs	Publicly available literature identified coral and reefs as culturally important with regard to connection with fish and important for food gathering.	×	✓	No	Possible
Benthic habitats: seagrass	Publicly available literature identified seagrass as a culturally important species, providing for the protection of other marine species (e.g., turtles, dugongs).	×	✓	No	Possible
Benthic habitats: macroalgal communities	Interest only, raised as a natural environment interest.	×	✓	No	Possible
Benthic habitats: epifauna and infauna	Interest only, subtidal soft bottom communities raised as a natural environment interest.	×	✓	No	Yes

Identified Cultural Features and Heritage Values	Context	EP Source		Potential for Overlap	
		Consultation Feedback	Desktop Literature Assessment	PAA	EMBA
Shoreline habitats: mangroves and saltmarsh communities	Mangrove seeds as resource. Critical breeding ground for marine and terrestrial wildlife. Mangroves would have provided shelter, crabbing, digging for shellfish, could be turtle nurseries. Saltmarshes would have provided an environment for crabbing and digging for shellfish. Coastal vegetation, raised as an interest	✓	✓	No	Possible
Shoreline habitats: intertidal sand/ mudflat communities	Interest only, raised as a natural environment interest.	×	✓	No	Possible
Shorelines and coastal landforms	Interest only, raised as a natural environment interest.	✓	×	No	Possible
Estuarine crocodiles	Publicly available literature identified estuarine crocodiles as a culturally important species. Resource.	×	✓	No	Possible
Marine Park/coastal reserves	Interest and responsibility.	×	×	No	Yes
Nearshore and offshore islands	Interest in protection of islands and species that inhabit the islands, including Rosemary Island and Solitary Island. Interest in access to nearshore islands. Offshore islands are culturally significant.	✓	×	No	Yes (Rosemary Island, other islands) No (Solitary Island)

4.9.4.2.1 Further Context: Archaeological Heritage

The PAA is in water depths of 40 to 960 m, some of which overlaps the Ancient Landscape. No coastal areas or islands exist within the PAA. Islands do exist within the EMBA boundary; however, given the EMBA is driven by an unplanned loss of well containment, there is no anticipated impact pathway from this activity to onshore archaeological sites above highest astronomical tide (HAT).

Archaeological sites identified onshore with the potential to exist in intertidal or submerged locations include petroglyphs, fish traps and artefact scatters or burials contained within sand dunes. As archaeological sites, these features have archaeological value which relates to the preservation of their fabric (i.e., the tangible features) and their context (i.e. their location and relationship to other archaeological and natural features). Archaeological sites may also have intangible dimensions (ICOMOS, 2013) cultural value that exist in addition to their archaeological or scientific value and are assessed separately.

Certain landscapes have been identified as archaeologically prospective on the submerged Ancient Landscape, including:

- submerged water sources (rivers, waterholes, tidal channels and seeps) which have an increased likelihood of use or habitation as past generations used the associated resources (UWA, 2021)
- submerged calcarenite ridges younger that human occupation of the continent which may have formed over and protected artefacts in situ (Veth, 2019)
- prominent landscape features (e.g. hills, particularly of igneous rock formations) that may have been foci for cultural activity (UWA, 2021)
- Karst depressions and other “catch points” where artefacts may accumulate following disturbances caused by inundation (UWA, 2021; Nutley, 2022; Nutley, 2023a).

4.9.4.2.2 Further Context: Intangible Cultural Heritage

Cultural knowledge, as expressed through songlines, dreaming, dance and other cultural practices, can be associated with tangible objects and physical sites that are culturally important to First Nations people (Ardler, 2021; Bursill et al., 2007). Intangible cultural heritage can also be embodied in the practices, representations, expressions, knowledge, uses and skills associated with physical sites (UNESCO, 2003). As a result, physical features may have intangible dimensions (ICOMOS, 2013).

In terms of identified cultural features and heritage values related to intangible values, see below some additional context:

- Songlines: Oral Songlines are often described by First Nations people as the law of the land and make up part of the Dreaming (Neale and Kelly, 2020). Songlines are viewed in Western academia as a framework for relating people to land and consist of a series of invisible, interconnected routes along the landscape that mark significant sites for First Nations people (Higgins, 2021). Songlines demonstrate First Nations peoples’ strong connections to land by revealing scared knowledge that is place-specific (Roberts, 2023). The land’s physical features are instrumental in maintaining songlines because this is how ancestral spirits journeyed through, and interacted with, the physical landscape leaving scared knowledge behind. The interconnection between the physical and spiritual is where songlines become intrinsically tied to significant places across Country. As a result, geographical landforms are recorded within songlines and become sacred places. Such landforms can include inter alia: rocks, mountains, rivers, caves and hills (Higgins, 2021). Songlines can become lost, fragmented or broken when there is a loss of Country or forced removal from Country (Neale and Kelly, 2020). Physical sites that have been identified as comprising a component of a songline are important to protect in order to prevent the fragmenting or breaking apart of

songlines and loss of sacred cultural knowledge. No specific details of songlines have been provided by relevant persons during consultation for this activity. The activity is located beyond the Ancient Landscape where prominent landscape features (e.g., rocks, mountains, rivers, caves and hills) would have been visible or used by Traditional Custodians and therefore likely to be incorporated in songlines. In Australia, songlines can stretch thousands of kilometres, making up a complex and organic network of stories containing cultural knowledge of First Nations communities across the land (Neale and Kelly, 2020). Songlines can also extend out to Sea Country and contain cultural knowledge that is tied to geographic features, atmospheric phenomena and marine plants and animals. Often songlines containing references to a seascape or Sea Country make mention of mythical events occurring around marine life, fishing areas, submerged rocks or coral. Songlines that embody seascapes can reflect how a group may relate to, or value, Sea Country; for example, connections to nearby islands that they once inhabited in their songlines (Smyth and Isherwood, 2016). Songlines can also be used as proof of long-standing connection to land and support a legal entitlement to land rights (Higgins, 2021). Examples where songlines contain strong references to Sea Country are more common in Pacific Islander and Torres Strait Islander communities, who often refer to seascapes and skylines in their songlines in order to communicate sacred knowledge that assists in safe navigation of the ocean (Neale and Kelly, 2020).

- Creation/dreaming sites, sacred sites and ancestral beings: The only sources identified by Woodside that contained detailed descriptions of the location of ancestral beings or creation/ dreaming/sacred sites placed these locations or sites on land, islands or within inland water sources such as rivers or pools. It is acknowledged that some ancestral beings are noted to live within or originate from the sea generally, and some creation stories talk to the creation of features from or in the sea. Additionally, places on shore or at sea are (without further information or specificity) assumed to have been created on some level in First Nations cosmology.
- Cultural obligations to care for Country: Caring for Country collectively refers to the cultural obligations of individuals and groups, as well as rituals and ceremonies required for the physical and spiritual health of the environment. In the literature reviewed by Woodside, caring for Country was noted to include, but is not limited to, maintenance of the physical environment and ecosystem. It may also have cultural, spiritual and ritual dimensions such as caring for ancestral beings or ensuring cultural safety. Thalu sites are places where ceremonies are performed to increase, enhance or maintain populations of plants, animals or phenomena. All references to active ceremonial sites were confined to onshore locations, though the values may extend offshore where, for example, a Thalu relates to marine species populations.
- Knowledge of Country/customary law and transfer of knowledge: Knowledge of and familiarity with the features of Sea Country is itself a “value”. The inherent potential for restricted or secret knowledge (or information that is not wished to be shared) makes this difficult to assess even through consultation with Traditional Custodians. However, aspects such as limitations on access to sites or disruption/relocation of First Nations communities may have implications for the preservation of First Nations knowledge. Further, connection to Country may be damaged where people are displaced or disrupted (e.g., during colonisation) or where there is a loss of technical skills or environmental knowledge (McDonald and Phillips, 2021). Transfer of knowledge includes continuing traditional practices to pass on practical skills. This transfer of knowledge may be integral to managing a group’s intangible cultural heritage (UNESCO, 2003).
- Connection to Country: Describes the multi-faceted relationship between First Nations people and the landscape, which is envisioned as having personhood and spirit. It is also an aspect of personal identity for many First Nations people. In the case of Sea Country this can mean identifying as a Saltwater person, where “essence of being a Saltwater person is

ontological… it is about how people relate spiritually to the sea and engage with spiritual forces that created it, the marine flora and fauna and people" (McDonald and Phillips, 2021).

- Access to Country, including Sea Country: Is necessary for the continuation of other values including caring for Country and the transfer of traditional knowledge. Being on Country can be an important way of expressing or maintaining connection to Country (Australian Indigenous HealthInfoNet n.d.). Access is also a value in its own right, as a continuation of traditional Sea Country access and use.
- Cultural Safety: refers to respecting local Lore and culturally significant areas to protect individuals from cultural harm. There are many cultural implications for those (Aboriginal and non-Aboriginal) who do not follow cultural advice or access Country in culturally inappropriate ways. Cultural safety may include observing gender restricted areas, respecting significant places and restricted areas as well as following the advice from those with cultural authority.
- Kinship systems and totemic species: Individuals may have kinship to specific species (Smyth, 2008; Juluwarlu, 2004) and/or a responsibility to care for species (Muller, 2008). Kinship arises from totemic associations within First Nations "skin group" systems. It is forbidden for an individual to kill or eat a species who is from the same "skin group" (Juluwarlu, 2004). They may also have certain obligations linked to the discussion of caring for Country below. It is assumed that marine species may have kinship/totemic relationships to Traditional Custodians, but it is understood that these relationships do not prohibit people outside of that "skin group" from hunting or eating that same species (Juluwarlu, 2004).
- Resource collection: A number of marine species are identified through consultation and literature as important resources, particularly as food sources. In addition to their immediate value as sustenance, the gathering and preparation of these resources is informed by cultural knowledge, and an inability to use these resources may result in a loss of ability to transfer that knowledge to future generations.

4.9.4.2.3 Further Context: Marine Ecosystems and Species

First Nations people have noted through consultation that they have a general interest in environmental management and ecosystem health (i.e., natural environment interest). This was noted in the context of a group/individual seeking further information about potential impacts and risks from the PAP on marine species and benthic communities in the PAA and EMBA. This includes marine mammals, marine reptiles, fish, seabirds, plankton, benthic and shoreline habitats and marine parks, which are described in context of their distribution and populations in Sections 4.6 to 4.8, with further details in Appendix K.

In terms of identified cultural features and heritage values related to marine ecosystems and species summarised in Section 4.9, see below some additional context:

- Marine mammals: Whales, and in particular humpback whales, have been identified through consultation with First Nations people as culturally important species, with totemic importance including their populations, biodiversity, and migration patterns. Cultural ceremonies associated with communicating with dolphins have also been raised by MAC through consultation and dugongs predominantly as a resource. Details pertaining to whales, dugongs and dolphins, their distribution, migration patterns and populations are described in Section **Error! Reference source not found.**, with further details in the Appendix K.
- Marine reptiles: Turtles and sea snakes have been identified through consultation with First Nations people as culturally important species, with turtles identified as a resource. First Nations people that identify marine reptiles as species of totemic importance or integral to songlines may place high cultural value on their protection. No specific marine reptiles-related songlines have been identified as per Section 4.9 that have the potential to interact with the PAA or EMBA. Note the only specific songline related to marine reptiles (turtles) was shared by MAC, and was geographically restricted from Fortescue to Withnell Bay, in Mermaid

Sound (MAC, 2021). Cultural knowledge of turtles at a population level (turtle migration, behaviour and the related marine environment) may all be important in ensuring the continuation of cultural functions and activities that remain valuable to First Nations people (Fijn, 2021:47; Delisle et al., 2018). Details pertaining to marine reptiles, their distribution, and populations are described in Section 4.6.2, with further details in the Appendix K.

- Fish and Cephalopods: Fish and squid have been identified through consultation with First Nations people as a culturally important species, with fish generally being identified as a resource. First Nations may identify cultural values associated with fish species as important to maintaining both tangible (physical cultural sites) and intangible (cultural knowledge) cultural heritage. Tangible cultural heritage associated with fish can include important cultural sites such as midden sites, fish traps and Thalu sites. While the octopus is an important totem to Ngarla People and features in the creation story of Solitary Island. There are increase ceremonies/ rituals for species of squid and octopus to enhance or maintain populations. Thalu are places where these increase ceremonies are performed. Details pertaining to fish and cephalopods are described in Section 4.9, with further details in the Appendix K.
- Seabirds: Seabird eggs have been identified through literature as a culturally significant resource (Smyth, 2007). Details pertaining to seabirds and migratory shorebirds are described in Section **Error! Reference source not found.**, with further details in the Appendix K.
- Benthic habitats: Through consultation, First Nations groups identified benthic habitats as valuable for their ecological values, including corals attracting fish and seagrass providing shelters for fauna, as well as an important resource for dugongs. Additionally, coral is valued by MAC for its aesthetic values. Details pertaining to benthic habitats and communities, including their distribution, with further details in the Appendix K.
- Shoreline habitats: Through consultation, First Nations groups identified shoreline habitats as valuable for their ecological values, including mangroves for providing shelter to marine invertebrates, which are identified resources, and potential nursery for turtles. Literature also notes that mangroves are also valued for the flora and fauna they are associated with and support (Commonwealth of Australia, 2002) and Smyth (2007) reports that mangrove seeds are used as a resource by Ngarda-Ngarli. Details pertaining to shoreline and coastal habitats, including their distribution, with further details in the Appendix K.

4.9.5 Murujuga Cultural Landscape

Murujuga is a significant cultural landscape rich with heritage values, included on Australia's National Heritage list and World Heritage tentative list. It contains one of the largest, densest and most diverse collections of rock art in the world, estimated to contain over a million engravings (petroglyphs) covering a broad range of styles and subjects. The landscape also contains quarries, middens, fish traps, rock shelters, ceremonial sites, artefact scatters, grinding patches and stone arrangements that evidence tens of thousands of years of human occupation. These places are linked through the stories, knowledge and customs that are still held by Traditional Custodians and have significance beyond their archaeological value.

This Cultural Landscape has global significance and is on the UNESCO World Heritage Tentative List. As stated on the UNESCO World Heritage website[27]:

The Traditional Custodians of Murujuga, the Ngarluma, Yindjibarndi, Yaburara, Mardudhunera and Wong-Goo-Tt-Oo groups, collectively referred to as Ngurra-ra Ngarli, have taken the lead in proposing the inclusion of the Murujuga Cultural Landscape on Australia's World Heritage Tentative List. Ngurra-ra Ngarli, represented by the Murujuga Aboriginal Corporation, have prepared this

[27] https://whc.unesco.org/en/tentativelists/6445/

Tentative List Submission in partnership with the Western Australian Government and with the support of the Australian Government.

Murujuga, the Aboriginal traditional name for the Dampier Archipelago and surrounds, including the Burrup Peninsula, is located in the Pilbara region of Western Australia. When the Ngurra-ra Ngarli talk about Murujuga, they talk about Land and Sea Country, which consists of a narrow peninsula of land extending approximately 22 kilometres from the mainland, a group of 42 islands, islets and rocks and the surrounding sea up to 40 kilometres from the port of Dampier (Murujuga Aboriginal Corporation 2016). With more than one million images in an area of more than 37,000 hectares, Murujuga is home to one of the most significant and diverse collections of petroglyphs in the world which documents the transition of an arid maritime cultural landscape through time (McDonald 2015, Mulvaney 2015, McDonald et al. 2018). Murujuga has the densest known concentration of hunter-gatherer petroglyphs anywhere in the world (Jo McDonald Cultural Heritage Management 2011, Australian Heritage Council 2012, Mulvaney 2015).

For the Aboriginal people of the Pilbara region, including the Ngurra-ra Ngarli, the petroglyphs are the work of the Marrga, the ancestral creator beings. They are a permanent reminder of Traditional Lore and retain their spiritual power. On Murujuga, the petroglyphs are an inherited and ongoing responsibility of the Ngurra-ra Ngarli (Jo McDonald Cultural Heritage Management 2011). The songs and mythologies for many of the images, such as Minyuburru (Seven Sisters), the fruit bat and Archaic Face, have important meaning across the whole of the Pilbara region and are central to Ngurra-ra Ngarli culture.

Archaic Faces have a widespread distribution throughout the arid zone of Australia and include a locally developed form on Murujuga (McDonald 2005, Mulvaney 2010, Veth et al. 2011). The Archaic Faces of Murujuga are a permanent reminder of how Traditional Lore should be followed. The presence of the Archaic Faces across the Pilbara region and into the Western Desert demonstrates the importance of the deep time-shared cultural practices, including through the transfer of songs and mythologies between different language groups over thousands of kilometres.

“Some of these carvings are our Lore and Culture. The Lore, it goes from here, right to Uluru, from Uluru into the desert and back again to the West. That’s including the Kimberley and Northern Territory area. It’s still going strong”.

Source: Jakari Togo (Geoffrey Togo), Senior Cultural Ranger (deceased) 2013. Murujuga Cultural Heritage Management Plan (Murujuga Aboriginal Corporation 2016)

There is evidence that suggests that the Ngurra-ra Ngarli first started living and using this part of the Pilbara coastal plain around 50,000 years ago, when the coastline was understood to be about 100 kilometres away. At that time Murujuga was understood to have been wetter and warmer than it is now. The archaeological record of the coastal plain at this time reveals a faunal assemblage no longer found in this part of Australia, such as nail-tailed wallabies and crocodiles. Murujuga’s artists recorded this group of animals in the engraving assemblage. During the last ice age (between 30,000 and 18,000 years ago), when the coastline was understood to be 160 kilometres away, Ngurra-ra Ngarli are understood to have lived in the Murujuga Ranges (McDonald et al. 2018) as well as other desert refugia. Evidence of Ngurra-ra Ngarli living in this landscape is seen in a number of petroglyphs of animals that are now extinct, such as thylacines (Tasmanian Tiger) and a fat-tailed species of kangaroo (Brown 2018; Mulvaney 2013) which are distributed widely across the Pilbara region and into the sandy deserts. More recent petroglyphs depict fish, turtles, dugongs and small marsupials that now live on the islands (McDonald 2015). The variations in petroglyphs and archaeological evidence demonstrate how Ngurra-ra Ngarli are understood to have adapted to the changing environments wrought by sea level rise (McDonald and Berry 2016).

The estimated more than one million petroglyphs of Murujuga demonstrate an extraordinary diversity of style, theme, mode of production and aesthetic repertoire. This art province is an inscribed landscape complete with other archaeological components, such as stone structures, middens and

quarries, and provides a social context and means for interpreting the complexity of the petroglyphs (McDonald and Veth 2009).

The many stone features of Murujuga include standing stones, fish traps, stone arrangements, hunting hides and domestic structures. Some standing stones are thalu sites, places where ceremonies are carried out to increase and manage the social and economic benefits of natural resources (Daniel 1990). On Murujuga, stone feature sites range from single monoliths through to extensive alignments comprising at least three or four hundred standing stones (Vinnicombe 2002). Thalu sites are permanent reminders of the Traditional Lore.

Murujuga is sacred to Ngurra-ra Ngarli, it is a place where everything is connected, through the Ancestral Beings – the land, the sky, the sea, the plants, the animals, the Lore and the spiritual world. This is the belief system that underlies life on Murujuga today (Murujuga Aboriginal Corporation 2016).

National Heritage Place – Dampier Archipelago

The Dampier Archipelago, including Murujuga, was included in the National Heritage List in 2007. Values listed against National Heritage criteria in the gazettal notice include:

- Engravings of a wide range of terrestrial, avian and marine fauna. These provide an "outstanding visual record of the course of Australia's cultural history through the Aboriginal responses to the rise of sea levels at the end of the last Ice Age"
- Engraved "archaic faces" which demonstrate the long contact between Aboriginal societies on the Dampier Archipelago and inland arid Australia
- Diversity in representation of the human form in engravings, including depictions of groups of people "engaged in both mundane and sacred activities"
- Standing stones, stone pits and circular stone arrangements associated with various uses
- Ability to link research on archaeological remains (middens, grinding patches, quarries) and associated rock engravings to "contribute to an understanding of the cultural and economic meaning"

Further details of these values can be found in the publicly available Gazettal[28].

Murujuga National Park Management Plan

Parts of the Burrup Peninsula (4,913 hectares which is approximately 44% of the Burrup Peninsula) is owned by the Murujuga Aboriginal Corporation, leased back to the Western Australian Government and is jointly managed with DBCA as a National Park (DBCA, 2024). The Park and some adjacent areas are managed under the Murujuga National Park management plan 78 (2013, as amended 2023). The Management Plan created by Ngarda-Ngarli and their joint management partners seeks to ensure the protection of the area and to revive Ngarda-Ngarli knowledge, associations and responsibility. The plan acknowledges the coexistence of Woodside production facilities and the Park, identifying its objective to 'To promote effective, integrated and cooperative management between Murujuga National Park and adjacent land managers' (DBCA, 2013, and amendment DBCA & MAC 2023).

In 2007, the Australian Government signed a Conservation Agreement with Woodside Energy Ltd to protect and research the National Heritage values of the Dampier Archipelago. In July 2017, Woodside signed the 'Ngajarli (Deep Gorge) Joint Statement' reaffirming the cooperative commitments made under each of the Conservation Agreements.

It is under the Conservation Agreement that Woodside provides ongoing funding for programmes continuing to support research into, and monitoring of the National heritage values of the park so

[28] https://www.dcceew.gov.au/sites/default/files/env/pages/d53ee213-2f1e-481e-b0f6-85d861a52de2/files/10572701.pdf

that activities are carried out in a manner that is consistent with the Murujuga National Park Management Plan 78 (2013). Further protections and management practices have been integrated into Woodside's Cultural Heritage Management Plans and engagement protocols. Outcomes of funded programs include processes to identify sites with National Heritage values, present and transmit information about the National Heritage values, and manage the National Heritage values so that they are conserved for future generations.

World Heritage Nomination

The United Nations Educational, Scientific and Cultural Organisation (UNESCO) "seeks to encourage the identification, protection and preservation of cultural and natural heritage around the world considered to be of outstanding value to humanity" via the World Heritage List, established under the World Heritage Convention 1972 (UNESCO 2024). The Murujuga Cultural Landscape was nominated to the UNESCO Tentative World Heritage List by the Federal Department of the Environment and Energy in 2020. Inscription on the World Heritage List means that Murujuga's unique cultural, spiritual and archaeological values would be internationally recognised at the highest level.

As stated by the State Department of Biodiversity, Conservation and Attractions, "World Heritage Listing also brings a commitment at local, state and national levels to protect and manage the property for present and future generations." World Heritage listing and industry can occur in parallel, as long as there are no significant impacts on World Heritage values.

As required under the World Heritage framework, the tentative World Heritage Listing of the Murujuga Cultural Landscape submission justifies its Outstanding Universal Values by meeting two of the possible ten selection criteria:

- To represent a masterpiece of human creative genius, with "more than one million images in an area of more than 27,000 hectares, the Murujuga Cultural Landscape has one of the densest known concentration of petroglyphs anywhere in the world," and for the content, age and significance of the petroglyphs
- To bear a unique or at least exceptional testimony to a cultural tradition or to a civilisation which is living or which has disappeared, through the unbroken connection of the Ngarda-Ngarli people to Murujuga "since the world was soft and Ancestral Beings moved over the earth," reflecting both deep-time history and ongoing critical cultural significance.

Further submissions on how the Murujuga Cultural Landscape meets World Heritage criteria can be found on the publicly available UNESCO World Heritage Tentative Listing[29].*Current Condition of Murujuga Cultural Landscape*

The current condition of the Murujuga Cultural Landscape has been assessed from a number of publicly available sources.

The World Heritage Tentative List Submission for Murujuga Cultural Landscape (MAC, DBCA, DEE 2020) notes, with regards to the Statements of Integrity and/or Authenticity:

"Aboriginal cultural landscapes are living landscapes that change as time progresses, where oral tradition is the canon of proof and where changing practices of embodied experience with landscapes grow from generation to generation (Andrews and Buggey 2008).

In the context of Aboriginal cultural landscapes, any test of authenticity, must recognise, expect, and endorse changes (Andrews and Buggey 2008). The archaeological and anthropological evidence for Murujuga is well preserved, with a high degree of authenticity. The exceptionally well-preserved cultural values of Murujuga can be found across an area of more than 37,000 hectares,

[29] https://whc.unesco.org/en/tentativelists/6445/

comprising the majority of the Burrup Peninsula, as well as the surrounding islands of the Dampier Archipelago…

The petroglyphs of Murujuga have been made on the exceptionally hard, dark volcanic rock using stone tool technology. Methods of production included pecking, abrasion, incision and bas-relief. When first produced the very pale grey petroglyphs would have contrasted starkly with the dark red-brown cortex of the rock. With subsequent patination and weathering, this contrast gradually reduces…

Murujuga has a high level of integrity and received enhanced protection and management following its National Heritage listing in 2007. A detailed land-use impact study of Murujuga documented that all 40 islands included in the Dampier Archipelago (including Burrup Peninsula) National Heritage place and approximately 85 per cent of the Burrup Peninsula, retain extremely high integrity (McDonald and Veth 2006a), and contain all the attributes that constitute the potential Outstanding Universal Value of the place…

Within the National Heritage listed area, the petroglyphs are whole and intact (Jo McDonald Cultural Heritage Management 2009, 2011). Although the entirety of Murujuga has not been surveyed and recorded, there are thousands of known sites which demonstrate the potential Outstanding Universal Value of the Murujuga Cultural Landscape…

While industrial development visually compromises some areas of the southern section of the Burrup Peninsula, the topography, with its deeply dissected gorges, valleys and scree slopes, means that a large portion of Murujuga, including the vast majority of its islands retain high visual integrity (Jo McDonald Cultural Heritage Management 2011, Australian Heritage Council 2012). In summary, the Murujuga Cultural Landscape is an intact and representative example of one of the most significant concentrations of human artistic creativity in the world, which survives through the continuity of Ngurra-ra Ngarli cultural and social practices and active management."

The Report "The Potential Outstanding Universal Value of the Dampier Archipelago Site and Threats to that Site - A report by the Australian Heritage Council to the Minister for Sustainability, Environment, Water, Population and Communities" (Australian Heritage Council 2012) found that:

"It is clear that the undisturbed area within the boundaries of the National Heritage Listed place is complete and whole, notwithstanding the proximity of industry"

The Australian Heritage Database listing for the Nationally Heritage Listed Damper Archipelago (including Burrup Peninsula) states:

"Condition: Parts of the area, particularly the Burrup Peninsula, East Intercourse Island and Mid East Intercourse Island, have been subject to industrial development and other impacts such as the construction of towns and work camps. A land use impact assessment, undertaken using aerial photographs from August 2004, estimates that high levels of impact have occurred on 1,643 hectares (or 16.4 square kilometres) on the Burrup Peninsula (McDonald and Veth 2006). A high level of impact in these areas on the Burrup Peninsula has resulted in the destruction of archaeological material and in some cases the relocation of engravings and other stone features. Despite this, the natural and cultural heritage in Dampier Archipelago and its surrounding waters is in good condition" (DCCEEW 2007).

Research to date on the impacts of industrial emissions on rock art has not been conclusive and is summarised in Section 4.9.6.

4.9.6 Summary of Existing Research on Murujuga Petroglyphs and Anthropogenic Air Emissions

Murujuga (Burrup Peninsula), including the Murujuga National Park, is most widely known for its large collection of rock art (petroglyphs). The Traditional Owners of Murujuga have a deep cultural

and spiritual connection to the rock art of the Burrup Peninsula, which provides a record of Aboriginal lore, dreamtime stories, customs, and local knowledge of the land and its resources (MAC, 2019).

The presence of industry on the Burrup Peninsula has been the subject of topics and issues raised by some Relevant Persons during consultation. The topics and issues have centred around emissions associated with industrial activity leading to an accelerated weathering of rocks on which rock art is present which may reduce the visibility or destroy the rock art. This is based on a hypothesis that deposition of compounds such as NOx, SOx and ammonia (NH_3) from anthropogenic industrial sources have the potential to increase the acidity of the rock surface through chemical and/or biological processes and that acidic conditions may then accelerate the weathering of rock patina, eroding or affecting the contrast of the rock art. There have been several independent studies and rock art monitoring initiatives since the mid-2000s, none of which have conclusively demonstrated a causal link between degradation of rock art and industrial activity. There are therefore also no applicable environmental air quality standards or guidelines available that can be applied to engraved rock art (Government of Western Australia, 2023).

Nevertheless, relevant persons have raised through consultation (Appendix F, Table 2) the possibility that emissions from the processing of LNG onshore at Murujuga may have an impact on the preservation of rock art. While these onshore emissions are not within the scope of the PAP, they are assessed in this EP as potential indirect impacts (Section **Error! Reference source not found.**). Research to date on the impacts of industrial emissions on rock art has not been conclusive and is summarised in this section. While these onshore emissions are not within the scope of the PAP, the research related to this topic is summarised in this section and evaluated to consider the potential for indirect impact (Section **Error! Reference source not found.**).

Further research continues to be undertaken by the Murujuga Rock Art Monitoring Program (MRAMP), run by the Traditional Custodians of the petroglyphs, the Murujuga Aboriginal Corporation, and Western Australian Department of Water and Environmental Regulation (DWER). MRAMP is described as “A best practice monitoring and analysis program” by the Western Australian Government which “will provide reliable information on changes and trends in the condition of the rock art and whether the rock art is showing signs of accelerated change… The results from these studies will guide management and protection of the rock art” (Government of Western Australia, 2023). MRAMP will provide the necessary certainty to guide management and protection of the rock art. The MRAMP website also describes the role of MRAS as part of the proposed World Heritage listing for Murujuga:

“The Department of Biodiversity, Conservation and Attractions (DBCA) works with MAC to lead the development of the World Heritage nomination of the Murujuga Cultural Landscape, as well as joint management of the Murujuga National Park. The World Heritage nomination for Murujuga includes a comprehensive and effective management framework that outlines how the potential ‘Outstanding Universal Value’ of the area will be protected, conserved and monitored. As part of this framework, the State Government and MAC will demonstrate how they are working closely together to protect the rock art through the Murujuga Rock Art Strategy and the Murujuga Rock Art Monitoring Program” (Government of Western Australia, 2023).

Refer to Section **Error! Reference source not found.** for more information about the Murujuga cultural heritage management framework.

In the absence of scientific certainty on the level of emissions which theoretically may affect rock art, Pluto LNG Plant (PLP) is applying the best available practicable and efficient technologies to minimise and monitor air emissions from the plant.

It is a condition of the existing EP Act approvals for PLP (Ministerial Statement 757) that the proponent of PLP produce a “Front End Engineering Design Report demonstrating that the proposed works adopt best practice pollution control measures to minimise emissions from the plant”. The WA Department of Environment and Conservation accepted this design demonstration in 2008 prior to facility construction, and the Pluto Air Quality Management Plan (Revision 1) was approved by Office

of the EPA (EPA) on 10 November 2011. An update of the Best Practice Air Emissions Report was prepared for the operation of a second LNG train at PLP and was submitted in July 2019 to the EPA for assessment (Woodside, 2019).

PLP's publicly available Air Quality Management Plan has been reviewed and approved by the Western Australian Environment Protection Authority as meeting the requirement for best available practicable and efficient technologies to be used to minimise and monitor air emissions from the plant (Woodside, 2019). This included an independent peer review assessment which concluded that the design of Pluto Train 2 is consistent with best practice in the context of air emissions control for LNG plants and the minimisation of greenhouse gas emissions (Woodside 2019).

4.9.6.1 Research, Monitoring and Publications

Bednarik (2002) speculated the existence of several possible impact pathways for industrial emissions to impact rock art, including acidification of rain and promotion of microbial activity. Bednarik suggested there was a key indicator for this is identified as colour change in the rock surfaces. Bednarik's speculation led to further studies detailed in this section. The data provided by Bednarik is not sufficient to demonstrate that industrial emissions have negative impacts on the rock art, but did warrant further study.

In 2002, the Western Australian Government established the Burrup Rock Art Monitoring Management Committee (BRAMMC) to assess the possible impacts of industrial emissions on the rock art of Murujuga. Research conducted by the BRAMMC included measurements of colour change as well as air quality, microclimate, dust deposition, mineral spectrometry, microbiological analyses, air dispersion modelling, and laboratory simulations of chemical impacts at contemporary, predicted and 10-times predicted pollutant estimates.

During the course of the BRAMMC studies, several further publications were produced, including:

- MacLeod 2005, which found that acidity of rockfaces on Murujuga is higher than samples kept in museum conditions. The paper does not demonstrate that the museum samples, which have been subject to decades of museum preservation conditions, are representative of the natural pH of Murujuga's rocks nor does it draw any conclusions on the impacts of acidity on rock art preservation.
- Bednarik 2006 and 2007a were editorials, which did not include any original research.
- Bednarik 2007b argued that industrial emissions were impacting rock art but provided no evidence beyond analogy to bird droppings and expert advice that the absence of rock patina near trees was not the result of any known process caused by plants. The data provided by Bednarik is not sufficient to demonstrate that industrial emissions have negative impacts on the rock art but did warrant further study (which was already underway at that time).

In 2009, the BRAMMC reviewed the results of studies conducted under their program and concluded that "there is no scientific evidence to indicate that there is any measurable impact of emissions on the rate of deterioration of the Aboriginal rock art in the Burrup" and recommended that a technical working group be established to continue long-term monitoring.

In 2010, the Burrup Rock Art Technical Working Group (BRATWG) was established. Under the BRATWG, the CSIRO continued to monitor potential colour change on the rock art (Markley et al., 2015). In 2016, an unpublished paper by Black and Diffey concluded, contrary to CSIRO analysis at the time, that colour change was detected in CSIRO data but that "a cause for the colour changes cannot be properly determined" and "the colour changes at the southern [non-control] sites are not readily explained by the concentrations of NOx and SOx compounds in the air."

These criticisms of the statistical methods used by CSIRO prompted the Department of Environment Regulation to commission Data Analysis Australia (DAA) to review the CSIRO research. The DAA report found that "Superficially our analyses and those of Black and Diffey suggest that some changes may have taken place, but… we have substantial doubts about the reliability of the data

and hence any conclusions drawn" and, in relation to the conclusions of Black and Diffey, "it would not be appropriate for the Draft paper to be published in its current form – the findings are based on highly doubtful data rendering any discussion of statistical significance moot" (DAA, 2016). The final CSIRO report includes a reassessment using more robust methods informed by the DAA report. The result of this analysis was "not fully conclusive" (Duffey et al., 2017).

In 2016, the BRATWG commissioned an extreme condition weathering study to investigate the effects of different concentrations of acids on weathered rock surfaces. This study found that the dissolution of chemicals began at lower pH levels than previously estimated (pH 3 for aluminium, manganese and iron), but was recognised as a preliminary study and did not provide definitive results (Ramanaidou et al., 2017). These results cannot be relied on as a meaningful threshold for determining whether rock art is being impacted by emissions.

Since the 2016 BRATWG extreme weathering study, several additional papers have been produced, including:

- Black et al. 2017a provides a review of the conclusions of earlier studies into emissions impacts by the CSIRO, specifically those undertaken with regards to the fumigation of rock samples with acid gasses, emersion of iron-rich rocks in acids, air pollution modelling and colour change. This review concluded that a number of errors and inaccuracies prevent any meaningful conclusion being drawn from the CSIRO data. This review did not demonstrate impacts to rock art from industrial emissions.
- Black et al. 2017b provides a theoretical evaluation of MacLeod 2005 research. It provides no data that links industrial air emissions or subsequent deposition to changes in pH on Murujuga rock surfaces. There are practical limitations that prevent the MacLeod data from being adapted to the paper's purpose, including variation in sample dilution and the arbitrary exclusion of data.
- Black et al. 2018 speculates the existence of several possible impact pathways, including acidification of rain and promotion of microbial activity. The paper recognises, however, that "there is no proof yet that the patina on Murujuga rocks is dissolving" and asserts that "there has not been credible research to determine" whether rock art is being degraded. In drawing conclusions regarding changes in acidity this paper assumes, without evidence, that geological samples which have been subject to decades of preservation in a museum are representative of the natural pH of Murujuga's rocks. The key conclusions of this paper are that further, more robust research is required, and that the precautionary principle should be applied in the interim.
- Gleeson et al. 2018 primarily discusses microbial organisms that may be responsible for the formation of rock varnish. The paper briefly speculates on the possible impacts of industrial emissions but does not purport to provide evidence of impacts to Murujuga's rock art.
- In 2019, the Department of Water and Environmental Regulation (DWER) produced the Murujuga Rock Art Strategy, which built on the research to that date, and according to DWER will establish a world's best practice program to monitor, evaluate and report on factors that could affect the condition of rock art. This will be undertaken in consultation with a team of national and international experts in relevant disciplines and funded by industry including from Woodside. Research by this program is led independently by MAC and DWER working with leading research groups so that results are independent from industry.
- CBG Solutions 2020 repurposes previous pH records from 2003 and 2004 (as a baseline), and data collected between 2017 and 2019 to assess changes in acidity on rock surfaces. The report repurposes historical and inconsistent pH data and acknowledges a number of resulting statistical issues which "makes determination of long-term pH changes problematic". The report states that "there appears to be no detrimental (acidification) impact that can be statistically supported regarding proximity to either the NW Gas plant or to the Pluto plant" and "owing to the many variables that determine the surface pH of the Burrup

rocks and the significant impact of periodic cyclonic heavy rain and the lack of historic data on all the tested sites, it is not possible to claim that there is sufficient evidence for the statement that there is a continuing increase in acidity across Murujuga since measurements commenced in 2003".

- Dorn 2020 discusses competing theories of desert varnish growth and how chemical changes to desert varnish result from human sources, such as lead concentration following the addition of lead to petrol. The chapter predominantly focusses on North America but uncritically restates the conclusions of Black et al. 2017b. Only one other example in the paper, regarding an apparent change in varnish texture from near Los Angeles, appears to have even tangential relevance to industry on Murujuga. Acid fog is proposed as one *possible* cause, but this suggestion is not supported by any provided data and is based on examinations from an area with significantly higher acid gas concentration than Murujuga experiences.
- MacLeod 2020 provides results of a study commissioned by Yara Pilbara Nitrates. This report observes a variability of the relationship between colour difference and pH, with colour difference diminishing with increasing pH at some points, and diminishing with decreasing pH at other points although the final sentence of the report claims "there is unequivocal evidence that the changes in colour contrast are affected by the changes in the mean and in the minimum pH observed on the rock art sites at the reference positions". At several points this report notes that rainfall events – particularly cyclonic events – appear to substantially reduce the acidity. The executive summary states that "there is a clear link between the minimum pH and the amount of sulphate on the rock surfaces, w*hich indicates some of the sulphate comes from anthropogenic sources*" (emphasis added), though the report does not articulate how a link between pH and sulphate contributes to an understanding of sulphate origin. MacLeod (2020) comments in relation to the two sites that are closest to Pluto LNG Plant and Karratha Gas Plant that the observed low sulphate concentrations "strongly supports that these exhaust sources are not resulting in any significant SOx deposition on the rock surfaces".
- MacLeod 2021 provides an update to this previous work which found that pH had increased during the study period, but pH changes were affected by microclimate at each site, including seasonal variations, microbial activity, and localised rainfall events. Any relationship between anthropogenic NOx and SOx emissions and acidity was not established and "just as the mechanisms of adsorption of NOx and SOx onto the moistened rock surfaces are yet to be unequivocally established, the presence of a direct relationship between the concentration of sulphate in the wash solutions with the underlying acidity can be regarded as a de-facto correlation". Once again, the report states that "there is unequivocal evidence that the changes in colour contrast are affected by the changes in the mean and in the minimum pH observed on the rock art sites at the reference positions".
- Also in 2021, MacLeod and Fish (2021) published results of the studies commissioned by Yara Pilbara Nitrates, including that "there is presently no adverse impact on the rock engravings from industrial pollution owing to a lower NOx level than when the studies commenced 14 years ago". This conclusion was critiqued by Smith et al. 2022a, who correctly noted that this conclusion is based on limited data and makes a number of key assumptions without adequate peer-reviewed research.
- Gagan et al. 2022 is an investigation of anthropogenic air-borne sulphur on rock art on limestone in Sulawesi, Indonesia. This is not comparable to the Murujuga petroglyphs as the Murujuga petroglyphs are not on a limestone substrate. The research notes that "the bulk of the damage was present before 1950 CE", for example such as due to biomass burning ~3,500 years ago; current threats include "vandalism and sulphur emissions from diesel-powered traffic and cement-based infrastructure"; and that "the rate of rock art loss may be on the decline".

- Smith et al. 2022a is a review of the Fish and McLeod report; the review does not contain original research and therefore does not further the existing scientific understanding of the subject. Claims that Smith et al. 2022a demonstrate that emissions from industry are impacting rock art are incorrect.
- Smith et al. 2022b does provide evidence of impacts to rock art and attributes these to three sources: mechanical removal and damage, chemical emissions and emitted by industry, and an increased unsympathetic human presence. in the landscape – examples provided include "rock scratching from off-road vehicles and graffiti, broken rocks from inappropriate trampling… rock splitting and discolouration from non-traditional burning practices". Evidence of the first and third of these is apparent and easily demonstrated from the photographic record, yet the paper itself notes that the use of photographic records to assess chemical impacts through colour change are subject to considerable errors including distortion and degradation of early photographs, variable lighting conditions and other factors. The researchers do note that several petroglyphs (numbered 2, 5, 6, 9, 16, 17, 21, 22 and 24) appear to have lightened over time in line with a hypothesis that emissions have played a role in this, while one petroglyph (1) appears to have darkened and at least 13 do not demonstrate any change, including several in close proximity to industry. The paper appropriately notes that further research is required to determine the causes of these perceived changes.
- Neumann et al. 2022 is an important proof-of-concept for analytical techniques, but is clear in its conclusion that "Although our data clearly demonstrate that acidic rain has measurable effects on the varnish surface, including its colour and increased dissolution of Fe and Mn compounds, it should be stressed here that this does not necessarily mean that natural weathering of the petroglyphs is accelerated by anthropogenic pollution."
- Ruffolo et al. 2023 review the formation of "black crusts", accumulation of materials on the surface of stone buildings, in highly polluted urban environments, and intervention strategies to mitigate damage to built heritage from black crusts. The study notes "the research outcomes have established some correlations between black crusts and the surrounding air pollution, leading to them being considered as a "'record'" and also a '"passive sampler'" of past pollution patterns. However, in this case, there is not yet a well-defined procedure to obtain accurate and unambiguous information." This paper does not provide new science applicable to the Murujuga petroglyphs due to its focus on built heritage and urban pollution.

In 2019, DWER released the Murujuga Rock Art Strategy (MRAS), "A monitoring, analysis and decision-making framework to protect Aboriginal rock art located on Murujuga (the Dampier Archipelago and Burrup Peninsula)" (DWER, 2019). The MRAS notes "This strategy builds on the previous work on Murujuga to deliver a scientifically rigorous approach to monitoring, analysis and management that will provide an appropriate level of protection to the rock art. It describes a risk-based approach for the management of impacts to the rock art that is consistent with the State Government's responsibilities under the Environmental Protection Act 1986 (EP Act) and provides the monitoring and analysis to determine whether accelerated change is occurring to the petroglyphs" (DWER 2019).

In regards to previous scientific studies and monitoring, the MRAS states *"In 2002, the Western Australian Government established the Burrup Rock Art Monitoring Management Committee (BRAMMC) in response to concerns about possible adverse impacts on the rock art from industrial air emissions…In 2009, after reviewing the information from these studies and the comments from the international peer reviewers, BRAMMC concluded there was no scientific evidence of any measurable impact of industrial emissions on the rate of deterioration of the Burrup rock art. BRAMMC recommended that no environmental management measures specifically to protect the rock art from air pollution were necessary at that time. BRAMMC recommended that colour contrast and spectral mineralogy monitoring be continued on an annual basis for 10 years and be reviewed after five years; and that a technical working group be established to consider the results*

of monitoring and other studies. BRAMMC also recommended that the monitoring of ambient air quality and rock microbiology be suspended and only recommenced if warranted by a major increase in emissions or if evidence became available indicating further monitoring was required. The Burrup Rock Art Technical Working Group (BRATWG) was established to oversee the colour contrast and spectral mineralogy monitoring program and other studies between September 2010 and June 2016. The then Department of Environment Regulation (DER) managed the monitoring program from the expiry of BRATWG's tenure in June 2016 until the formation of DWER on 1 July 2017" (DWER 2019).

Outcomes of both the BRAMMC and the BRATWG have been discussed above.

The MRAS states that "The successful implementation of the management framework to protect the rock art from anthropogenic emissions will require…a monitoring program that is appropriately designed and implemented to take the necessary measurements, to analyse the data and to report on the integrity or condition of the rock art and change in that condition" (DWER 2019). As described in the MRAS "The Western Australian Government in partnership with MAC and in consultation with international and national experts in relevant disciplines and the Murujuga Rock Art Stakeholder Reference Group, will develop and implement a revised long-term Murujuga Rock Art Monitoring Program" (DWER 2019).

In December 2023, the first interim report of MRAMP was published. An accompanying summary report notes that "Data collected in the first year of observation do not permit any firm conclusions to be drawn about trends in rock surface condition and any relationship to air quality over time" (Government of Western Australia 2023). However, several techniques were considered promising for future analysis, including spectral measurement of rock art condition, geological studies and mineralogical studies. Though requiring more data to draw any conclusions, the report and summary both note that the correlation observed between acid-producing emissions and pH were the *inverse* of predictions if these gases were causing acidification of rock surfaces (that is, higher concentrations of these gases were associated with *less* acidic rock surfaces). Woodside does not consider these results to be definitive and recognises that further work by MRAMP is required. Final results by MRAMP are scheduled for December 2025, with interim Environmental Quality Criteria anticipated to be published in the preceding years. This will provide the necessary certainty to guide management and protection of the rock art for industry on Murujuga.

Produced subsequent to these interim results, Smith 2024 provides the results of laboratory studies on Murujuga rock samples. The methodology for these experiments is not provided. The reported results are that particles of weathering rind begin to detach from the rock samples when the pH of rocks reach 6 or lower—significantly higher than, for example, suggested in Ramanaidou et al 2017. This report also reinterprets results from the MRAMP program (although excluding results from the first campaign of this work from consideration). This reinterpretation requires cautious consideration, noting the MRAMP interim report's caveats that the available data is insufficient for drawing meaningful conclusions. The conclusions of Smith 2024 state that "The rock surfaces of Murujuga have become increasingly acidic due to the nitric and sulphuric dusts emitted *by industry in the area.*" (emphasis added). This causal link is not supported in the report by reference to any other study, and as the report does not provide a clearly stated methodology it is unclear whether this is supported by the laboratory work performed. A correlation may, perhaps, be implied by reference to historic trends reported in reports discussed elsewhere in this section, which have noted methodological issues. Smith 2024 also fails to address, in its reinterpretation of MRAMP data, the preliminary observation that higher levels of acid-producing emissions were found to correlate with less acidic rock surfaces.

Woodside is also aware of a draft paper, [Individual 18] 2024, which reiterates previous conclusions drawn by [Individual 18] but does not provide new science regarding Murujuga's rock art. The paper summarises some of the scientific literature addressing rock art on Murujuga and other locations around the world described above.

On 1 July 2024, a Statutory Declaration by [Individual 19], formerly employed by Murujuga Aboriginal Corporation as Coordinator of the Murujuga Rock Art Strategy and the Monitoring Program (MRAMP) was tabled in the Australian Senate by [Individual 20] which alleges that:

Calibre Ventures Pty Ltd, a third-party private contractor, was in effect managing the MRAMP" (paragraph 10), and

the partnership between MAC and DWER (as it stood in 2023) required "significant changes in the existing management structure, due largely to conflict of interest and related issues", (paragraph 11) and

people in leadership positions at MAC have attempted to unduly influence the outcome of MRAMP (paragraphs 4-5, 24-25 and 34).

[Individual 19] also claimed to record "multiple scientific flaws" (paragraph 13) and "numerous deficiencies" (paragraph 17) with MRAMP, though the nature of these issues is not provided. No such errors are apparent from the MRAMP first interim report, which has been subject to independent peer review (Government of Western Australia 2024).

The CEO of MAC provided comments to media in response to the tabled documents, stating "The claims made in the tabled documents do not stand up to scrutiny. The Murujuga rock art monitoring program is a strong, best-practice program that has been designed with international experts to examine the impact of industrial emissions on Murujuga's petroglyphs" (WA Today, 6 June 2024, article entitled "Leaked letter reveals internal concerns about science on Australia's next world heritage site by Hamish Hastie and Peter Milne, 2024)

The Government of Western Australia maintains that the MRAMP is a "*best practice monitoring and analysis program*" which "*will provide reliable information on changes and trends in the condition of the rock art and whether the rock art is showing signs of accelerated change*" (Government of Western Australia 2024). As a basic principle of managing First Nations cultural heritage, and as reflected in Woodside's First Nations Communities Policy (Woodside, 2022), the involvement of MAC as representatives of Traditional Custodians in this project is also important to ensuring that the broader values of Murujuga are appropriately managed. Further results from the MRAMP are expected periodically until its conclusion in 2025, and relevant findings will be managed through Woodside's Management of Change process.

4.9.7 Historic Sites of Significance

Historic sites of significance and heritage value are found along adjacent foreshores of the NWMR. Heritage places are protected in Western Australia under the Heritage Act 2018. There are no known sites of historic cultural heritage significance within the PAA.

4.9.8 Historic Underwater Heritage

A search of the Australian National Shipwreck Database, which records all known Maritime Cultural Heritage (shipwrecks, aircraft, relics and other underwater cultural heritage) in Australian waters, indicated there are no sites within the PAA; however, a number of shipwrecks exist within the EMBA and detailed in Appendix K.

Table 4-21: Historic shipwrecks within 100 km of the PAA

Shipwreck	Distance from PAA to Shipwreck (km)
Curlew	<1
Marietta	<1
Wild Wave (China)	<1
Vianen	<1
McDermott Derrick Barge No 20	14
Zelma	17
Tanami	28
Trial	28
HMS Plym	36
Tropic Queen	41
Parks Lugger	45

4.9.9 World, National and Commonwealth Heritage Listed Places

No World, National or Commonwealth heritage listed places overlap the PAA. World, National and Commonwealth heritage places within the EMBA are identified in Table 4-22.Appendix K outlines the values and sensitivities of these places.

Table 4-22: World, National and Commonwealth Heritage Listed places within the EMBA

Listed Place	Distance and Direction from PAA to Listed Place (km)
World Heritage Places	
The Ningaloo Coast	208 south-west (Facility and Xena-03 Operational Areas)
National Heritage Places	
The Ningaloo Coast	194 south-west (Facility and Xena-03 Operational Areas)
Dampier Archipelago	9 km south-east (Export Pipeline Operational Area)

4.10 Socio-economic Environment

4.10.1 Commercial Fisheries

Five Commonwealth and 18 State fishery management areas are located within the PAA and EMBA. For additional detail, the PAA is presented here in two parts: the Export Pipeline Operational Area, and the combined Facility and Xena-03 Drilling Operational Areas.

The Annual Fishery Status Reports published by the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) were used to identify whether Commonwealth-managed fisheries were active within the PAA and EMBA in the last five years. FishCube data were also requested from the WA Department of Primary Industries and Regional Development (DPIRD) for the most recently available five-year period for each fishery (2019–2023). Data obtained from the catch and effort system (CAES) was analysed to assess the potential for fisheries interaction with the PAA and Petroleum Activities Program. Data was reviewed from the last five years as a subset of past fishing effort. This was deemed an appropriate period to represent potential future fishing effort over the lifecycle of this EP (five years from NOPSEMA acceptance). In addition, any impacts to fish are expected to be temporary in nature (see Section 6) and therefore not to extend beyond the life of the EP.

This information was used to determine relevant fisheries for consultation who may be impacted by the PAP. Table 4-23 provides an assessment of the potential interaction and Appendix K provides

further detail on the fisheries that have been identified through desk-based assessment and consultation (Section 5). One Commonwealth-managed and 10 State-managed fisheries were identified as having a potential interaction with the Petroleum Activities Program, within the PAA (Figure 4-14).

Table 4-23: Commonwealth and State commercial fisheries management areas overlapping the PAA and EMBA and potential for interaction during the PAP

Fishery	PAA/EMBA			Description		
	Facility and Xena-03 Operational Areas	Export Pipeline Operational Area	EMBA	Potential for Interaction During Petroleum Activity Program		
				✖ no spatial overlap	✓ spatial overlap	Blue shading possibility for interaction
Commonwealth Managed Fisheries						
North West Slope Trawl Fishery	✓	✖	✓	The North West Slope Trawl Fishery management area overlaps the Facility and Xena-03 Operational Areas and the EMBA. The fishery operates off north-western Australia from 114°E to 125°E, roughly between the 200 m isobath and the outer boundary of the Australian Fishing Zone (Keller and Curtotti, 2023). Fishing effort commenced in 1985 with vessel numbers between 1 and 6 vessels per year since 2005–2006 (Keller and Curtotti, 2023). Three vessels operated in the 2021–2022 season, decreasing from 4 in 2020–2021 season (Keller and Curtotti, 2023). Woodside considers it a possibility that interactions with the fishery may occur in the Facility and Xena-03 Operational Areas and the EMBA.		
Southern Bluefin Tuna Fishery	✓	✓	✓	The Southern Bluefin Tuna Fishery management area overlaps the PAA and the EMBA. The Southern Bluefin Tuna Fishery spans the Australian Fishing Zone; however, since 1992, the majority of Australian catch has concentrated in south-eastern Australia (Patterson and Dylewski, 2023a). Woodside considers there to be no potential for interaction with this fishery and the Petroleum Activities Program.		
Western Deepwater Trawl Fishery	✖	✖	✓	The Western Deepwater Trawl management area overlaps the EMBA. The fishery operates off the coast between the western boundary off the Southern and Eastern Scalefish and Shark Fishery in the south, and the western boundary of the North West Slope Trawl Fishery in the north (Kell et al., 2023). Fishing effort has been relatively low since 2005–2006, with 1 to 3 vessels active in the fishery since 2004–2005, and 2 active vessels recorded in 2021–2022 (Keller et al., 2023). Woodside considers it a possibility that interactions with the fishery may occur in the EMBA.		

Fishery	PAA/EMBA			Description
	Facility and Xena-03 Operational Areas	Export Pipeline Operational Area	EMBA	Potential for Interaction During Petroleum Activity Program × no spatial overlap ✓ spatial overlap Blue shading possibility for interaction
Western Tuna and Billfish Fishery	✓	✓	✓	The Western Tuna and Billfish Fishery management area overlaps the PAA and the EMBA. However, the majority of Australian catch has concentrated off south-west Western Australia with occasional activity off South Australia (Patterson et al., 2023). Woodside considers there to be no potential for interaction with this fishery and the Petroleum Activities Program.
Western Skipjack Tuna Fishery	✓	✓	✓	The Western Skipjack Tuna Fishery management area overlaps the PAA and the EMBA. The Western Skipjack Tuna Fishery spans the Australian Fishing Zone west of Victoria and the Torres Strait. The Fishery is currently not active, and no fishing has occurred since 2009 (Patterson and Dylewski, 2023b). Woodside considers there to be no potential for interaction with this fishery and the Petroleum Activities Program.
State Managed Fisheries				
Exmouth Gulf Prawn Managed Fishery	×	×	✓	The Exmouth Gulf Prawn Fishery is a prawn trawl fishery operating in Exmouth Gulf. Target species generally <50 m water depth. Fishing effort has been stable in the last 5 years with 6 vessels active during the 2020–2021 and 2021–2022 season (Wilkin et al., 2023a). The fishery management area overlaps with the EMBA. The fishery is limited to the spatial extent within the Exmouth Gulf and Muiron Islands. Woodside considers there to be a potential for interaction with this fishery in the EMBA.
Hermit Crab Fishery	×	✓	✓	The Hermit Crab Fishery management area overlaps the Export Pipeline Operational Area and the EMBA. The Land Hermit Crab Fishery is a shoreline fishery active North of Exmouth, with crabs taken onshore at night by hand. The fishery is active within the Export Pipeline Operational Area, with 60 NM CAES blocks only (DPIRD, 2023) with 2 licences active during the 2021-2022 fishing season (Newman et al., 2023). The activity is likely to occur predominantly in coastal waters outside of the Export Pipeline Operational Area. Woodside considers it a possibility that interactions with the fishery may occur in the Export Pipeline Operational Area and the EMBA.

Fishery	PAA/EMBA			Description
	Facility and Xena-03 Operational Areas	Export Pipeline Operational Area	EMBA	Potential for Interaction During Petroleum Activity Program × no spatial overlap ✓ spatial overlap Blue shading possibility for interaction
Mackerel Managed Fishery	✓	✓	✓	The Mackerel Managed Fishery management area (Area 2) overlaps the PAA and the EMBA (Areas 2 and 3). The fishery is active within the Facility and Xena-03 Operational Areas, and the Export Pipeline Operational Area. FishCube data for the Mackerel Managed Fishery reported less than 3 vessels active during the 2020-2021 season under 10 NM, and up to 6 vessels active over the last 5 years under 60 NM CAES blocks (DPIRD, 2023). The fishery is managed through designated Areas, and extends from coastal waters to the EEZ, in waters northwards of Cape Leeuwin to the NT border. Nominal catch rates in Area 2 (Pilbara) have been generally decreasing since 2004 (Lewis and Watt, 2023). Woodside considers it a possibility that interactions with the fishery may occur within the PAA and the EMBA.
Marine Aquarium Managed Fishery	✓	✓	✓	The Marine Aquarium Managed Fishery management area overlaps the PAA and the EMBA. The Marine Aquarium Fishery is a diver-based fishery and therefore typically restricted to relatively shallow waters. FishCube data for the fishery from within the EMBA is provided at 10 NM and 60 NM CAES blocks reporting a maximum of 4 licences under 10 NM and 7 licences active under 60 NM across the 2017–2023 seasons (DPIRD, 2023). Woodside considers it a possibility that interactions with the fishery may occur within the Export Trunkline Operations Area and the EMBA.
Nickol Bay Prawn Managed Fishery	×	×	✓	The Nickol Bay Prawn Managed Fishery management area overlaps the EMBA. The fishery is active in State waters and the EMBA with fishing effort at 10 NM CAES blocks recording 3 vessels active during the 2021-2022 fishing season, a decrease from 8 vessels in 2021–2022 (Wilkin et al., 2023b). Woodside considers it a possibility that interactions with this fishery may occur within the EMBA.
Onslow Prawn Managed Fishery	✓	✓	✓	The Onslow Prawn Managed Fishery management area overlaps the PAA and the EMBA. The fishery is active within the Export Pipeline Operational Area and EMBA with 60 NM CAES blocks reporting less than 3 vessels active during the 2021–2022 season (DPIRD, 2023). Woodside considers it a possibility that interactions with the fishery may occur in the Export Pipeline Operational Area and EMBA.

Fishery	PAA/EMBA			Description		
	Facility and Xena-03 Operational Areas	Export Pipeline Operational Area	EMBA	Potential for Interaction During Petroleum Activity Program		
				✖ no spatial overlap	✓ spatial overlap	Blue shading possibility for interaction
Pearl Oyster Managed Fishery (Zones 1 and 2)	✓	✓	✓	The Pearl Oyster Managed Fishery management area overlaps the PAA and the EMBA. Fishing effort is mostly focused within coastal waters (10–15 m depth) with a maximum depth of 35 m (Lulofs et al., 2002), collecting wild oysters for use in the aquaculture production of pearls. These are collected from fishing grounds primarily off the coast of Eighty Mile Beach with smaller catches from the Lacepede Islands. Woodside considers there to be no potential for interaction with this fishery and the Petroleum Activities Program.		
Pilbara Line Fishery (Condition)	✓	✓	✓	The Pilbara Line Fishery (Condition) licensees are permitted to operate anywhere within Pilbara waters (Wakefield et al., 2023), overlapping the PAA and the EMBA. The fishery is active in the PAA and the EMBA, with 60 NM CAES blocks reporting up to 5 vessels active across the 2017–2023 seasons (DPIRD, 2023). Fishing effort has decreased form 7 vessels activin in 2020–2021 to 6 vessels active in 2021-2022 (Wakefield et al., 2023). Woodside considers it a possibility that interactions with the fishery may occur within the Facility, Xena-03 and Export Pipeline Operational Area and the EMBA.		
Pilbara Crab Managed Fishery	✓	✓	✓	The Pilbara Crab Managed Fishery management area overlaps the PAA and the EMBA. The fishery operates via trap-based fishery methods up to 50 m and is concentrated around Dampier. The fishery is active in the Export Pipeline Operational Area and the EMBA, with 60 NM CAES blocks reporting less than 3 vessels active across the 2017–2023 seasons (DPIRD, 2023). Fishing effort has remained stable from 2020–2022 with 2 vessels active within the EMBA (Johnston et al., 2023). Woodside considers it a possibility that interactions with the fishery may occur within the Export Pipeline Operational Area and the EMBA.		
Pilbara Trap Managed Fishery	✓	✓	✓	The Pilbara Trap Managed Fishery management area overlaps the PAA and EMBA. The fishery is active within the Facility and Xena-03 Operational Areas, Export Pipeline Operational Area and the EMBA, with 60 MN CAES blocks reporting less than 3 vessels active across the 2017–2023 seasons (DPIRD, 2023). Fishing effort has increased from 7 active vessels during 2020–2021 to 8 vessels active in 2021–2022 (Wakefield et al., 2023). Woodside considers it a possibility that interactions with the fishery may occur within the PAA as well as the EMBA.		

Fishery	PAA/EMBA			Description		
	Facility and Xena-03 Operational Areas	Export Pipeline Operational Area	EMBA	Potential for Interaction During Petroleum Activity Program ✗ no spatial overlap	✓ spatial overlap	Blue shading possibility for interaction
Pilbara Fish Trawl (Interim) Managed Fishery	✗	✓	✓	The Pilbara Fish Trawl (Interim) Managed Fishery management area (Area 1) overlaps the Export Pipeline Operational Area and the EMBA. The fishery is active within the Export Pipeline Operational Area and EMBA with four 10 NM CAES blocks reporting up to four vessels across the 2017–2023 seasons (DPIRD, 2023). Fishing effort within the EMBA has been stable with 2 vessels active between 2018 and 2022 (Wakefield et al., 2023). Woodside considers it a possibility that interactions with the fishery may occur within the EMBA and the Export Pipeline Operational Area.		
Specimen Shell Managed Fishery	✓	✓	✓	The Specimen Shell Managed Fishery management area overlaps the PAA and the EMBA. The fishery is active within the Export Pipeline Operational Area and the EMBA. FishCube data for the fishery is provided at 10 NM and 60 NM CAES blocks reporting less than 3 licences under 10 NM and up to 3 licences under 60 NM CAES blocks active across 2017–2023 seasons (DPIRD, 2023). The fishery is largely diver-based, targeting specimen shells in water depths mostly <30 m. Given the depth of the Export Pipeline Operational Area at its shallowest, it is not likely to interact with the fishery. Woodside considers it a possibility that interactions with the fishery may occur in the Export Pipeline Operational Area and the EMBA.		
West Coast Deep Sea Crustacean Managed Fishery	✓	✓	✓	The West Coast Deep Sea Crustacean Managed Fishery management area overlaps the PAA and the EMBA. The fishery is prohibited to fish landwards of the 150 m isobath, restricting any potential interactions to activities within the Facility and Xena-03 Operational Areas. Most of the commercial crab catch is taken in depth of 500 m to 800 m (WAFIC, 2024). The fishery is active within the EMBA, with 5 vessels active during the 2021–2022 season (Tuffley et al., 2023). Woodside considers it a possibility that interactions with the fishery may occur within the EMBA only.		

Fishery	PAA/EMBA			Description		
	Facility and Xena-03 Operational Areas	Export Pipeline Operational Area	EMBA	Potential for Interaction During Petroleum Activity Program		
				✖ no spatial overlap	✓ spatial overlap	Blue shading possibility for interaction
Western Australian Sea Cucumber Fishery	✓	✓	✓	The Western Australian Sea Cucumber Fishery management area overlaps the PAA and the EMBA. The fishery is active within the EMBA, with 60 NM CAES blocks reporting less than 3 vessels active across the 2017–2019 seasons. The fishery operates as a wader and diver-based fishery in the Kimberley region and therefore would typically be restricted to coastal waters outside of the Export Pipeline Operational Area. Woodside considers it a possibility that interactions with the fishery may occur in the Export Pipeline Operational Area and the EMBA.		
South West Coast Salmon Managed Fishery	✓	✓	✓	The South West Coast Salmon Managed Fishery management area overlaps the PAA and EMBA. Historically, no fishing has occurred north of the Perth Metropolitan Area. Therefore, no effort is reported within the EMBA (Duffy et al., 2023) and Woodside considers there to be no potential for interaction with this fishery within the PAA and EMBA.		
Western Australian Abalone Managed Fishery	✓	✓	✓	The Abalone Fishery management area overlaps the PAA and the EMBA. The fishery operates in shallow coastal waters off the south-west and south coasts of WA (Strain et al., 2023). Given the fishery method (shore-based and hand caught) and water depths of the PAA there are no CAES blocks reporting fishing effort within the PAA. Woodside considers there to be no potential for interactions with the fishery within the EMBA or PAA.		
West Coast Rock Lobster Managed Fishery	✖	✖	✓	The Western Rock Lobster Fishery management area overlaps the EMBA. The fishery mainly operates off the west coast of WA between Shark Bay and Cape Leeuwin (de Lestang and Walsh, 2023). There is no CAES block reporting fishing effort within the EMBA. Woodside considers there to be no potential for interactions with the fishery within the EMBA.		
WA North Coast Shark Fishery	✓	✓	✓	The North Coast Shark Fishing area overlaps the PAA and the EMBA. The northern shark fisheries comprise of the North Coast Shark Fishery in the Pilbara and Western Kimberly (closed since 1998), and the Joint Authority of Northern Shark Fishery in the eastern Kimberly, which has not been active since the 2008–2009 season (AFMA, 2021). Woodside considers there to be no interaction with the fishery and the Petroleum Activities Program.		
Charter Based Commercial Operators						

Fishery	PAA/EMBA			Description		
	Facility and Xena-03 Operational Areas	Export Pipeline Operational Area	EMBA	Potential for Interaction During Petroleum Activity Program ✖ no spatial overlap	✓ spatial overlap	Blue shading possibility for interaction
Tour Operators	✓	✓	✓	Fishing Tour Operators are permitted to operate across WA state waters and are required to report monthly logbook records of client fish catches. The fishery is active within the Facility and Xena-03 Operational Areas and Export Pipeline Operational Area as well as the EMBA. FishCube data indicates fishing effort across the 10 NM and 60 NM CAES blocks overlap the PAA. Fishing effort at 10 NM scale has been consistent over the last 5 years reporting no more than 3 licence holders (DPIRD, 2023). FishCube data provided for 60 NM recorded up to 5 licences active across the 2017–2023 seasons (DPIRD, 2023). Woodside considers interaction with tour operators a possibility within the Facility and Xena-03 Operational Areas, the Export Pipeline Operational Area, and the EMBA.		

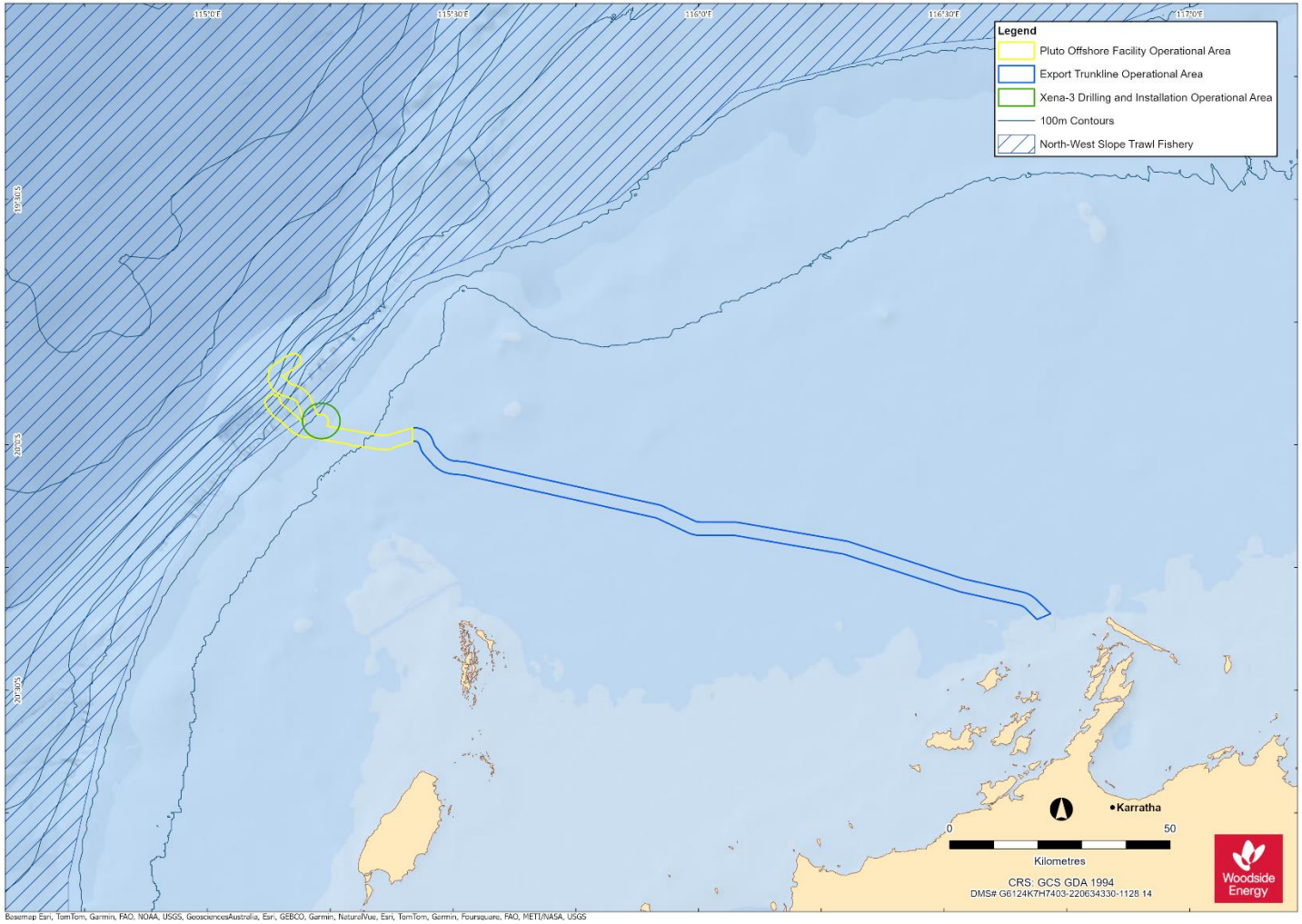


Figure 4-14: Commonwealth managed commercial fisheries overlapping the PAA with a potential for interaction with the PAP

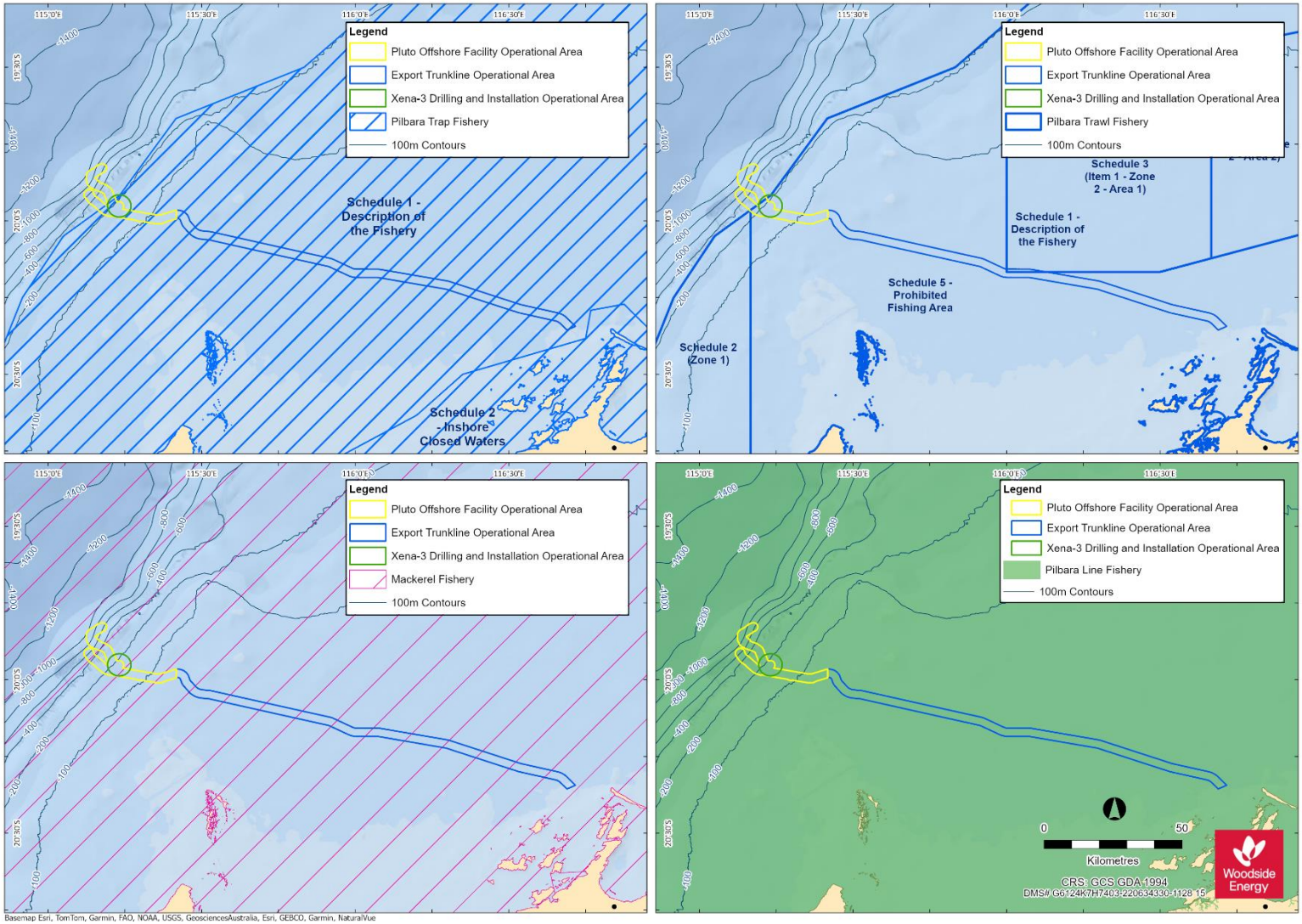


Figure 4-15: State-managed (Western Australia) commercial fisheries overlapping the PAA with a potential for interaction with the PAP

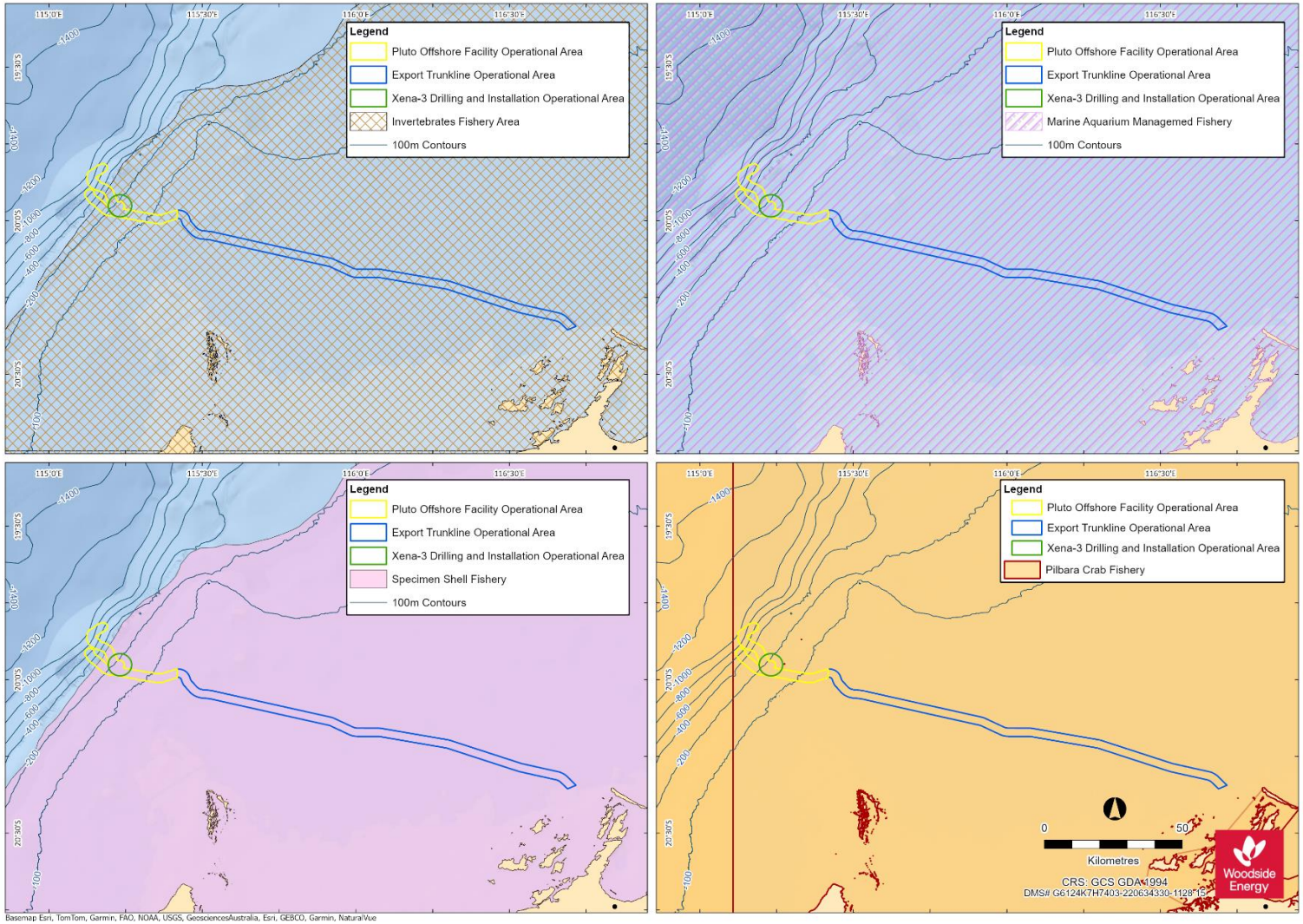


Figure 4-16: State-managed (Western Australia) commercial fisheries overlapping the PAA with a potential for interaction with the PAP

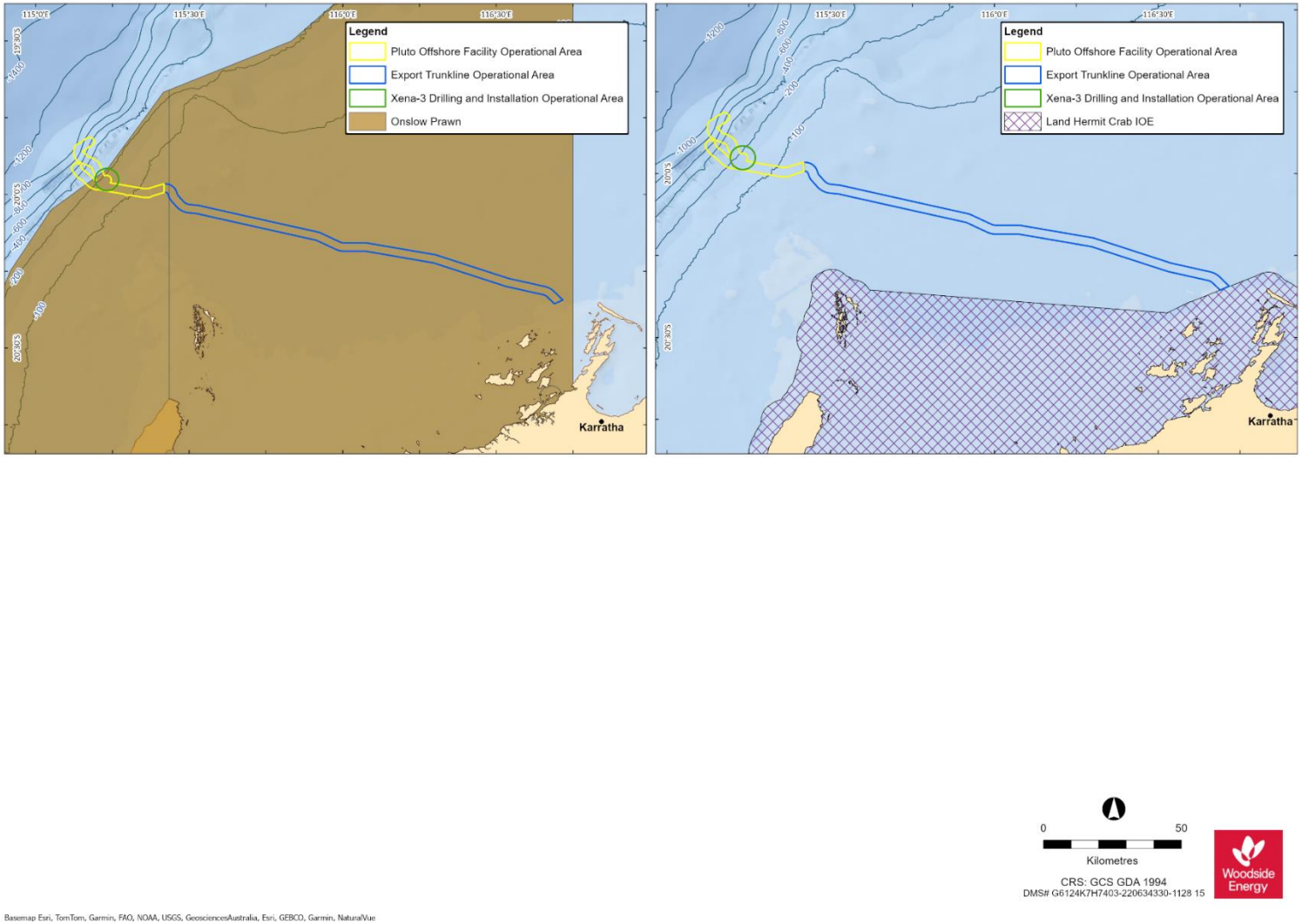


Figure 4-17: State-managed (Western Australia) commercial fisheries overlapping the PAA with a potential for interaction with the PAP

4.10.2 Traditional Fisheries

There are no traditional or customary fisheries within the PAA, as these are typically restricted to shallow coastal waters and/or areas with structures such as reefs. However, it is recognised that Barrow Island, Montebello Islands and Ningaloo Reef, all within the wider EMBA, have a known history of fishing when areas were occupied (as from historical records) (Department of Conservation and Land Management (DCLM), 2005, Department of Environment and Conservation (DEC), 2007). Areas that are covered by registered native title claims are likely to practice Aboriginal fishing techniques at various sections of the Western Australia coastline. Further information on traditional fishing activity that is likely to occur in the EMBA is provided in Appendix K).

4.10.3 Tourism and Recreation

The recreation and tourism industries in the Pilbara are of high social value with approximately 965,000 visitors over the last five years (Tourism Western Australia, 2023). Tourism continued to grow in 2022, with over one million visitors (Tourism Western Australia, 2023). Growth and the potential for further expansion in tourism and recreational activities are recognised for the Pilbara region, with the development of regional centres and a workforce associated with the resources sector (SGS Economics and Planning, 2012).

The PAA is located offshore of the North West tourism region, which includes parts of the Gascoyne, Pilbara, and Kimberley region. Tourism is concentrated in the vicinity of population centres such as Broome, Dampier, Exmouth, Coral Bay, and Shark Bay. The population centre closest to the PAA is the town of Dampier (31 km from the Export Pipeline Operational Area and 157 km from the Facility and Xena-03 Operational Areas). No tourist activities take place specifically within the PAA.

The nearest tourism areas include the Montebello State Marine Park (25 km from the Export Pipeline Operational Area and 34 km from the Facility and Xena-03 Operational Areas) and the Montebello Marine Park, which is located in deeper offshore waters and overlaps the Facility and Export Pipeline Operational Areas. These tourism areas have some charter boat operators taking visitors to islands (Department of Environment and Conservation, 2007). Recreational fishing in the Pilbara and Gascoyne regions is mainly concentrated around the coastal waters and islands and has grown considerably with the expanding regional centres, seasonal tourism and increasing residential and fly in/fly out work force, particularly in the Pilbara region (Fletcher et al., 2017). Some recreational fishing has historically taken place at Rankin Bank (approximately 29 km north-east of the PAA at the closest point). However, due to the distance from access nodes, such as Dampier and Onslow (approximately 31 km south and 180 km southwest from the PAA at the closest point respectively) recreational fishing effort is expected to be restricted to relatively large vessels and hence is considered to be low.

4.10.4 Commercial Shipping

The Australian Maritime Safety Authority (AMSA) has introduced a network of marine fairways across the NWMR off WA to reduce the risk of vessel collisions with offshore infrastructure. Two fairways overlap the Export Pipeline Operational Area, and none overlap with the Facility and Xena-03 Operational Areas (

Figure 4-18). Ports in the region are nodes of increased vessel activities. Active ports within the vicinity of the PAA include:

- Dampier (approximately 30 km south)
- Barrow Island (approximately 85 km south)
- Port Walcott (approximately 160 km south)
- Onslow (approximately 180 km south)

- Port Hedland (approximately 200 km south-east).

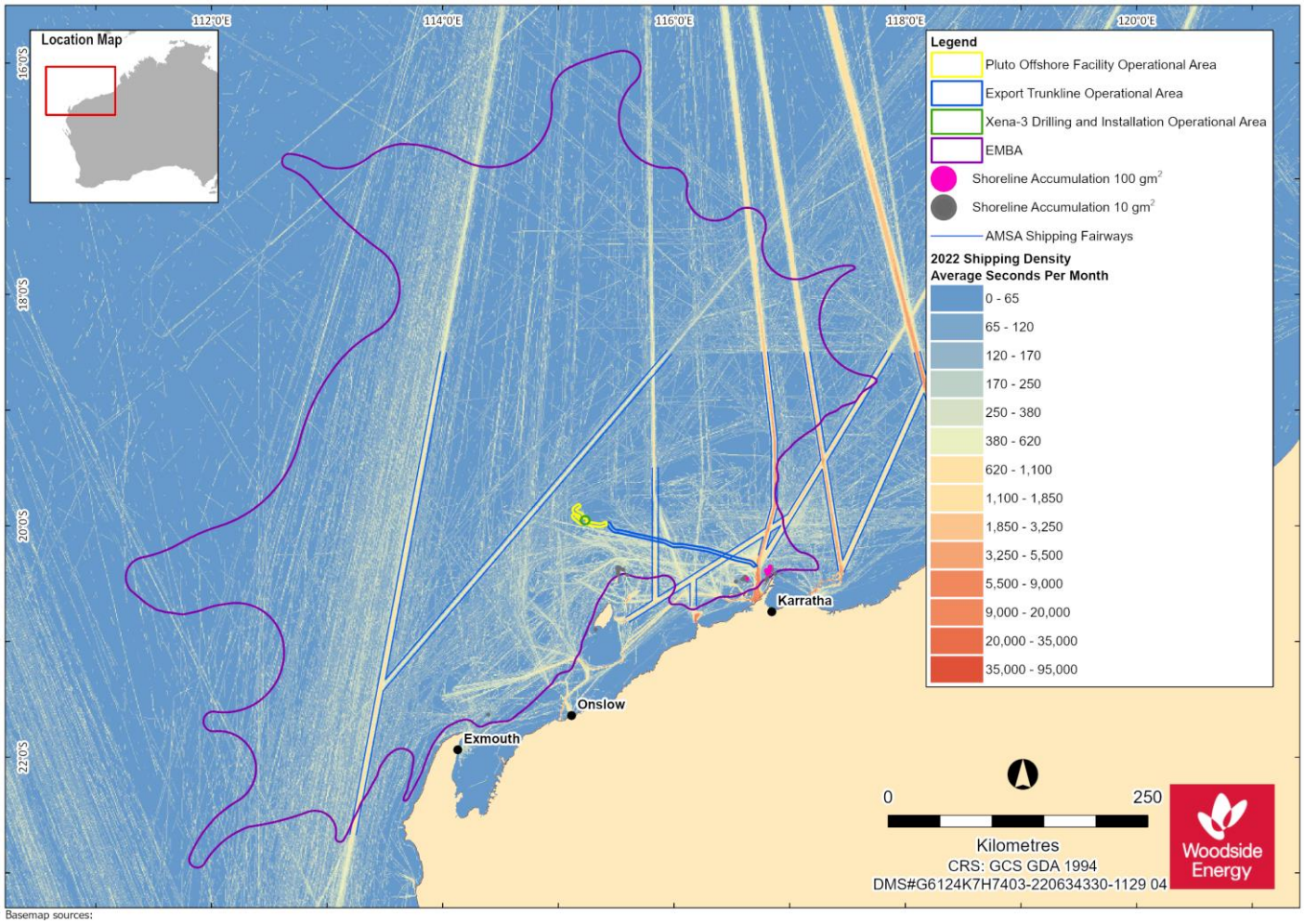


Figure 4-18: Vessel density map for the PAA, derived from AMSA satellite tracking system data (vessels include cargo, LNG tanker, passenger vessels, support vessels, and others/unnamed vessels

4.10.5 Oil and Gas

The PAA is located within an area of established oil and gas operations in the broader NWMR. Table 4-24 details the proximity of other oil and gas facilities within the region to the operational areas within the PAA. Appendix K describes current oil and gas development within the EMBA, also shown in Figure 4-19.

There are also facilities with intersecting subsea infrastructure, including:

- Julimar Brunello production pipeline (Woodside)
- Wheatstone pipeline (Chevron)
- Reindeer offshore gas supply pipeline (Santos)
- Scarborough export trunkline (Woodside).

Table 4-24: Other oil and gas facilities located within 70 km of the PAA

Facility Name and Operator	Distance and Direction from Facility and Xena-03 Operational Areas	Distance and Direction from Export Pipeline Operational Area
Wheatstone platform (Chevron)	5 km north	5 km north
Angel platform (Woodside)	48 km north	48 km north
John Brookes (Santos)	50 km south	57 km south-west
Goodwyn Alpha platform (Woodside)	72 km north-east	51 km north
North Rankin complex (Woodside)	86 km north-east	64 km north
Reindeer wellhead platform (Santos)	109 km east	12 km north
Stag A (Jadestone)	112 km south-east	8 km south
Wandoo B (VOGA)	123 km south-east	12 km south

The PAA overlaps the following titles for which Woodside is not a titleholder:

- WA-48-L: Chevron Australia Pty Ltd is the contact titleholder of production licence WA-48-L.
  - Part of the Facility Operational Area, including the Pluto Platform (WA-1-IL) and part of the Pluto subsea infrastructure within WA-16-PL overlap WA-48-L (Figure 4-19). While the platform and IMMR activities will be undertaken within Woodside operated pipeline and infrastructure licences, the Operational Area includes a radius of 1,500m from the platform and subsea infrastructure, and allows for the movement and positioning of vessels. This means that vessel surface activity may temporarily occur within this adjacent Title during crewed platform activities and some IMMR activities.
  - The Xena-03 well and subsea infrastructure is located in close proximity to WA-48-L. The Xena-03 Operational Area extends 4000 m from the well and into WA-48-L to allow for vessel movement which may temporarily occur within this adjacent title.

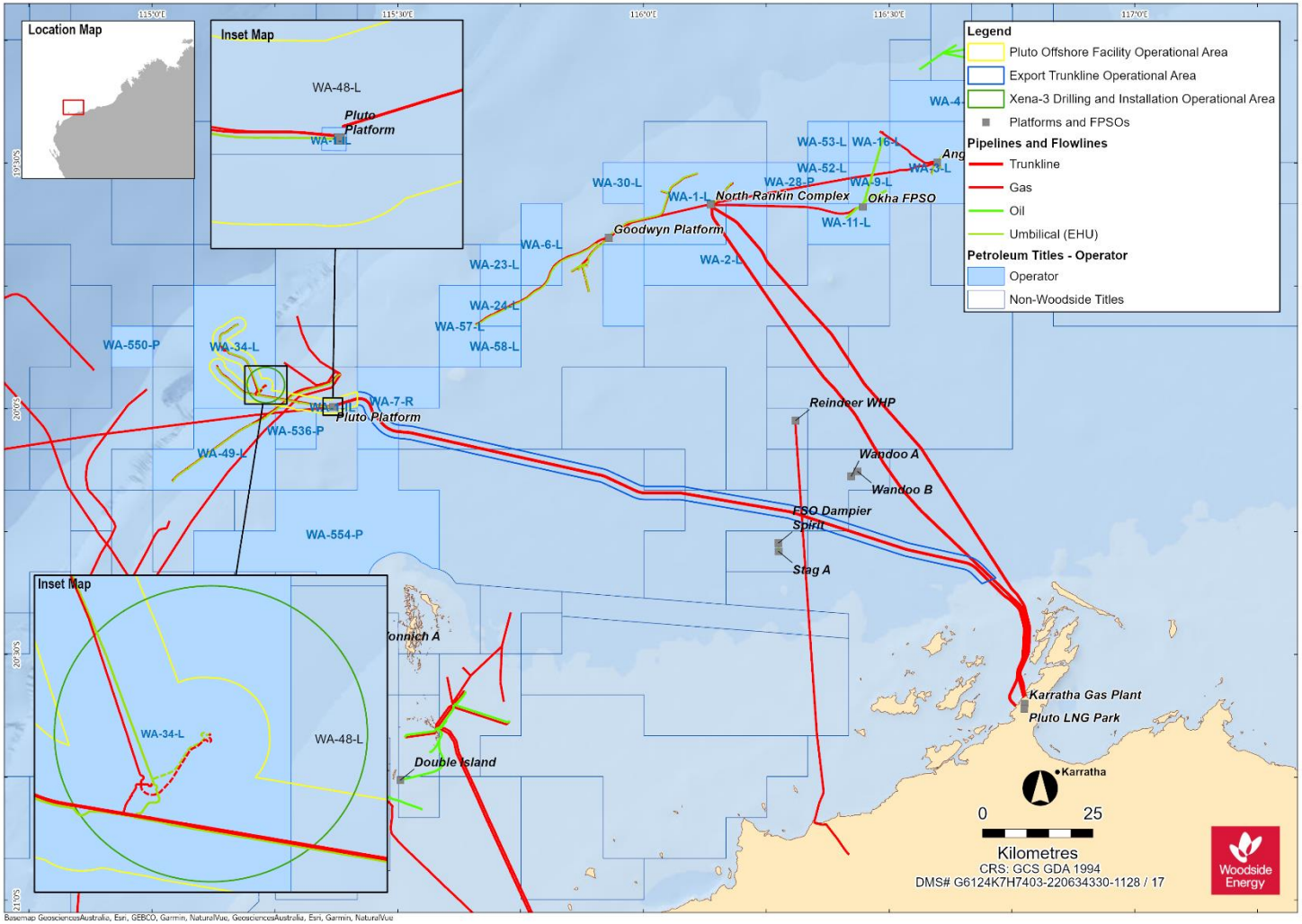


Figure 4-19: Oil and gas facilities located within the EMBA

4.10.6 Submarine Communications Infrastructure

The PAA is located in a region with submarine communications infrastructure. The submarine communications infrastructure located within 50 km of the PAA is listed in Table 4-25.

Table 4-25:Communications Infrastructure located within 50 km of the PAA

Communications Infrastructure (submarine cables)	Distance and direction from PAA to Facility
Woodside Fibre Optic Cable Route	~21 km from the Export Trunkline Operational Area
Scarborough Fibre Optic Cable	~18 km from the Facility Operational Area
Chevron Fibre Optic Cable Route	Intersects Export Trunkline Operational Area in two places

Source: Submarine cable locations sourced from Vocus and Telstra.

4.10.7 Defence

Department of Defence (DoD) areas, facilities and UXOs near the PAA and within the EMBA are outlined in Table 4-26. There are no DoD areas overlapping the PAA. Appendix Kdescribes key DoD areas and facilities.

Table 4-26: Defence areas, facilities and unexploded ordnances overlapping the PAA or EMBA

Defence Area/Facility	Presence	
	PAA	EMBA
UXO SDG096 Sea Dumping: Anchor Island. This site is an area used for the dumping at sea of ordnance and other items.		✓
Potential Depth Charge UXO DEP022: Northwest of Bessieres Island. This site was an area where Depth Charges were used in WWII and where some depth charges failed to function.		✓
Potential Depth Charge UXO DEP027: East of Montebello Islands. This site was an area where Depth Charges were used in WW2 and where some depth charges failed to function.		✓

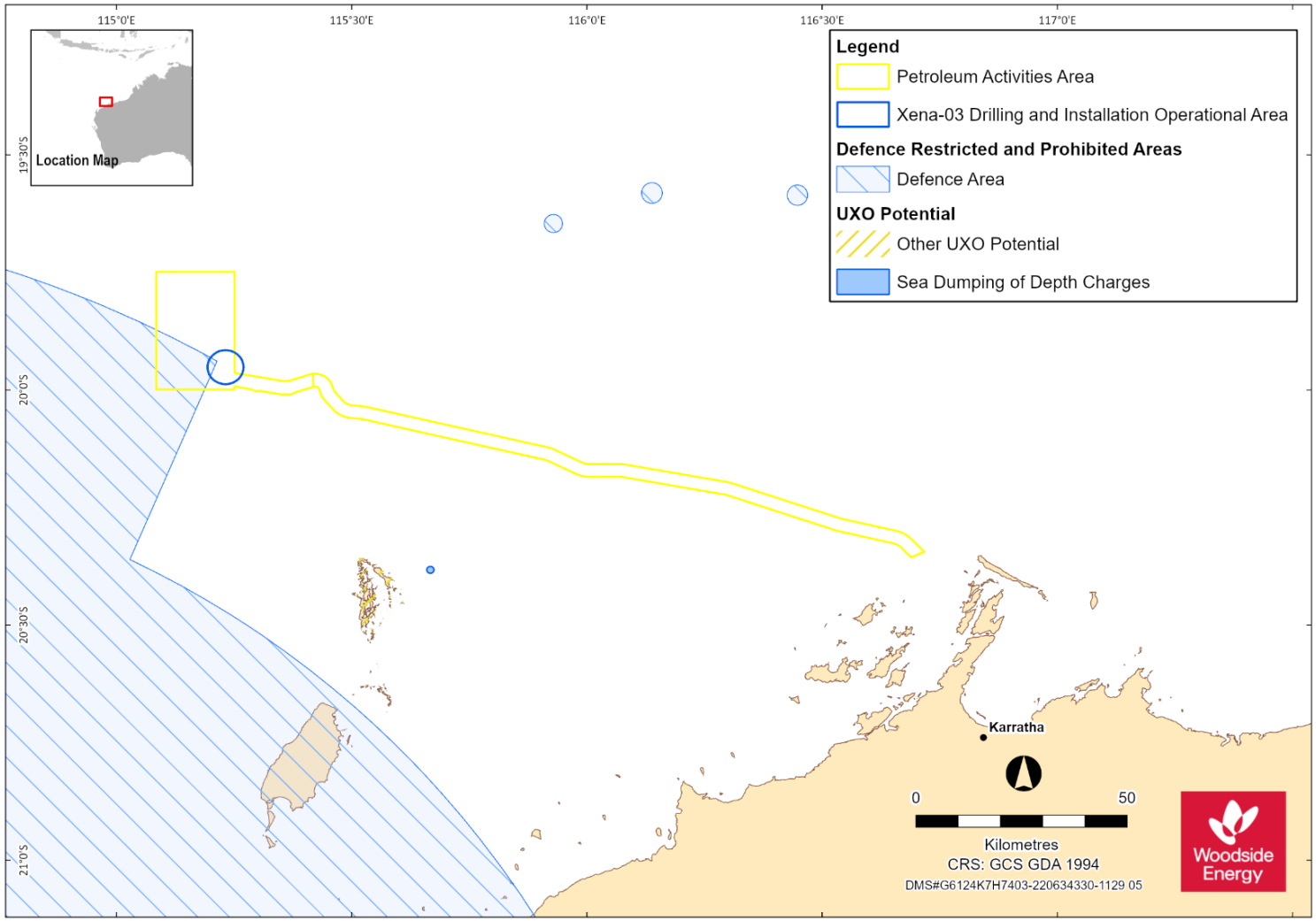


Figure 4-20: Defence areas relative to the PAA

5. CONSULTATION

5.1 Summary

Woodside consults relevant persons in the course of preparing an Environment Plan (EP) in accordance with Regulation 25 of the Environment Regulations. (In this section, references to 'Regulations' are to Regulations of the Environment Regulations, unless otherwise stated).

The consultation process is designed to identify relevant persons and provide them with sufficient information and a reasonable period to allow them to make an informed assessment of the possible consequences of the proposed activity on their functions, interests or activities. This enables Woodside to assess the merits of objections or claims about the adverse impact of each activity to which the EP relates that are received from relevant persons and for Woodside to adopt appropriate measures (if any) in response to those objections or claims so that the activity is carried out in a manner by which the environmental impacts and risks of the activity will be reduced to as low as reasonably practicable (ALARP) and will be of an acceptable level.

Consultation is informed by both the Environment Regulations and the findings of relevant Courts, including the Full Federal Court in the *Santos NA Barossa Pty Ltd v Tipakalippa [2022]* FCAFC 193 (Tipakalippa Appeal) (see Section 5.2 and 5.5.1) and *Munkara v Santos NA Barossa Pty Ltd (No 3) [2024]* FCA 9 (Munkara Case).

For this EP, Woodside has considered both the PAA and the broader EMBA in undertaking consultation (see further discussion in Section 5.2). The broadest extent of the EMBA has been determined by reference to the highly unlikely event of a hydrocarbon release resulting from the activities in the PAA (see Section 4). Consultation beyond the defined EMBA is too remote, would mean persons with interests are not reasonably capable of ascertainment and would mean consultation is not workable (*Tipakalippa* para [88]).

Woodside's consultation methodology is divided into two parts:

- The first part (Section 5.2 to 5.5) provides an overview of Woodside's consultation methodology for its EPs, including how we apply Regulation 25(1) to identify relevant persons.
- The second part (Sections 5.6 and 5.7) details Woodside's approach to accepting feedback and assessment of the merits of each objection or claim about the adverse impact of each activity to which the EP relates, and engaging in ongoing consultation for this EP.

Woodside's consultation record is in Appendix F and includes a summary of the following:

- assessment and identification of relevant persons
- consultation information provided to relevant persons, feedback received, Woodside's assessment of the merits of objections or claims and Woodside's response to relevant persons and other stakeholders Woodside chose to consult
- engagement with persons or organisations that Woodside chose to contact who are not relevant persons for the purposes of Regulation 25(1) (see Section 5.3.4)
- opportunities provided to persons or organisations to participate in consultation.

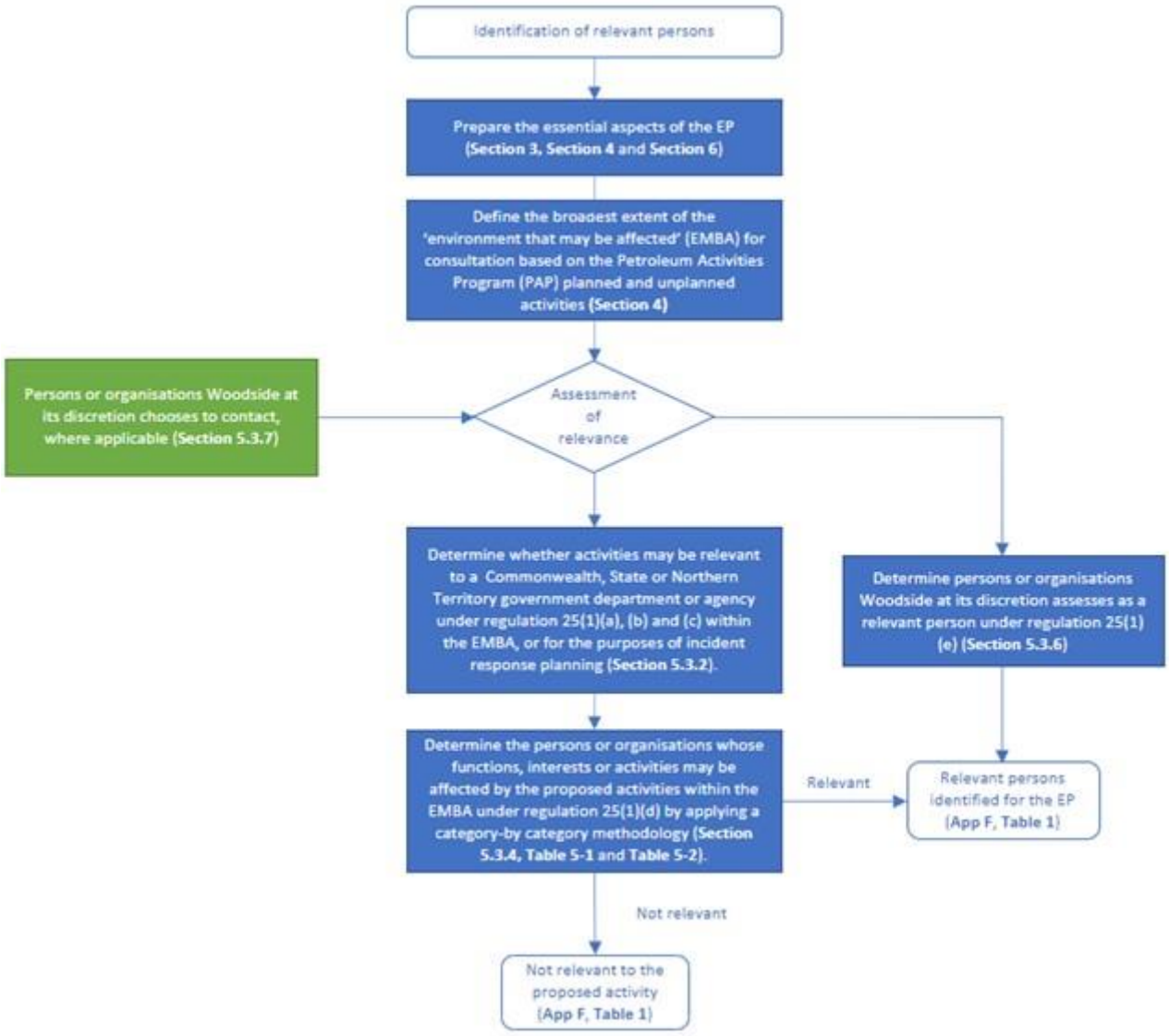


Figure 5-1: Overview of Woodside's methodology to identify relevant persons

5.2 Consultation – General Context

Woodside has a portfolio of quality oil and gas assets and more than 40 years of operating experience. We have a strong history of working with local communities, the relevant regulators and a broad range of persons and organisations, to better understand the potential risks and impacts associated with our proposed activities and to develop appropriate measures to manage them.

The length of time that we have operated in Commonwealth and State waters, and the history of continued engagement with a wide range of persons and organisations, enables Woodside to develop an extensive consultation list to inform its consultation process. This consultation list is not used as a definitive list of persons to consult but, rather, assists Woodside as an input to its understanding of relevant persons with whom to consult on a Petroleum Activities Program. The information in the consultation list has been captured from years of experience: it contains insights relating to the type of information particular persons or organisations want to receive during consultation, the appropriate method of consultation for relevant persons and includes appropriate contact details, which are reviewed and updated periodically.

Woodside acknowledges NOPSEMA's GL2086 - *Consultation in the course of preparing an environment plan* guideline (May 2023) as well as judicial guidance in the *Tipakalippa Appeal* on the intent of consultation, as follows:

- At paragraph 54 of the appeal decision: … *provide a basis for NOPSEMA's considerations of the measures, if any, that a titleholder proposes to take or has taken to lessen or avoid the deleterious effect of its proposed activity on the environment, as expansively defined.*
- At paragraph 89 of the appeal decision: … *its purpose is to ensure that the titleholder has ascertained, understood and addressed all the environmental impacts and risks that might arise from its proposed activity. Consultation facilitates this outcome because it gives the titleholder an opportunity to receive information that it might not otherwise have received from others affected by its proposed activity. Consultation enables the titleholder to better understand how others with an objective stake in the environment in which it proposes to pursue the activity perceive those environmental impacts and risks. As the Regulations expressly contemplate, it enables the titleholder to refine or change the measures it proposes to address those impacts and risks by taking into account the information acquired through the consultations. Objectively, the scheme intends that this is likely to improve the minimisation of environmental impacts and risks from the activity.*

The *Tipakalippa Appeal* and *Munkara Case* have also been further considered in the context of specific methods for consultation with First Nations' relevant persons (Section 5.5.1).

To undertake consultation, Woodside has developed a methodology for identifying relevant persons in accordance with Regulation 25(1) (Section 5). This methodology is consistent with NOPSEMA's Guideline and demonstrates that, to meet the requirements of Regulation 34 (criteria for EP acceptance) when preparing the EP, Woodside understands:

- our planned activities in the PAA, being the area in which our planned activities are proposed to occur (see Section 3.2.1)
- the geographical extent to which the environment may be affected (EMBA) by risks and impacts from our activities (unplanned) (identified in Section 4.1 and assessed in Section 6.8).

Woodside has undertaken consultation in the course of preparing this EP in compliance with Regulation 25, which requires a Titleholder to:

- consult with each of the following (a relevant person):
  - each Commonwealth, State or Northern Territory agency or authority to which the activities to be carried out under the EP may be relevant
  - if the plan relates to activities in the offshore area of a state – the Department of the responsible State Minister
  - if the plan relates to activities in the Principal Northern Territory offshore area – the Department of the responsible Northern Territory Minister
  - a person or organisation whose functions, interests or activities may be affected by the activities to be carried out under the EP
  - any other person or organisation that the titleholder considers relevant (Regulation 25(1)).
- give each relevant person sufficient information to allow the relevant person to make an informed assessment of the possible consequences of the activity on their functions, interests or activities (Regulation 25(2))
- allow a relevant person a reasonable period for the consultation (Regulation 25(3))

- tell each relevant person that the Titleholder consults with, that the relevant person may request that particular information it provides in the consultation not be published and any information subject to such a request is not to be published (Regulation 25(4)).

Further, Woodside seeks to carry out consultation in a manner that:

- is consistent with the principles of ecologically sustainable development (ESDev) set out in section 3A of the EPBC Act – see Section 2
- is intended to reduce the environmental impacts and risks from the activity to ALARP and an acceptable level (Regulation 4)
- is intended to minimise harm to the relevant person and the environment from the proposed petroleum activities and to enable Woodside to consider measures that may be taken to mitigate the potential adverse environmental impacts from the petroleum activity
- is collaborative; Woodside respects that, for a relevant person, consultation is voluntary. Where the relevant person seeks to engage, Woodside engages with the relevant person with the aim of seeking genuine and meaningful two-way dialogue
- provides opportunities for relevant persons to provide feedback throughout the life of the EP through its ongoing consultation process (refer to Section 5.7 and Section 7.12).

An overview of Woodside's consultation approach is outlined at Figure 5-2.

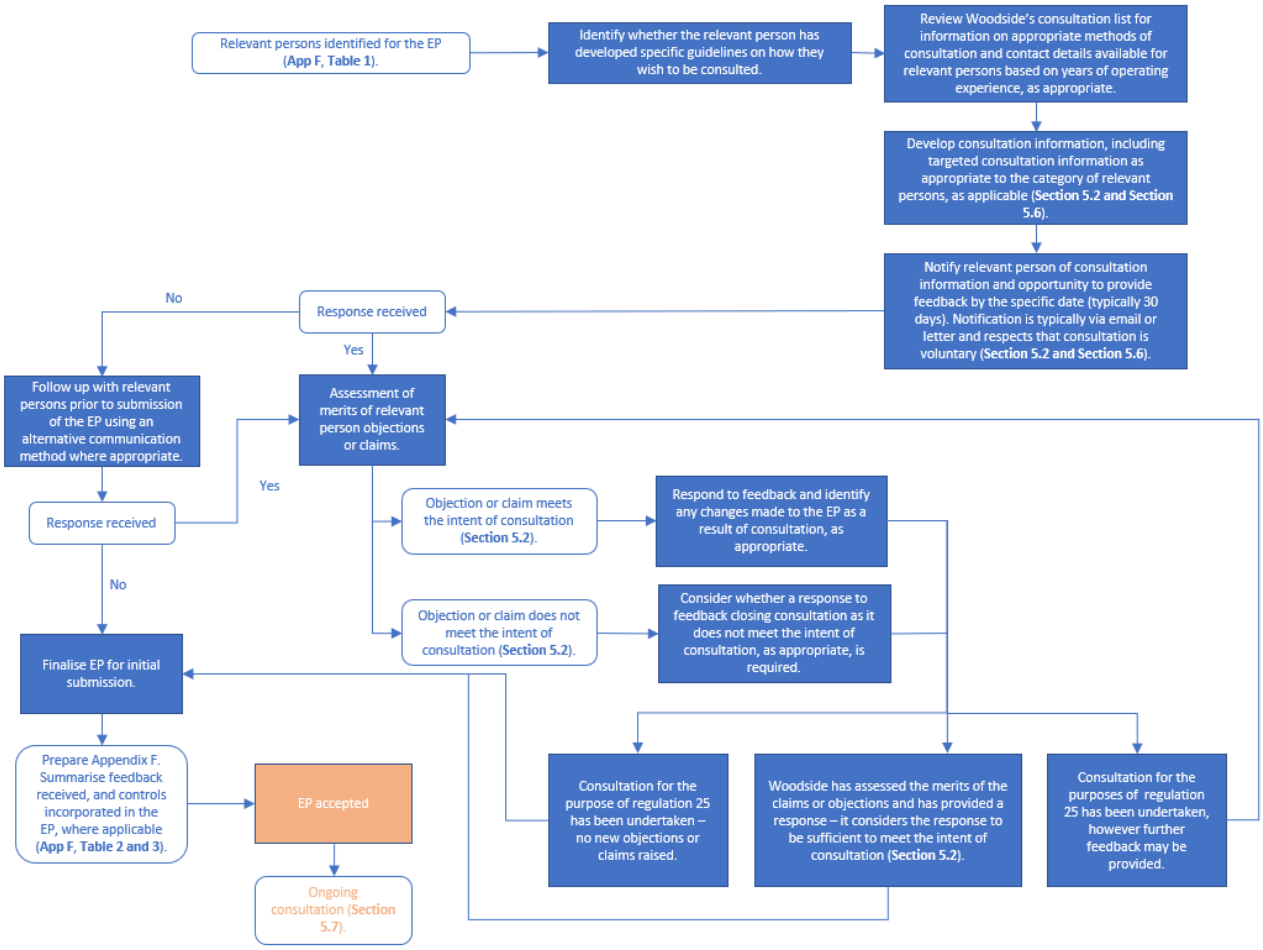


Figure 5-2: Overview of Woodside's consultation approach

The methodology for consultation for this activity has been informed by various guidelines and relevant information for consultation on planned activities, including:

Federal Court:

- Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193
- Munkara v Santos NA Barossa Pty Ltd (No 3) [2024] FCA 9.

NOPSEMA:

- GL2086 – Consultation in the course of preparing an environment plan – May 2023
- GN1847 – Responding to public comment on environment plans – January 2024
- GN1344 - Environment plan content requirements – September 2020
- GL1721 – Environment Plan decision making – January 2024
- GN1488 - Oil pollution risk management - July 2021
- GN1785 – Petroleum activities and Australian Marine Parks – January 2024GL 1887 – Consultation with Commonwealth agencies with responsibilities in the marine area – August 2024PL9028 Managing gender-restricted information – December 2023
- Consultation on offshore petroleum environment plans – Information for the community.

Department of Climate Change, Energy, the Environment and Water (DCCEEW)

- Sea Countries of the North-West; Literature review on Indigenous connection to and uses of the North West Marine Region.

Australian Fisheries Management Authority (AFMA):

- Petroleum industry consultation with the commercial fishing industry.

Commonwealth Department of Agriculture, Fisheries and Forestry (DAFF):

- Fisheries and the Environment – Offshore Petroleum and Greenhouse Gas Act 2006
- Offshore Installations Biosecurity Guide.

WA Department of Primary Industries and Regional Development (DPIRD):

- Guidance statement for oil and gas industry consultation with the Department of Fisheries.

WA Department of Transport (DoT):

- Offshore Petroleum Industry Guidance Note.

WA Australian Fishing Industry Council (WAFIC):

- Oil and Gas Consultation Framework.

Good practice consultation:

- IAP2 Public Participation Spectrum
- Interim Engaging with First Nations People and Communities on Assessments and Approvals under the Environment Protection and Biodiversity Act 1999.

5.3 Identification of Relevant Persons for Consultation

5.3.1 Regulations 25(1)(a), (b) and (c)

The relevant inquiry for determining relevant persons under Regulations 25(1)(a) and (b) is whether the activities to be carried out under the EP may be relevant to one of the government departments

or agencies in those Regulations. The government departments and agencies relevant to the EP are listed in Appendix F, Table 1. In accordance with Regulation 25(1)(b), Woodside consults with the Department of the relevant State Minister.

5.3.2 Identification of Relevant Persons under Regulations 25(1)(a), (b) and (c)

Woodside's methodology for identifying relevant persons under Regulations 25(1)(a), (b) and (c) is as follows:

- Woodside considers the defined responsibilities of each of the departments and agencies to which the activities to be carried out in the EMBA under the EP may be relevant. This list of relevant departments and agencies is formulated by reference to the responsibilities of the government departments, as set out on their websites, in NOPSEMA's GL1887 – Consultation with Commonwealth agencies with responsibilities in the marine area guideline (January 2024), which describes where the Department is a relevant agency under the Environment Regulations, as well as experience and knowledge that Woodside has gained from years of operating. This list is revised from time to time, for example, for the purposes of accommodating government restructures, renaming of departments, shifting portfolios and/or to account for new agencies that might arise.
- Woodside has categorised government department or agency groups as follows:

– ***Government departments / agencies – marine***	– Agencies with legislated responsibilities for use of the marine environment.
– ***Government departments / agencies – environment***	– Agencies with legislated responsibilities for the protection of the environment.
– ***Government departments / agencies – industry***	– The legislated Department of the responsible Commonwealth, State or Northern Territory Minister for Industry.

- Woodside considers each of the responsibilities of the departments and agencies, determining whether those responsibilities overlap with potential risks and impacts specific to the PAA in the EMBA. The assessment is both activity and location based.
- Woodside acknowledges the roles and responsibilities of government departments and agencies acting on behalf of various industry participants. For example, AMSA – Marine Safety is responsible for the safety of vessels and the seafarers who are operating in the domestic commercial shipping industry; and AHO is responsible for maritime safety and Notices to Mariners. To undertake the PAP in a manner that prevents a substantially adverse effect on the potential displacement of marine users, Woodside therefore consults AMSA – Marine Safety and AHO on its proposed activities. Woodside considers each of the responsibilities of the departments and agencies and determines those that would either be involved in the incident response itself or in relation to the regulatory or decision-making capacity with respect to planning for the unlikely event of a worst-case hydrocarbon release incident response specific to the Operational Area. Feedback received, if any, is assessed in accordance with the intended outcome of consultation.
- The list of government departments and agencies assessed as relevant is set out in Appendix F, Table 1.
- Feedback received, if any, is assessed in accordance with the intended outcome of consultation and summarised at Appendix F, Table 2 and Table 3 as appropriate to the relevance assessment.

Woodside does not consult with departments or agencies with interests that do not overlap with risks and impacts specific to the PAA in the EMBA or would not be involved in incident response planning.

5.3.3 Regulation 25(1)(d)

To identify a relevant person for the purposes of Regulation 25(1)(d), the meaning of "*functions, interests or activities*" needs to be understood. In Regulation 25(1)(d), the phrase "*functions, interests or activities*" should be construed broadly and consistently with the objects of the Environment Regulations (Regulation 4) and the objects of the *EPBC Act* (section 3A).

In developing its methodology for consultation, Woodside acknowledges the guidance below from NOPSEMA's *GL2086 – Consultation in the course of preparing an environment plan guideline* (May 2023):

- functions: refers to a power or duty to do something
- interests: conforms to the accepted concept of 'interest' in other areas of public administrative law and includes any interest possessed by an individual whether or not the interest amounts to a legal right or is a proprietary or financial interest or relates to reputation
- activities: broader than the definition of 'activity' in Regulation 5 of the Environment Regulations and is likely be directed to what the relevant person is already doing.

Woodside's methodology for determining 'relevant persons' for the purpose of Regulation 25(1)(d) includes consideration of:

- whether a person or organisation has functions interests or activities that overlap with the Operational Area or PAA, and EMBA
- whether a person or organisation's functions, interests or activities may be affected by Woodside's proposed planned or unplanned activities.

5.3.4 Identification of Relevant Persons under Regulation 25(1)(d)

Relevant persons under Regulation 25(1)(d) are defined as a person or organisation whose functions, interests or activities may be affected by the activities to be carried out under the EP. In identifying relevant persons, Woodside considers:

- the planned activities to be carried out under the EP (described in Section 3)
- the EMBA by unplanned activities (identified in Section 4 and assessed in Section 6).

To identify relevant persons who fall within Regulation 25(1)(d), Woodside adopts the following methodology and then undertakes consultation with relevant persons.

As a general proposition, Woodside assesses whether a person or organisation is a relevant person having regard to:

- whether a person or organisation has functions, interests or activities that overlap with the Operational Area or PAA, and EMBA
- whether a person or organisation's functions, interests or activities may be affected by Woodside's proposed planned or unplanned activities to be carried out under the EP.

This assessment will include applying judgement, knowledge and considering available, relevant literature.

To assist in identifying the full range of relevant persons, Woodside considers the impacts and risks associated with its proposed activities and considers the broad categories of relevant persons who may be affected by the activities to be carried out under the EP. The broad categories are identified in Table 5-1 and identification methodology applied as set out in Table 5-1.

The list of those persons or organisations assessed as relevant persons or organisations Woodside separately chose to contact is set out in Appendix F, Table 1.

Feedback received, if any, is assessed in accordance with the intended outcome of consultation and applying the categories of relevant persons methodology outlined in Table 5-3, as appropriate.

Feedback from relevant persons is summarised at Appendix F, Table 2. Feedback from persons assessed as "not relevant" but whom Woodside chose to contact, or self-identified and Woodside assessed as "not relevant", are summarised at Appendix F, Table 3.

Table 5-1: Categories of relevant persons

Category	Explanation
Commercial fisheries (Commonwealth and State) and peak representative bodies	Commonwealth or State Commercial Fishery with a fishery management plan recognised under the *Commonwealth Fisheries Management Act 1991* (Cth) and the *Western Australian Fish Resources Management Act 1994* (WA), which may be amended from time to time. Commonwealth peak fishery representative bodies are identified by AFMA. WAFIC is the peak representative body for state fishers in Western Australia.
Recreational marine users and peak representative bodies	Charter boat, tourism and dive operators identified by DPIRD specific to the location of the proposed activity. Representative bodies are the recognised peak organisation(s) for recreational marine users.
Titleholders and operators	Registered holder of an offshore petroleum title or GHG title under the OPGGS Act and associated Regulations.
Peak industry representative bodies	Recognised peak organisation(s) for the oil and gas sector.
Traditional Custodians (individuals and/or groups/entity)	Traditional Custodians are First Nations Australians with cultural rights and interests or cultural functions or who perform cultural activities over particular lands and waters. Where a First Nations person, group or entity self-identifies and asserts cultural rights, functions, interests or activities they will be considered under the definition of Traditional Custodian for the purpose of this EP (as appropriate).
Nominated Representative Corporations	Nominated representative corporations are Traditional Custodians' nominated representative institutions such as Prescribed Bodies Corporate (PBC). PBCs are established under the Native Title Act 1993 (Cth) by Traditional Custodians to represent their entire Traditional Custodian group (defined broadly by reference to descents from an ancestor set who were known to be the Traditional Custodians at the time of European colonisation) and their interests including, among other things, management and protection of cultural values.
Native Title Representative Bodies	A Representative Aboriginal/Torres Strait Islander Bodies (RATSIB) is a regional organisation appointed under the Native Title Act 1993 with prescribed functions, set out in Part 11 of the Native Title Act 1993, which relate to: facilitation and assistance; certification; dispute resolution; notifications; agreement making. They are also known, and referred to here, as Native Title Representative Bodies.
Historical heritage groups or organisations	Legislated or government enlisted groups or organisations responsible for the management of marine heritage.
Local government and recognised local community reference/liaison groups or organisations	Local government body formed under the Local Government Act 1995 (WA) which is responsible for representing the local community. Recognised local community reference or liaison group or organisation in relation to oil and gas matters.
Other non-government groups, organisations or individuals	Non-government organisation with public website material targeting the proposed activity.

Category	Explanation
	Individual who demonstrates the proposed activity could potentially impact their interests, functions or activities.
Research institutes and local conservation groups or organisations	Research institutes are government or private institutions that conduct marine or terrestrial research. Local conservation groups are local non-government organisation that regularly conduct conservation activities focused on the local environment or wildlife.

Table 5-2: Methodology for identifying relevant persons within the environment that may be affected undertaken under Regulation 25(1)(d) – by category

Category	Relevant Person Identification Methodology
Commercial fisheries (Commonwealth and State) and peak representative bodies	Woodside assesses relevance for commercial fisheries (Commonwealth and State) and their representative bodies using the following next steps in its methodology: • Defining the parameters having regard to timing, location and duration of the proposed petroleum activity. • Confirming whether the EMBA overlaps with the fisheries management area (i.e., the spatial area the fishery is legally permitted to fish in) (see Section 4.10.1). • Woodside acknowledges WAFIC's consultation guidance[30], that Titleholders develop separate consultation strategies for significant unplanned events (for example an oil spill) where titleholders can demonstrate the likelihood of such events occurring is extremely low. WAFIC's guidance is that consultation on unplanned events resulting in an emergency scenario should only be undertaken if an incident occurs. • For Commonwealth and State commercial fisheries, Woodside assesses the potential spatial and temporal extent for interaction with the fishery by reviewing AFMA, ABARES and DPIRD FishCube data within the Operational Area and EMBA (see Section 4.10.2). Assessment of relevance: • State commercial fisheries that have been assessed as having a potential for interaction within the Operational Area or EMBA (see Section 4.10.2) are assessed as relevant to the proposed activity. However, to avoid over consulting and as requested in WAFIC's guidance, Woodside only consults individual licence holders based on WAFIC's advice. Woodside also utilises WAFIC's consultation service whereby WAFIC: – directly consults fishery licence holders that are assessed as having a potential for interaction in the Operational Area – consults fisheries that are assessed as having a potential for interaction in the EMBA only in the event of an unplanned emergency scenario. • Commonwealth commercial fisheries that have been assessed as having a potential for interaction within the Operational Area or EMBA (see Section 4.10.1) are assessed as relevant to the proposed activity. • If Woodside has identified that a Commonwealth or State fishery is a relevant person, then Woodside also consults the fisheries relevant representative body. For example, WAFIC represents the interests of State fisheries in Western Australia. If a State fishery is identified as relevant, Woodside would also identify WAFIC as relevant. Recognised Commonwealth fishery representative bodies are identified by AFMA via its website. WAFIC is the only recognised State fishery representative body.
Recreational marine users and peak representative bodies	Woodside assesses relevance for recreational marine users and peak representative bodies using the following next steps in its methodology: • Using Woodside knowledge and operating experience, apply knowledge of recreational marine users in the area. This assessment is both activity and location based.

[30] Consultation Approach for Unplanned Events – WAFIC.

Category	Relevant Person Identification Methodology
	• Define the parameters having regard to timing, location and duration of the proposed petroleum activity. • Assess the potential spatial and temporal extent for interaction with recreational marine users by reviewing DPIRD FishCube data to assess whether there has been activity within the EMBA in the past 5 years. Assessment of relevance: • Recreational marine users that have been active in the past 5 years within the EMBA are assessed as relevant to the proposed activity. Woodside is provided with the contact details of charter, boat tourism and dive operators specific to the region of the EMBA by DPIRD to consult with the relevant persons. • If Woodside has identified recreational marine users as relevant persons, then Woodside also consults identified peak recreational marine user representative bodies. For example, Recfishwest represents the interests of recreational fishers. These representative bodies are identified via Woodside's existing consultation list, which is updated as appropriate via advice from known groups and DPIRD.
Titleholders and Operators	Woodside assesses relevance for other Titleholders and operators using the following steps in its methodology: • Use GPInfo to determine overlap with other Titleholders or Operators permit areas within the EMBA. • Using Woodside knowledge and operating experience, apply knowledge of other operators in the area. • Woodside produces a map showing the outcome of this assessment. Assessment of relevance: • Titleholders and Operators whose permit areas are identified as having an overlap within the EMBA are assessed as relevant.
Peak industry representative bodies	Woodside assesses relevance for peak industry representative bodies using the following steps in its methodology: • Review of peak industry representative bodies responsibilities that Woodside actively participates in, with consideration of overlap between industry focus area and Woodside's proposed activities within the EMBA. • Review of Woodside's existing consultation list. • Website search to identify whether any additional peak industry representative bodies have been created whose responsibilities may overlap with Woodside's proposed activities within the EMBA. Assessment of relevance: • Peak industry representative bodies whose responsibilities are identified as having an overlap with Woodside's proposed activities within the EMBA are assessed as relevant.
Traditional Custodians (individuals and/or groups/entity) and Nominated Representative Corporations	Consistent with its understanding of the matters discussed in Section 4.9, to identify Traditional Custodian groups or individuals, Woodside: • uses existing systems of recognition to identify First Nations groups who overlap or are coastally adjacent to the EMBA (for example, recognition provided under Native Title or cultural heritage legislation, or marine park management plans, or identification by other First Nations groups or entities) • notifies and invites consultation with First Nations people through their nominated representative corporation (for example PBCs); or, in the case of native title and where appropriate, the Native Title Representative Body • requests the nominated representative body to forward the notifications and invitations to consult to their members (members are individual communal rights holders • requests advice as to other First Nations groups or individuals that should be consulted • advertises widely so as to invite self-identification and consultation by First Nations groups and individuals.

Category	Relevant Person Identification Methodology
	Further detail to Woodsides methodology is as follows: • Woodside uses the databases of the National Native Title Tribunal to understand: – whether there are any Native Title Claims (historical or current) or determinations overlapping or coastally adjacent to the EMBA – whether there are any relevant Indigenous Land Use Agreements (ILUA), registered with the National Native Title Tribunal that overlap or are adjacent to the EMBA that may identify Traditional Custodians or representative bodies to contact regarding potential cultural values. • Where there is a positive determination of Native Title, contacting the PBC or, where their representative is a Native Title Representative Body, contacts the Native Title Representative Body. • Where appropriate, contacting the relevant Native Title Representative Body to request a list of any First Nations groups asserting Traditional Custodianship over an area of coastline adjacent to the EMBA. • Review of Commonwealth and State Marine Park Management Plans that overlap the EMBA which may identify Traditional Custodians or representative bodies to contact regarding potential cultural values. • In Victoria, using the Victorian Aboriginal Heritage Council data to determine whether there are any Registered Aboriginal Parties (RAP) appointed under the Aboriginal Heritage Act 2006 (Vic), that overlap or are adjacent to the EMBA. • First Nations groups or individuals are identified by a Traditional Custodian, nominated representative corporation, Native Title Representative Body. • Request to the PBC to distribute Woodside consultation materials through its membership. Woodside is unable to contact this membership through any other means. • Woodside has a number of public notification and information sharing processes by which individual Traditional Custodians can become aware of the proposed activity, its risks and impacts, and self-identify. • Individuals that consider their functions, interests or activities may be affected by a proposed activity are provided an opportunity to self-identify for each EP. Woodside does not presume that self-identification for an activity, covered by another EP, automatically means that an individual/s functions, interests and activities may be affected by other activities where EMBAs overlap. This decision is for the individual to make. The public notification, information sharing, and consultation processes Woodside puts in place enables Traditional Custodians to become aware of proposed activities, assess risks and impacts to their values, and enable individuals to self-identify. Assessment of relevance: • Traditional Custodian groups, entities or individuals and Nominated Representative Corporations who are identified through the above methodology and overlap or are coastally adjacent to the EMBA are assessed as relevant.
Native Title Representative Bodies	Woodside assesses relevance for Native Title Representative Bodies using the following steps in its methodology: • A Representative Aboriginal/Torres Strait Islander Body (RATSIB) is a regional organisation appointed under the Native Title Act 1993 with prescribed functions set out in Part 11 of the Native Title Act 1993, which relate to: facilitation and assistance; certification; dispute resolution; notifications; agreement making. They are also known, and referred to here, as Native Title Representative Bodies. • Review of National Native Title Tribunal RATSIB areas that overlap or are coastally adjacent to the EMBA. Assessment of relevance: • Where the area for which a Native Title Representative Body is recognised under the Native Title Act 1993, overlaps with the EMBA or is coastally adjacent to the EMBA, Woodside will assess the Native Title Representative Body as relevant.

Category	Relevant Person Identification Methodology
Historical heritage groups or organisations	Woodside assesses relevance for groups or organisations whose responsibilities are focused on historical heritage using the following steps in its methodology: • Use the Australasian Underwater Cultural Heritage Database to assess known records Maritime Cultural Heritage sites (shipwrecks, aircraft and relics) within the EMBA (see Section4.9.8). Assessment of relevance: • Where there is a known underwater heritage site (shipwrecks, aircraft and relics) within the EMBA, the relevant group or organisation that manages the site will be assessed as relevant.
Local government and recognised local community reference/liaison groups or organisations	Woodside assesses relevance for local government and recognised local community reference/liaison groups or organisations using the following steps in its methodology: • Review of Woodside maps (developed based on data from the WA Local Government, Sport and Cultural Industries 'My Council' database and WA Local Government Association (WALGA) Local Government Directory maps to assess overlap between the local government's defined area of responsibility and the EMBA. • Woodside hosts regular community reference/liaison group meetings. Members represent a cross-section of the community and local towns interests. Representatives are from community and industry and generally include, Woodside, State Government (for instance relevant Regional Development Commissions), Local Government, Indigenous Groups, Industry representative bodies, community and industry organisations. Woodside considers these reference/liaison groups to be the appropriate recognised representatives of the local community for the oil and gas sector. • Woodside reviews the community reference/liaison group's terms of reference to determine its area of responsibility and overlap with the EMBA. For example, the Exmouth Community Liaison Group's area of responsibility in relation to Woodside's operational, development and planning activities, is defined in the terms of reference as the Exmouth sub-basin. Comparatively, the Karratha Community Liaison Group's area of responsibility is the Pilbara region (i.e., onshore). Assessment of relevance: • The local government whose defined area of responsibility overlaps the EMBA is assessed as relevant. • The community reference/liaison group whose defined area of responsibility overlaps the EMBA is assessed as relevant and consulted collectively via the relevant reference/liaison group.

Category	Relevant Person Identification Methodology
Other non-government groups, organisations or individuals	Woodside assesses relevance for other non-government groups, organisations or individuals using the following steps in its methodology: • Review of Woodside's existing consultation list. • Website search of registered non-government groups or organisations (i.e., registered with an Australian Business Number (ABN) and publicly available contact information) that may have public website and/or social media material specific to the proposed activity at the time of development of the EP. • Organisation has a publicly available statement (or purpose) that clearly describes its collective functions, interests or activities. • Review of current website and/or social media material to identify targeted information which demonstrates functions, interests or activities relevant to the potential risks and impacts associated with planned activities associated with the EMBA. • Review of an organisations/individual's feedback to consider whether their functions, interests or activities within the EMBA may be affected by the activities to be carried out under the Environment Plan. Considering interests outside the EMBA would be considered too remove and contrary to the purpose of Environment Plan consultation. Assessment of relevance: • Registered non-government groups or organisations with current targeted public material specific to the proposed activity at the time of developing the EP and who have demonstrated functions, interests or activities relevant to the potential risks and impacts associated with planned activities in accordance with the intended outcome of consultation will be assessed as relevant. • Individual demonstrates their functions, interests or activities may be impacted will be assessed as relevant.
Research institutes and local conservation groups or organisations	Woodside assesses relevance for research institutes and local conservation groups or organisations using the following steps in its methodology: • Review of Woodside's existing consultation list. • Website search for research institutes that may operate within the EMBA. This assessment is both activity and location based. • Website search for local conservation groups or organisations that regularly conduct conservation activities within the EMBA. Assessment of relevance: • Where there is known research being undertaken by a research institute within the EMBA, the research institute that is conducting the research will be assessed as relevant. • Local environmental conservation groups who regularly conduct conservation activities or have demonstrated conservation functions, interests or activities within the EMBA are assessed as relevant. This assessment is both activity and location based.

5.3.5 Regulation 25(1)(e)

In addition to assessing relevance under Regulation 25(1)(d), Woodside has discretion to categorise any other person or organisation as a relevant person under Regulation 25(1)(e).

5.3.6 Identification of Relevant Persons under Regulation 25(1)(e)

Woodside adopts a case-by-case approach for each EP to assess relevance under Regulation 25(1)(e).

5.3.7 Persons or Organisations Woodside Chooses to Contact

In addition to undertaking consultation with relevant persons under Regulation 25(1), from time to time there are persons or organisations that Woodside chooses to contact in relation to a proposed activity. For example, these are persons or organisations:

- that are 'not relevant' pursuant to Regulation 25(1) but that Woodside has chosen to seek additional guidance from, for example, to inform the correct contact person that Woodside should consult, or engage with
- that are 'not relevant' pursuant to Regulation 25(1) but have been contacted as a result of consultation requirements changing or updated guidance from the Regulator
- where it is unclear what their functions, interests or activities are, or whether their functions, interests or activities may be affected. In this circumstance, engagement is used to inform relevance under Woodside's methodology. Woodside follows the same methodology for assessing a person or organisations relevance as it does during its initial assessment (as described in Figure 5-2 and Section 5.3). The result of Woodside's assessment of relevance during the development of the EP is outlined at Appendix F, Table 1.

5.3.8 Assessment of Relevant Persons for the Proposed Activity

The result of Woodside's assessment of relevant persons in accordance with Regulation 25(1) is outlined at Appendix F, Table 1 and Table 2.

Persons or organisations that Woodside assessed as not relevant but chose to contact at its discretion in accordance with Section 5.3.4, or who self-identified and Woodside assessed as not relevant, are summarised at Appendix F, Table 1 and Table 3.

5.4 Consultation Material and Timing

Regulation 25(2) provides that a titleholder must give each relevant person sufficient information to allow the relevant person to make an informed assessment of the possible consequences of the activity on the functions, interests or activities of the relevant person. Regulation 25(3) provides that the Titleholder must allow a relevant person a reasonable period for the consultation.

As set out in Section 5.2, Woodside notifies relevant persons of the proposed activities, respecting that consultation is voluntary, and collaborates on a consultation approach where further engagement is sought by the relevant person. The consultation process aims to be appropriate for the category of relevant persons and not all persons or organisations will require the same level of engagement. Woodside recognises that the level of engagement is dependent on the nature and scale of the PAA and PAP. Woodside acknowledges published guidance for good practice consultation, relevant to different sectors and disciplines. Woodside's methodology for providing relevant persons with sufficient information as well as a reasonable period of time to provide feedback is set out in this section.

5.4.1 Sufficient Information

Woodside produces a Consultation Information Sheet for each EP. This is provided to relevant persons and organisations and is also available on Woodside's website for interested parties to access and to provide feedback on. The Consultation Information Sheet typically includes:

- a description of the proposed petroleum activity
- the Operational Area or PAA, dependant on the EP
- where the activity will take place
- the timing and duration of the activity

- a location map of the Operational Area or PAA, and EMBA
- a description of the EMBA
- relevant exclusion zones
- a summary of relevant risks and mitigation and management control measures relevant to the proposed petroleum activity.

It also sets out contact details to provide feedback to Woodside.

The level of information necessary to assist a person or organisation to understand the impacts of the proposed activity on their functions, interests or activities may vary and may depend on the degree to which a relevant person is affected. For example, Woodside considers that relevant persons who may be impacted by planned activities in the PAA, as a result of temporary displacement due to exclusion zones, may require more targeted information relevant to their functions, interests or activities. Sufficient information may have been provided to a relevant person even where all documents requested by a relevant person have not been provided. Woodside acknowledges NOPSEMA's brochure titled Consultation on offshore petroleum environment plans information for the community, which advises persons being consulted that they may inform titleholders that they only want to be consulted in the very unlikely event of an oil spill.

Woodside places advertisements in selected local, state and national newspapers. This typically includes:

- the name of the EP Woodside is seeking feedback on
- an overview of the activity
- the consultation feedback date
- the ways in which a person or organisation can provide feedback.

Advertising in the local paper in the area of the activity is also consistent with the public notification process under section 66 of the Native Title Act 1993 for Native Title applications. Woodside typically aligns advertisement feedback timeframes with the timing described below. Feedback received is assessed in accordance with Section 5.3 to determine relevance and evidenced in Appendix F, Table 1 as appropriate.

Woodside uses a range of tools to provide sufficient information to relevant persons, which may include one or more of the following:

- Consultation Information Sheet available on Woodside's website and shared directly with relevant persons
- Summary Consultation Information Sheet, presentations or summaries specific to a particular relevant person group
- subscription available on Woodside's website to receive notification of new Consultation Information Sheets for Woodside EPs
- emails
- letters
- phone calls
- face-to-face meetings (virtual or in person) with presentation slides or handouts as appropriate
- Let's Talk newsletter – digital and hard copy
- maps outlining a person or organisation's defined area of responsibility in relation to the proposed activity, for example a fisheries management area or defence training area

- community meetings, as appropriate
- attendance at on-the-ground community events or planned regional roadshows
- broader awareness campaigns on the how to be involved in the EP consultation process.

Woodside recognises that information may be provided to relevant persons in an iterative manner during the consultation process. Woodside considers that genuine two-way engagement may be demonstrated via information on incorporation of controls, where applicable, being provided to the relevant person so that the relevant persons understand how their input has been considered in the development of the EP.

Woodside communicates with relevant persons in different ways. Woodside recognises that, as part of genuine two-way dialogue, these forms of communication may evolve including, for example, due to changes to organisation representation, as relationships are further established, or a preference for an alternative form of communication is expressed by a person or organisation. There might be limitations in how Woodside can consult with relevant persons.

Typical forms of communications for categories of relevant persons are set out in Table 5-3.

Table 5-3: Forms of communication with relevant persons

Category of Relevant Person	Typically Accepted Form of Communication
Government departments/ agencies – marine	Woodside applies NOPSEMA's guideline for engagement with Commonwealth government departments or agencies GL1887 – Consultation with Commonwealth agencies with responsibilities in the marine area – January 2023 by using email for its consultation unless another form of communication is requested. Other forms of communication, such as phone calls, meetings and/or presentation briefings are used on request.
Government departments/ agencies – environment	
Government departments/ agencies – industry	
Commercial fisheries and peak representative bodies	Commonwealth commercial fisheries: Email is used as the primary form of communication with Commonwealth commercial fisheries in the ordinary course of business. Other forms of communication, such as phone calls, and meetings and/or presentation briefings are used on request. State commercial fisheries and recreational marine users: The Western Australian Department of Primary Industries and Regional Development (DPIRD) has responsibility for managing the Fish Resources Management Act 1994 and Aquatic Resources Management Act 2016, which limits the provision of contact details from the register to the name and business address of licence holders. Alternative forms of communication are at the licence holder's discretion. Other forms of communication, such as phone calls, and meetings and/or presentation briefings are used on request. Peak representative bodies: Email is used as the primary form of communication with commercial fishery and recreational marine user peak representative bodies in the ordinary course of business. Other forms of communication, such as phone calls, and meetings and/or presentation briefings are used on request.
Recreational marine users and peak representative bodies	
Titleholders and Operators	Email is used as the primary form of communication between titleholders and operators in the ordinary course of business. Other forms of communication, such as phone calls, and meetings and/or presentation briefings are used on request.
Peak industry representative bodies	Email is used as the primary form of communication with peak representative bodies in the ordinary course of business. Other forms of communication, such as phone calls, and meetings and/or presentation briefings are used on request.
Traditional Custodians and nominated representative corporations	There are many forms of communication that Woodside uses on a case-by-case basis and as appropriate to or requested by the specific group, such as email, phone calls, meetings and community forums. Other forms of communication are used on request.
Native Title Representative Bodies	There are many forms of communication that Woodside uses on a case-by-case basis and as appropriate to or requested by the specific group, such as email,

Category of Relevant Person	Typically Accepted Form of Communication
	phone calls, meetings and community forums. Other forms of communication are used on request.
Historical heritage groups or organisations	NOPSEMA's guideline (GL1887 – Consultation with Commonwealth agencies with responsibilities in the marine area – January 2023) for engagement with government departments or agencies is used as a reference for Woodside's approach for communicating with historical heritage groups or organisations. Other forms of communication, such as phone calls, and meetings and/or presentation briefings are used on request.
Local government and recognised local community reference/liaison groups or organisations	Local government: NOPSEMA's guideline (GL1887 – Consultation with Commonwealth agencies with responsibilities in the marine area – January 2023) for engagement with local government is used as a reference for Woodside's approach for communicating with historical heritage groups or organisations. Community reference/liaison groups and chambers of commerce: Email and presentations are used as the primary form of communication with local community reference/liaison groups or organisations in the ordinary course of business. Other forms of communication, such as phone calls, and meetings and/or presentation briefings are used on request.
Other non-government groups or organisations	Email is used as the primary form of communication with Other non-government groups or organisations. Other forms of communication, such as phone calls, and meetings and/or presentation briefings are used on request.
Research Institutes and Local conservation groups or organisations	Email is used as the primary form of communication with research institutes and local conservation groups or organisations. Other forms of communication, such as phone calls, and meetings and/or presentation briefings are used on request.

Information which is provided to relevant persons for the purposes of consultation on this EP is summarised at Appendix F, Table 2.

Appendix F, Table 3 sets out the information which is provided to persons or organisations that are not relevant for the purposes of Regulation 25 but which Woodside has chosen to contact.

When engaging in consultation, Woodside notifies relevant persons that, in accordance with Regulation 25(4), the relevant person may request that the titleholder notifies NOPSEMA that particular information the person or organisation provides in the consultation not be published, and that information subject to that request will not be published under the Environment Regulations.

5.4.2 Reasonable Period for Consultation

Woodside seeks to consult in order to support preparation of its EP. Woodside recognises that what constitutes a reasonable period for consultation should be considered on a case-by-case basis, with reference to the nature, scale and complexity of the activity.

Woodside recognises that information may need to be provided to relevant persons in an iterative manner during the consultation process. Woodside considers that genuine two-way engagement may be demonstrated via information on incorporation of controls, where applicable, being provided to the relevant person so that the relevant person understands how their input has been considered in the development of the EP.

Woodside's methodology allows relevant persons a reasonable period for consultation (Regulation 25(3)). A reasonable period for all relevant persons, including Traditional Custodians, to participate in consultation for this EP has been provided.

The consultation period under this EP has satisfied benchmark periods under other relevant legislative processes:

- Regulation 30 sets out a public consultation period of 30 days.

- The Department of Mines, Energy and Petroleum (DEMIRS) "*Guidelines for Consultation with Indigenous People by Mineral Explorers*" directs a period of 21 to 30 days of consultation with traditional owners.
- While repealed, guidance taken from the *Aboriginal Cultural Heritage Act 2021 – Consultation Guidelines* (Government of Western Australia, 2023) suggests that up to 12 weeks may be a reasonable period to allow identification, contact and response from First Nations peoples (subject to any alternative timeframe being agreed through co-design of consultation).

This period of consultation demonstrates that Woodside has provided a "*reasonable period*" for relevant persons to consult in accordance with Regulation 25(3). Commentary in the *Tipakalippa Appeal* judgment limits consultation to a process that must be capable of being discharged within a reasonable time:

"it must be taken to be the regulatory intention that the consultation requirement cannot be one that is incapable of being complied with within a reasonable time..."[31]

Woodside seeks feedback in order to support preparation of its EP. What constitutes a reasonable period for consultation is considered on a case-by-case basis, with reference to the person being consulted and the nature, scale and complexity of the activity.

Woodside's typical approach to providing a reasonable period for consultation is as follows:

- advertising in selected local, state and national newspapers to give persons or organisations the opportunity to understand the activity and identify whether their functions, interests or activities may be affected
- providing consultation materials directly to identified relevant persons as well as persons who are not relevant but Woodside chose to contact and providing a target date for feedback; Woodside acknowledges that feedback may be received from relevant persons following the target date
- acknowledging that the way in which Woodside provides consultation information may vary depending on the relevant person or organisation and, may depend on the degree to which a relevant person or organisation is affected; different consultation processes may be required for relevant persons and organisations depending on the information requirements
- following up with relevant persons prior to EP submission; where possible, Woodside will endeavour to use an alternative method of communication to contact the relevant person
- engaging in two-way dialogue with relevant persons or organisations where feedback is received.

Appendix F, Table 2 and Table 3 sets out a history of ongoing consultation and demonstrates that a reasonable period of consultation has been provided.

Woodside considers that consultation for this EP has closed.

As detailed in Section 5.6, if comments and feedback are received after the EP has been submitted, Woodside will consider those comments and update controls as appropriate and at all stages of the life of the EP as per Woodside's ongoing consultation approach described in Section 5.7.

5.4.3 Discharge of Regulation 25

The Full Federal Court made clear in the *Tipakalippa Appeal* that consultation should be approached in a "*reasonable*", "*pragmatic*" and "*not so literal*" way, so that consultation obligations were capable

[31] Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193 at paragraph [136].

of being met by Titleholders (Section 5.5.1).[32] Consultation is a "*real world activity*" and must be capable of reasonable discharge.[33] The Full Federal Court referred to Native Title cases as an illustration that reasonable limits should be applied to consultation efforts to ensure the process is workable.[34]

When the Titleholder demonstrates that it has provided sufficient information and a reasonable period for consultation, then Regulation 25 consultation requirements are met.[35] Meeting these obligations requires evaluative judgement to determine reasonable satisfaction of the consultation obligation and, as such, the Regulator uses its discretion to determine if this criteria are met. The nature of the person being consulted and their function, interest and activity that may be affected, will inform the manner of consultation and the reasonable period to be afforded.[36]

While a Titleholder is required to provide an opportunity to consult, the titleholder is not required to obtain consent to engage in the activity from a person being consulted, or confirmation from a person being consulted, that consultation is complete. The Federal Court has commented that a "reasonable opportunity" for consultation must be afforded to relevant persons.[37] A reasonable opportunity may not be every opportunity requested and is limited to reasonable opportunities to consult.

Woodside has completed steps required to discharge its consultation obligations. Woodside has provided sufficient information and a reasonable period of time to enable relevant persons to make an informed assessment of the possible consequences of the activity on their functions, interests or activities; and sufficient time to provide relevant feedback for Woodside to assess relevant persons objections or claims. Woodside has also provided a reasonable opportunity for there to be genuine two-way dialogue on a person's claims or objections.

Woodside has discharged its duty under Regulation 25 and considers that is complete.

Appendix F, Table 2 and Table 3 of this EP sets out the history of consultation under Regulation 25. To the extent a relevant person says that they have further information to share or claims that consultation under Regulation 25 has not been completed, Appendix F, Table 2 and Table 3 provide reasons why Woodside considers consultation under Regulation 25 has been met, in relation to that relevant person.

5.5 Context of Consultation Approach with First Nations

To comply with Regulation 25, Woodside identifies and consults Traditional Custodians whose functions, interests or activities may be affected by the activities under an EP.

5.5.1 Approach to Methodology − Woodside's Interpretation of Tipakalippa Appeal

Woodside has implemented a consultation methodology consistent with Regulation 25 and guidance provided in the *Tipakalippa Appeal*. Woodside's consultation methodology allows for a sufficiently broad capture of Traditional Custodian relevant persons, provides for informed consultation, follows cultural protocols and allows a reasonable opportunity for consultation with Traditional Custodians whose functions, interests or activities may be affected by the activity described in this EP.

Woodside notes the Full Federal Court discussed several *Native Title Act 1993* (Cth) cases in response to a submission made in that case that a requirement under Regulation 25 to consult "*each and every*" relevant person would be "*unworkable*". The reference to Native Title cases dealt with

[32] Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193 [89], [98], [103]-[104] and [109].
[33] Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193 at [89].
[34] Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193 at [96] and [103].
[35] Explanatory Statement, Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, page 29.
[36] Explanatory Statement, Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, page 30 and Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193 at [153].
[37] Cooper v National Offshore Petroleum Safety and Environmental Management Authority (No 2) [2023] FCA 1158 at paragraph [11]; Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193 at [153].

how decision-making processes under the NTA requiring "*all*" members of a group to be contacted for communal approval are interpreted by courts in a "*reasonable*", "*pragmatic*" and "*not so literal*" way,[38] and how obligations to consult "each and every" person under Regulation 25 should be interpreted in a similarly pragmatic way, so that consultation is workable. The reference to NTA authorities was made by analogy:

"It can be seen that the terms of [the native title legislation] are somewhat absolute – "all". However, [the native title legislation] has consistently been construed in a way that is not so literal … The cases concerning [the native title legislation] … have reiterated … that [the native title legislation] does not require that "all" of the members of the relevant claim group be involved in the decision. The key question will be whether a reasonable opportunity to participate in the decision-making process has been afforded by the notice for a relevant meeting."[39]

"We consider the authorities in relation to processes under the NTA to be ***illustrative*** *of how a seemingly rigid statutory obligation to consult persons holding a communal interest may operate in a workable manner"*[40] *(emphasis added).*

"there is no definition of what constitutes "consultation for the purpose of Reg11A [now Regulation 25] ... A titleholder will need to "demonstrate" to NOPSEMA that what it did constituted ***consultation appropriate and adapted*** *to the nature of the interests of the relevant persons"*[41] *(emphasis added).*

The Judgment in the *Tipakalippa Appeal* makes it clear that a Titleholder will have some decisional choice in identifying which person(s) are to be approached, how the information will be given to allow the "*relevant person*" to assess the possible consequence of the proposed activities on their functions, interests or activities, and how the requisite consultation is undertaken.[42] Consultation is not fixed to a rigid process and will be adapted so that it is informed by the relevant person or group. Woodside has met its Regulation 25 requirements through its consultation methodology (Section 5.5.2).

Consistent with the *Tipakalippa Appeal*, Woodside considers NTA-style "*full group*" meetings are not required for there to be compliance with Regulation 25. Nominated representative corporations (such as PBCs established under the NTA) have a designated role of representing the views of their member Traditional Custodians. They have established methods for engaging with their own members. Woodside will not undermine the purpose and authority of nominated representative corporations by requiring full group meetings where the nominated representative corporations have not requested engagement of members via full group meetings. It is not appropriate for titleholders to direct or challenge the nominated representative corporations on how to engage with their members.

Woodside's approach described below demonstrates that sufficient information and a reasonable opportunity is provided to individual Traditional Custodians to provide feedback on Woodside activities beyond the opportunity provided to nominated representative corporations.

5.5.2 Consultation Method

Woodside's First Nations team has experience in engaging and working with First Nations organisations and individuals, including within the Commonwealth Native Title and cultural heritage systems, and state and territory cultural heritage and land rights systems. The team understands the complexities of making information accessible to groups and individuals and engaging in accordance with First Nations groups' established channels of communication and methods of consultation. The

[38] Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193 at paragraph [95], [98], [103]-[104] and [109].
[39] Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193 at paragraph [98].
[40] Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193 at paragraph [96].
[41] Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193 at paragraph [104].
[42] Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193 at paragraph [47] and [48].

First Nations team exercises its professional judgement and is respectful of long-standing relationships (where in place) when considering consultation with First Nations groups. The First Nations team's approach is also informed by the established systems of recognition for First Nations groups and their nominated representative corporations within particular jurisdictions. For example, the methodology for engaging with First Nations groups in the Northern Territory (not relevant for this EP) tends to centre around engagement through Aboriginal land councils (under the *Aboriginal Land Rights (Northern Territory) Act 1976* (Cth)) as well as community meetings that target clan groups where they do not have PBCs or other nominated representative corporations to represent them.

By contrast, recognition for First Nations groups and their nominated representative corporations in Western Australia falls under the *Native Title Act 1993* (Cth) because the vast majority of the Western Australian coastline is settled under the Native Title regime. This means that the methodology and process for consultation in Western Australia places greater emphasis on, but is not limited to, Native Title Representative Bodies and PBCs.

Native Title determinations provide certainty about the appropriate Traditional Custodian groups that have the cultural authority to speak for country adjacent to the EMBA and help Woodside to identify Traditional Custodian persons and groups asserting Traditional Custodianship. The Judgment in the *Tipakalippa Appeal* endorses methods of consultation with groups of relevant persons that are appropriate and adapted to the characteristics of groups.[43] Woodside's consultation methodology is adapted and appropriate to the recognised systems of communal interests in Western Australia.

In Western Australia (relevant for this EP), Woodside has sought to follow the established, effective and respectful means of communication used by Native Title Representative Bodies and nominated representative corporations (including PBCs) with their respective First Nations communities. Woodside follows these processes for the appropriate broad capture of individuals' awareness of our activities, to self-identify (Section 5.5.4), and to provide feedback to inform the management of environmental impacts and risks.

Using these processes, Woodside communicates information about EPs by:

- Advertising in relevant newspapers – This encourages self-identification, by advertising proposed activities widely through newspapers that have national and intra-state circulation; i.e., Koori Mail, National Indigenous Times, The West Australian.
- Creating carefully considered Consultation Summary Sheets with information developed by an Indigenous member of the First Nations Team to remove jargon and provide relevant information for people to have informed understandings about the activities.
- Direct contact through nominated representative corporations.
- Utilising social media (i.e., Facebook/Instagram), texts and emails – These mediums are the preferred communication methods used by Traditional Custodians throughout Western Australia and, on that basis, used by Native Title Representative Bodies and other government agencies and industry, to engage with Traditional Custodians or call meetings. First Nations woman, Professor Bronwyn Castle, through 10 years of research found "*Social media is an intrinsic part of daily life. The use of Facebook is around 20 per cent higher [among First Nations people] than the national average across all geographical locations*" (Social media mob: being Indigenous online, Professor Bronwyn Carlson (2018)).
- For ongoing consultation post Regulation 25 consultation, Woodside has a Program of Ongoing Engagement with Traditional Custodians which sets out Woodside's commitment to ongoing engagement and support to care for and manage country, including Sea Country. The program was developed in response to Traditional Custodian feedback.

[43] Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193 at paragraph [95].[104].[153].

- Woodside has members of its First Nations team who are based in Karratha and Roebourne and who serve as on-Country points of contact for First Nations organisations and individuals. These team members have broad local knowledge and established, on-the-ground relationships within communities. This helps contribute to positive outcomes including encouraging First Nations attendance and involvement at Woodside's information sessions and Community roadshows. Team members on the ground engage in a great deal of preparatory work including by distributing information and providing notice to the community to support First Nations attendance at information sessions and Community roadshows.
- From the commencement of engagement with Traditional Custodians, Woodside seeks direction on how they prefer to be consulted and has consulted accordingly. Consultation processes that are informed by Traditional Custodians and co-designed on a case-by-case basis and includes their direction as to cultural protocols, structure of consultation and who to appropriately consult with (such as elders).
- Holding meetings on country at a place and time agreed with Traditional Custodians and offering and providing financial assistance for meeting expenses (as appropriate).
- Providing information specifically designed to be easily understood, to reach all relevant people, and give a reasonable period of time for those people to make an informed assessment of the possible consequences of the proposed activity on them.

The First Nations team approach to consultation is also consistent with the Federal Court's decision in the *Munkara Case.* The *Munkara Case* notes that the word "*culture*" (and hence the word "*cultural*") has a communal aspect to it. To establish cultural features, it is necessary that the beliefs and values are held by the relevant people as a people. For values, features or beliefs that are expressed by an individual to be "*cultural*" they cannot simply be an individual's belief - the belief must have a communal aspect too, and demonstrate that the "*individual beliefs are broadly representative of the beliefs of other members of the group*"[44]. The phrase "*cultural features*", when applied to "*people*" as constituent parts of an ecosystem, is not directed to idiosyncratic views or beliefs of an individual[45]. When the First Nations team is told that a particular value is cultural by an individual Traditional Owner, that information is taken back to the relevant cultural authority to test its broad acceptance. In the case of gender sensitive information, that information would be restricted to the specific gender within the community.

5.5.3 Identification of Relevant Persons

To undertake consultation, Woodside has developed a methodology for identifying relevant persons, in accordance with Regulation 25(1) (Sections 5.2 and 5.3).

Specific to Woodside's approach for identifying relevant Traditional Custodians, Woodside's First Nations Communities Policy and consultation approach is guided by Traditional Custodians by directing consultations through their nominated representative corporation. This has been implemented by Woodside through consultation with a nominated representative corporation, where that corporation has advised Woodside that it acts as the representative body for a Traditional Custodian group and has requested that Woodside engage with it as the representative body for that Traditional Custodian group.

Woodside asks nominated representative corporations (such as PBCs) and Native Title Representative Bodies to identify individuals that should be consulted, and enables individuals to self-identify in response to national and local advertising, social media and community engagement opportunities (Section 5.5.4). Where there is a nominated representative corporation for an area, unless directed by the nominated representative corporation, Woodside does not directly approach individuals for consultation, because this has the potential to undermine the role of the nominated

[44] Munkara v Santos NA Barossa Pty Ltd (No 3) [2024] FCA 9 at [205].
[45] Munkara v Santos NA Barossa Pty Ltd (No 3) [2024] FCA 9 at [205].

representative corporation. Approaching individuals directly is a practice that is no longer considered acceptable because of divisions it has been shown to cause in communities. In addition to asking for the identification of individuals, Woodside also asks nominated representative corporations to distribute consultation information to whomever the nominated representative corporations deem appropriate, including members of the nominated representative corporations who are communal rights holders.

Having said this, as set out in further detail in Section 5.5.4, individuals are also given the opportunity to self-identify, consult and provide their own feedback on the proposed activity. When approached in this way, Woodside will engage individuals as relevant persons and will also (subject to any confidentiality or cultural restrictions) advise the nominated representative body of the consultation where it relates to cultural values. These methods of consultation are consistent with requirements for notification under the *Native Title Act 1993 (*Cth), such as under the future act provisions (section 29), which requires notification of the Native Title Representative Body, the PBC (or nominated representative) and notification through newspapers. The notification process has been selected as a respectful, practical and pragmatic analogue for consultation with First Nations peoples, rather than requiring members to be notified via a formal authorisation process which seeks, from members, authorisation of agreements and native title/compensation claims under the *Native Title Act 1993* (Cth)[46].

In this consultation, Woodside requested nominated representative corporations to identify any potential individual relevant persons for consultation. Woodside requests nominated representative corporations to distribute consultation materials to their members. However, Woodside recognises that the process is voluntary and that it cannot compel nominated representative corporations (such as PBCs) to do so. Woodside also recognises that it would not be appropriate to seek to audit the nominated representative corporations for compliance with any member consultation request.

5.5.4 Opportunity to Self-identify and Identifying Other Individuals

Woodside requests nominated representative corporations and Native Title Representative Bodies to identify other individuals to consult with or individuals who may seek to self-identify for a proposed activity. Woodside also advertises broadly through Indigenous, national and local advertising, social media and community engagement opportunities to provide individuals with an opportunity to consult. Woodside does not directly approach individuals for consultation, as this undermines the role of the nominated representative corporations (Section 5.5.3). Woodside's approach to providing individual Traditional Custodians the opportunity to self-identify and consult for an EP is as follows:

- Woodside applies the principles of self-determination when consulting with Traditional Custodians by consulting through the Traditional Owners authorised representative entities.
- Recognising the function of nominated representative corporations (such as PBCs) and Native Title Representative Bodies to represent communal interests and manage cultural values, Woodside requests that the information provided to representative entities is provided to their members but Woodside recognises the process is voluntary and Woodside cannot compel them to do so, nor seek to audit the representative entities for compliance with any request.
- Representative entities cannot provide membership details to Woodside due to individual confidentiality requirements.
- Woodside requests advice as to who else Woodside should be consulting but recognises the process is voluntary and cannot compel nominated representative corporations to provide this information.

[46] Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193, at [104].

- Modern Indigenous engagement practises rely on the building and maintaining of respectful relationships. To date, most nominated representative corporations have requested the building of that relationship, where one is not already in place.
- While Woodside has, in some cases, approached individual directors and Elders outside of this process due to requirements imposed in EP consultation, this approach is considered inappropriate by modern Indigenous engagement standards, fundamentally undermining the authority of the authorised representative entity and can be detrimental to the relationship.

For this proposed activity, Woodside requested nominated representative corporations (including PBCs) and Native Title Representative Bodies to identify any potential individual relevant persons for consultation, and to distribute consultation materials to their member base. However, Woodside recognises the process is voluntary and it cannot compel them to do so nor seek to audit the representative entities for compliance with any request. Woodside has not been directed to engage individual Traditional Custodians by nominated representative corporations for this proposed activity. Woodside has nevertheless provided reasonable opportunity for individual Traditional Custodians to engage in consultation through appropriate and adapted consultation methods.

5.5.5 Sufficient Information

Woodside recognises that the information sufficient to allow a person or organisation to make an informed assessment of the possible consequences of the proposed activity on their functions, interests or activities may vary and may depend on the degree to which a relevant person is potentially affected.

Woodside produces Consultation Information Sheets for each EP which is provided to relevant persons and organisations for the purpose of seeking feedback on the activity (Section 5.4.1). In response to feedback from Traditional Custodians' feedback on information provisions, Woodside has tailored effective consultation methods for its activities, specifically designed for Traditional Custodians, so that information is provided in a form that is readily accessible and appropriate. The targeted Summary Information Sheet developed and reviewed by Woodside's First Nations Engagement Team and First Nations staff to ensure that content is appropriate to the intended recipients, which is then provided to relevant Traditional Custodian groups. Phone calls are made to provide context to the consultation.

Where face-to-face consultation meetings are requested, Woodside coordinates engagement at the Traditional Custodians location of choice (where practicable) and with their nominated attendees. Key project personnel, environmental and First Nations relations experts are typically present to enable effective communication and prompt response to questions. Materials for these sessions incorporate visual aids such as photos, maps and videos, and plain language suitable for people with a non-technical background.

During consultation, Woodside provides relevant persons with additional information as appropriate in response to requests. There is no requirement to provide relevant persons with all information or documents requested and a titleholder will have provided sufficient information even where it has not provided all information or documents requested.

Woodside has sought to provide sufficient information to individual members of nominated representative corporations (such as PBCs) by providing information to representative bodies and requesting dissemination with members. However, Woodside recognises consultation is voluntary and it cannot compel them to do so, nor would it be appropriate to seek to audit the representative entities for compliance with any request.

5.5.6 Reasonable Period for Consultation

Woodside seeks to consult in order to support preparation of its EP. Woodside recognises that what constitutes a reasonable period for consultation should be considered on a case-by-case basis, with reference to the nature, scale and complexity of the activity (Section 5.4.2).

5.5.7 Discharge of Regulation 25

Woodside's consideration and approach to discharging Regulation 25 for relevant persons is discussed in Section 5.4.3. In addition to this, Woodside has considered the application of Regulation 25 specific to First Nations based on the *Tipakalippa Appeal*.

In relation to Traditional Custodian relevant persons (and all relevant persons), Woodside has discharged its duty under Regulation 25 of the Environment Regulations. Woodside considers that consultation under Regulation 25 is complete.

5.6 Providing Feedback and Assessment of Merit of Objections or Claims

There are a number of ways in which feedback can be provided. Feedback can be provided through the Woodside feedback email or via the Woodside feedback toll free phone line as outlined in the Consultation Information Sheet and the Woodside website. Where appropriate, consultation may also be supported by phone calls or meetings. An EP feedback form is also available on Woodside's website enabling stakeholders to provide feedback on proposed activities, or to request additional information.

Woodside consults widely on its EPs and notes that feedback is received in various forms. Feedback that is considered inappropriate or that puts the environment, health, safety or wellbeing of Woodside employees or operations at risk will not be tolerated. Woodside respects people's rights to protest peacefully and lawfully but actions that put the environment, health, safety or wellbeing of Woodside employees or operations at risk go beyond those boundaries.

Woodside accepts feedback and engages in consultation in order to achieve the aims set out in Section 5.2. Woodside recognises that there are persons and organisations that take a view that Woodside's operations and/or growth projects should be stopped or at least delayed as far as possible. Whilst Woodside assesses the merits of objections or claims received, it acknowledges NOPSEMA's guidance in its brochure entitled Consultation on offshore petroleum environment plans information for the community, which states that relevant persons are free to respond on any matter and raise any concern, however this may not be able to be considered if it is outside the scope or purpose of the EP and approval process, for example, statements of fundamental objection to offshore petroleum activities or information containing personal threats or profanities. Under Regulation 34(g), there is no requirement for a relevant person to agree or confirm that they have been adequately consulted.

Feedback from relevant persons is reviewed and an assessment of the merits is made of information provided as well as objections or claims about the adverse impact of each activity to which the EP relates. This might, for instance, be done through a review of data and literature and for relevance to the nature and scale of the activity outlined in the EP. Consistent with the aim of consultation in Section 5.2, Woodside will consider information received when reviewing and designing measures to put in place to minimise harm to relevant persons and where reasonable or practical to further manage impacts and risks to ALARP and acceptable levels.

Woodside considers feedback during consultation from relevant persons and other persons Woodside chose to contact (see Section 5.3.7). This information is summarised in Appendix F, Table 1 and Table 2 of the EP and includes a statement of Woodside's response, or proposed response, if any, to each objection and claim.

In accordance with Regulation 26(8), sensitive information (if any) in an EP, and the full text of any response by a relevant person to consultation under Regulation 25, must be contained in the sensitive information part of the plan and not anywhere else in the plan.

5.7 Ongoing Consultation

Consultation can continue to occur during the life of an EP, including after an EP has been accepted by NOPSEMA.

As per Woodside's ongoing consultation approach (refer to Section 7.12), feedback and comments received from relevant persons continue to be assessed and responded to, as required, throughout the life of an EP, including during its assessment and once accepted, in accordance with the intended outcome of consultation.

Should consultation feedback be received following the acceptance of an EP that identifies a measure or control that Woodside considers requires implementation or updates to meet the intended outcome of consultation, Woodside will apply its Management of Change and Review process as appropriate (see Section 7.3).

6. ENVIRONMENTAL IMPACT AND RISK ASSESSMENT, PERFORMANCE OUTCOMES, STANDARDS AND MEASUREMENT CRITERIA

6.1 Overview

This section presents the impact and risk analysis and evaluation, EPOs, EPSs and MC for the Petroleum Activities Program, using the methodology described in Section 2. MEEs require a further level of analysis and are assessed separately in Section 6.8.

6.2 Analysis and Evaluation

As required by Regulation 21(5) and 21(6) of the Environment Regulations, the analysis and evaluation demonstrate that the identified risks and impacts associated with the PAP are reduced to ALARP, are of an acceptable level and consider all operations of the activity, including potential emergency conditions.

Impacts and risks identified during the ENVID (including Decision Type, current risk level, acceptability of risk and tools used to demonstrate acceptability and ALARP) have been divided into two broad categories:

- planned (routine and non-routine) activities
- unplanned events (accidents, incidents or emergency situations).

Within these categories, impact and risk assessment groupings are based on environmental aspect[47] (e.g., emissions, physical presence, etc). For all hazardous events considered, the worst credible consequence was assumed.

The ENVID identified 12 impacts and 15 risks associated with the Petroleum Activities Program. Planned activities and unplanned events are summarised in Table 6-1 and Table 6-2.

The analysis and evaluation for the PAP indicate that current environmental risks and impacts associated with the activity are reduced to ALARP and are of an acceptable level, as discussed further in Section 6.

[47] An environmental aspect is an element of the activity that can interact with the environment.

Table 6-1: Environmental impact and risk analysis summary table – planned activities

Aspect	EP Section	Source of Impact	Key Potential Environmental Impacts (Refer to relevant EP section for details)	Controlled Impact Classification	Residual Impact Level (ALARP controls in place)	Acceptability of Impact
Planned Activities (Routine and Non-routine)						
Physical Presence: Interaction with Other Marine Users	6.7.1	Presence of facility, ASV and vessels displacing and/or excluding other users from PSZ during routine and IMMR activities within the PAA, respectively.	Potential isolated social impact resulting from interference with other sea users (e.g., commercial and recreational fishing, and shipping).	F	Socio-economic – No lasting effect (<1 month). Localised impact not significant to area/item of cultural significance.	Broadly Acceptable
		Presence of MODU, AHVs, installation vessels and other support vessels displacing and/or excluding other users during Xena-03 Tie-back activities.				
		Presence of subsea infrastructure interfering with or displacing third party vessels (commercial fishing).				
Physical Presence: Disturbance to the Seabed	6.7.2	Presence of Pluto Facility and subsea infrastructure.	Localised modification of seabed habitat (formation of artificial reef) within PAA.	E	Environment – Slight, short-term impact (<1 year) on species, habitat (but not affecting ecosystem function), physical or biological attributes.	Broadly Acceptable
		Subsea operations, inspection, maintenance and repair activities, including ASV and installation of pig receivers/launchers at the subsea wells.	Potential minor, localised modification of seabed habitat within PAA.	E	Environment – Slight, short-term impact (<1 year) on species, habitat (but not affecting ecosystem function), physical or biological attributes.	
		Presence of redundant infrastructure remaining infield until facility EOFL.	Potential slight, short-term loss or damage to benthic habitats, including benthic communities and marine primary producers.	F	Environment – No lasting effect (<1 month). Localised impact not significant to environmental receptor.	
		Disturbance to seabed from drilling operations.		F	Environment – No lasting effect (<1 month). Localised impact not significant to environmental receptor.	
		Disturbance to seabed from subsea installation of infrastructure (e.g., flowlines, umbilicals, flying leads) as well as rectification and stabilisation activities (e.g. installation of concrete mattresses).		F	Environment – No lasting effect (<1 month). Localised impact not significant to environmental receptor.	
		Disturbance to seabed from ROV operation (including localised sediment relocation from sediment mobilisation techniques and marine growth removal).		E	Environment – Slight, short-term impact (<1 year) on species, habitat (but not affecting ecosystem function), physical or biological attribute.	
		Disturbance to seabed from mooring installation.		E	Environment – Slight, short-term impact (<1 year) on species, habitat (but not affecting ecosystem function), physical or biological attribute.	
		Placement and retrieval of seabed transponders and temporary installation aids.		E	Environment – Slight, short-term impact (<1 year) on species, habitat (but not affecting ecosystem function), physical or biological attribute.	
Acoustic Emissions: Generation of Noise for Facility Operations	6.7.3	Noise generated within the PAA from: • Pluto Facility and associated infrastructure • vessels (ASV and support vessels) • helicopters • subsea IMMR activities.	Potential localised behavioural impacts to marine fauna around and within the PAA.	F	Environment – No lasting effect (<1 month). Localised impact not significant to environmental receptor.	Broadly Acceptable
Acoustic Emissions: Generation of Noise During Xena-03 Tie-Back Activities	6.7.4	Generation of noise from MODU, AHVs and support vessels.	Slight, short-term impacts to marine mammals, reptiles and fish, varying from behavioural responses to physiological impact (TTS).	F	Environment – Slight, short-term impact (<1 year) on species, habitat (but not affecting ecosystem function), physical or biological attributes.	Broadly Acceptable
		Generation of noise from DP systems on support vessels.		F	Environment – Slight, short-term impact (<1 year) on species, habitat (but not affecting ecosystem function), physical or biological attributes.	
		Generation of noise from cutting of well infrastructure and contingency activities.		F	Environment – No lasting effect (<1 month). Localised impact not significant to environmental receptors.	

Aspect	EP Section	Source of Impact	Key Potential Environmental Impacts (Refer to relevant EP section for details)	Controlled Impact Classification	Residual Impact Level (ALARP controls in place)	Acceptability of Impact
Routine and Non-Routine Discharges: Discharge of Hydrocarbons and Chemicals	6.7.5	Discharge of subsea control fluids.	Localised decrease in water quality around subsea system within PAA with no lasting effect.	F	Environment – No lasting effect (<1 month). Localised impact not significant to environmental receptors.	Broadly Acceptable
		Discharge of hydrocarbons remaining in subsea pipework and equipment as a result of subsea intervention works (including pigging).	Slight, short-term decrease in water quality at release location during IMMR activities.	E	Environment – Slight, short-term impact (<1 year) on species, habitat (but not affecting ecosystems function), physical or biological attributes.	
		Discharge of chemicals remaining in subsea pipework and equipment or the use of chemicals for subsea IMMR activities.	Localised decrease in water quality at release location during IMMR activities.	F	Environment – No lasting effect (<1 month). Localised impact not significant to environmental receptors.	
		Discharge of minor fugitive hydrocarbons from subsea equipment.	Potential slight short-term, localised decrease in water quality around subsea system within PAA with no lasting effect.	F	Environment – No lasting effect (<1 month). Localised impact not significant to environmental receptors.	
		Discharge of chemicals (e.g., MEG) during installation and leak testing of new infrastructure.	Localised decrease in water quality at discharge location during installation and leak testing of new infrastructure.	F	Environment – No lasting effect (<1 month). Localised impact not significant to environmental receptors.	
Routine and Non-Routine Marine Wastewater Discharges: Utility Systems and Drains	6.7.6	Discharge of sewage, grey water and putrescible waste from the Pluto Facility, MODU, ASV, installation and support vessels to the marine environment.	Potential localised, short-term decrease in water quality (increased nutrients and biological oxygen demand) at the discharge location.	F	Environment – No lasting effect (<1 month). Localised impact not significant to environmental receptors.	Broadly Acceptable
		Discharge of deck, bilge and drain water from the Pluto Facility, MODU, ASV, installation and support vessels to the marine environment.	Potential localised, short-term decrease in water quality (increased hydrocarbon and chemical concentrations) at the discharge location.	F	Environment – No lasting effect (<1 month). Localised impact not significant to environmental receptors.	
		Discharge of brine and cooling water from the Pluto Facility, MODU, ASV, installation and support vessels to the marine environment.	Negligible, localised increase in salinity at the discharge location.	F	Environment – No lasting effect (<1 month). Localised impact not significant to environmental receptors.	
Routine and Non-routine Discharges: Produced Water	6.7.7	Discharge of produced water during routine and non-routine operations.	Potential slight, short-term, localised decrease in water quality (increased hydrocarbon and chemical concentrations) at discharge location and within mixing zone, with potential impacts to marine fauna (toxicity).	E	Environment – Slight, short-term impact (<1 year) on species, habitat (but not affecting ecosystem function), physical or biological attributes.	Broadly Acceptable
Routine and Non-routine Discharges: Drill Cuttings, Drilling Fluids and Well Removal Fluids	6.7.8	Routine discharge of WBM drill cuttings to the seabed and the marine environment.	Potential slight, short-term toxic effects to marine biota, as well as localised reduction in water quality with potential effects on both water quality and benthic communities.	E	Environment – Slight, short-term impact (<1 year) on species, habitat (but not affecting ecosystem function), physical or biological attributes.	Broadly Acceptable
		Routine discharge of drilling muds (WBM) to the seabed and the marine environment.		D		
		Non-routine discharge of treated NWBM drill cuttings to the marine environment.		D		
		Non-routine discharge of wash water from mud pits and vessel tank wash fluids.		E		
		Routine discharge of well clean-out fluids.		E		
		Non-routine discharge of well annular fluids.		F		
Routine and Non-Routine Discharges: Cement, Cementing Fluids, Subsea Well Fluids, Unused Bulk Product and Subsea Chemicals from Xena-03 Tie-back Activities	6.7.9	Routine discharge of cement and cementing fluids, to the seabed and the marine environment.	Potential slight, short term toxic effects to marine biota, as well as localised reduction in water quality with potential effects on both water quality and benthic communities.	F	Environment – No lasting effect (<1 month). Localised impact not significant to environmental receptors.	Broadly Acceptable
		Routine discharge of subsea well fluids (including BOP and well construction activity control fluids).				
		Produced / reservoir water disposal.				
		Non-routine discharge of unused bulk products at campaign end.				

Aspect	EP Section	Source of Impact	Key Potential Environmental Impacts (Refer to relevant EP section for details)	Controlled Impact Classification	Residual Impact Level (ALARP controls in place)	Acceptability of Impact
Routine and Non-routine Atmospheric (Direct) and GHG Emissions (Direct and Indirect)	6.7.10	Operational flaring, exhaust emissions from fuel combustion, fugitive emissions from the Pluto facility.	Potential short-term localised decrease in air quality, limited to the airshed local to the facility. Potential negligible (de minimis) impact to global atmospheric GHG carbon budgets	F	Environment – No lasting effect (<1 month). Localised impact not significant to environmental receptors.	Broadly Acceptable
		Exhaust emissions from fuel combustion and incinerators on the ASV, MODU, installation and support vessels and helicopters.				
		Contingent MODU flaring (well test non-routine) during well unloading for pressure test and clean up.				
		Contingent venting of gas during drilling (e.g., well kick).				
		Consideration of indirect emissions associated onshore processing, third party transportation, regassification and combustion by end users.				
Routine Atmospheric Emissions: Indirect Emissions associated with Gas Processing Onshore	**Error! Reference source not found.**	Consideration of potential indirect impact from atmospheric emissions associated with onshore processing of Pluto gas.	Negligible, small contribution to cumulative air quality relative to defined air quality criteria. Risk of processing of Pluto gas at onshore facilities adversely impacting rock art on Murujuga is considered to be low, and no impact classification assigned.	F	Environment – No lasting effect (<1 month). Localised air quality impact not significant to environmental receptors.	Broadly Acceptable
Routine Light Emissions: Light Emissions from Facility Operations and Xena-03 Tie-back Activities	6.7.12	Light emissions from the Pluto Facility, ASV, MODU, installation and support vessels.	Negligible, localised potential for behavioural disturbance of species in close proximity to riser platform and vessels.	F	Environment – No lasting effect (<1 month). Localised impact not significant to environmental receptors.	Broadly Acceptable
		Light emissions during flaring.	Negligible, localised potential for behavioural disturbance of species in close proximity to riser platform and vessels.	F	Environment – No lasting effect (<1 month). Localised impact not significant to environmental receptors.	

Table 6-2: Environmental impact and risk analysis summary table – unplanned events (including MEEs)

Aspect	EP Section	Source of Risk	Key Potential Environmental Impacts (refer to relevant EP section for details)	Risk Rating				Acceptability of Impact
				Controlled Impact Classification	Residual Impact Level (ALARP controls in place)	Likelihood	Residual Risk Rating	
Unplanned Events (Accidents/Incidents) – MEEs								
Unplanned Hydrocarbon Release: Loss of Well Containment from Operating Wells (MEE-01)	6.8.3	Release of hydrocarbons resulting from subsea loss of well containment.	Potential significant impacts to the marine environment: • medium-term impacts to sensitive nearshore areas of offshore islands and coastal shorelines • disruption to marine fauna, including protected species • potential short-term interference with or displacement of other sea users.	C	Environment – Moderate, medium-term impact (2–10 years) on ecosystem, species, habitat or physical or biological attribute.	1	M	Acceptable if ALARP
Unplanned Hydrocarbon Release: Subsea Equipment Loss of Containment (MEE-02)	6.8.4	Surface or subsea release from flowline, pipeline and riser to the marine environment and atmosphere within PSZ and to mid-point of export pipeline.	Potential significant impacts to the marine environment: • medium-term impacts to sensitive offshore and nearshore areas • disruption to marine fauna, including protected species • potential short-term interference with or displacement of other sea users.	C	Environment – Moderate, medium-term impact (2–10 years) on ecosystem, species, habitat or physical or biological attribute.	1	M	Acceptable if ALARP
		Subsea release from export pipeline to the marine environment and atmosphere between mid-point of export pipeline to shore.		B	Environment – Major, long-term impact (10–50 years) on highly valued ecosystem, species, habitat or physical or biological attribute.	1	M	
Unplanned Hydrocarbon Release: Loss of Structural Integrity (MEE-03)	6.8.5	Marine environment footprint and associated hydrocarbon and chemical release associated with structural collapse of riser platform.	Potential significant impacts to the marine environment: • medium-term impacts to sensitive offshore and nearshore areas • disruption to marine fauna, including protected species • potential short-term interference with or displacement of other sea users.	C	Environment – Moderate, medium-term impact (2–10 years) on ecosystem, species, habitat or physical or biological attribute.	1	M	Acceptable if ALARP
		Surface or subsea release from flowline, pipeline and riser to the marine environment and atmosphere within PSZ (MEE-02) – caused by loss of structural integrity.		C	Environment – Moderate, medium-term impact (2–10 years) on ecosystem, species, habitat or physical or biological attribute.	1	M	
Unplanned Hydrocarbon Release: Loss of Marine Vessel Separation (MEE-04)	6.8.6	Hydrocarbon release of marine diesel to the marine environment from vessel due to collision within the PSZ.	Potential significant impacts to the marine environment: • medium-term impacts to sensitive offshore and nearshore areas • disruption to marine fauna, including protected species • potential short-term interference with or displacement of other sea users.	C	Environment – Moderate, medium-term impact (2–10 years) on ecosystem, species, habitat or physical or biological attribute.	1	M	Acceptable if ALARP
		Hydrocarbon release from pipeline, flowline(s) and riser(s) to the marine environment and atmosphere (MEE-02/03) caused by collision and structural integrity failures.		C	Environment – Moderate, medium-term impact (2–10 years) on ecosystem, species, habitat or physical or biological attribute.	1	M	
		Marine environment footprint and associated hydrocarbon and chemical release associated with platform loss of structural integrity (MEE-03) caused by collision.		C	Environment – Moderate, medium-term impact (2–10 years) on ecosystem, species, habitat or physical or biological attribute.	1	M	
Unplanned Hydrocarbon Release: Loss of Control of Suspended Load from Platform (MEE-05)	6.8.7	Surface or subsea release from flowline, pipeline and riser to the marine environment and atmosphere within PSZ (MEE-02) – caused by loss of control of suspended load.	Potential significant impacts to the marine environment: • medium-term impacts to sensitive offshore and nearshore areas • disruption to marine fauna, including protected species • potential short-term interference with or displacement of other sea users.	C	Environment – Moderate, medium-term impact (2–10 years) on ecosystem, species, habitat or physical or biological attribute.	1	M	Acceptable if ALARP
		Hydrocarbon release from topsides equipment to the marine environment and atmosphere – caused by loss of control of suspended load.	Potential minor, short-term impacts to the marine environment including disruption to marine fauna, including	D	Environment – Minor, short-term impact (1–2 years) to a community or highly valued area/item of cultural significance.	1	M	

Aspect	EP Section	Source of Risk	Key Potential Environmental Impacts (refer to relevant EP section for details)	Risk Rating				Acceptability of Impact
				Controlled Impact Classification	Residual Impact Level (ALARP controls in place)	Likelihood	Residual Risk Rating	
			protected species, and/or temporary impacts to water quality.					
Unplanned Events (Accidents/Incidents)								
Unplanned Hydrocarbon Release: Loss of Well Integrity During Drilling of Xena-03	6.9.1	Loss of hydrocarbons to marine environment due to loss of well containment during drilling of the Xena-03 well.	Potential significant impacts to the marine environment: • medium-term impacts to sensitive offshore and nearshore areas • disruption to marine fauna, including protected species • potential short-term interference with or displacement of other sea users.	B	Environment – Major, long-term impact (10–50 years) on highly valued ecosystem, species, habitat or physical or biological attribute.	1	M	Acceptable if ALARP
Unplanned Hydrocarbon Release: Pluto-A Topsides Loss of Containment	6.9.2	Hydrocarbon release from Pluto-A topsides equipment to the marine environment and atmosphere.	Potential minor, short-term impacts to the marine environment including disruption to marine fauna, including protected species, and/or temporary impacts to water quality.	D	Environment – Minor, short-term impact (1–2 years) to a community or highly valued area/item of cultural significance.	1	M	Broadly Acceptable
Unplanned Hydrocarbon Release: Vessel Collision during Drilling and Tie-back Activities	6.9.3	Loss of hydrocarbons to marine environment due to a vessel collision during drilling and tie-back of the Xena-03 well.	Potential minor, short-term impacts to the marine environment: • short-term impacts to sensitive offshore and nearshore areas • disruption to marine fauna, including protected species • potential short-term interference with or displacement of other sea users.	C	Environment – Moderate, medium-term impact (2–10 years) on ecosystem, species, habitat or physical or biological attribute.	1	M	Broadly Acceptable
Unplanned Hydrocarbon or Chemical Release: Hydrocarbon Release During Bunkering, Refuelling and Chemical Release During Transfer, Storage and Use, Rupture of Chemical Supply Lines – Pluto Operations	6.9.4	Accidental discharge of marine diesel/hydrocarbons to the marine environment during bunkering and refuelling.	Potential minor, short-term impacts to marine water quality with no lasting effect.	D	Environment - Minor, short-term impact (1–2 years) to a community or highly valued area/item of cultural significance.	2	M	Broadly Acceptable
		Accidental discharge of chemicals to the marine environment from transfer, storage and use, as well as rupture of chemical supply lines.	Potential minor, short-term impacts to marine water quality with no lasting effect	D	Environment - Minor, short-term impact (1–2 years) to a community or highly valued area/item of cultural significance.	1	M	Broadly Acceptable
		Accidental release of MEG from chemical supply lines.	Potential slight, short-term impacts to marine water quality with no lasting effect.	E	Slight, short-term impact (<1 year) on species, habitat (but not affecting ecosystem function), physical or biological attributes.	2	M	Broadly Acceptable
Unplanned Discharges: Tie-back Activities Unplanned Deck and Subsea Spills	6.9.5	Accidental discharge of hydrocarbons or chemicals from the MODU, ASV, installation and support vessel deck activities and equipment, and from subsea ROV hydraulic leaks.	Potential minor, short-term impacts to the marine environment including disruption to marine fauna, including protected species, and/or temporary impacts to water quality.	D	Environment - Minor, short-term impact (1–2 years) to a community or highly valued area/item of cultural significance.	2	M	Broadly Acceptable
Unplanned Discharge: Drilling Fluids	6.9.6	Accidental discharge of project fluids (WBM/NWBM/base oil) and cement to marine environment.	Potential slight, short-term impacts to the marine environment including disruption to marine fauna, including protected species, and/or temporary impacts to water quality.	E	Environment – Slight, short-term impact (< 1 year) on species, habitat (but not affecting ecosystem function), physical or biological attributes.	1	L	Broadly Acceptable
Unplanned Discharges: Hazardous and Non-hazardous Waste Management	6.9.7	Incorrect disposal or accidental discharge of non-hazardous and hazardous waste to the marine environment.	Potential slight, short-term impacts to the marine fauna, and localised temporary impacts to water quality and marine sediments.	E	Environment – No lasting effect (< 1 month). Localised impact not significant to environmental receptors.	2	M	Broadly Acceptable

Aspect	EP Section	Source of Risk	Key Potential Environmental Impacts (refer to relevant EP section for details)	Risk Rating				Acceptability of Impact
				Controlled Impact Classification	Residual Impact Level (ALARP controls in place)	Likelihood	Residual Risk Rating	
Physical Presence: Seabed Disturbance from Dropped Objects or Loss of Station Keeping Leading to Anchor Drag	6.9.8	Dropped objects resulting in the disturbance of benthic habitat.	Potential minor, localised impact to benthic habitat as well as potential seabed infrastructure damage.	D	Environment – Minor, short-term impact (1–2 years) to a community or highly valued area/item of cultural significance.	1	L	Broadly Acceptable
		Loss of station keeping of the MODU leading to anchor drag and the disturbance of benthic habitat.		D	Environment – Minor, short-term impact (1–2 years) to a community or highly valued area/item of cultural significance.	1	L	
Physical Presence: Interactions with Marine Fauna	6.9.9	Physical presence of MODU, ASV, installation and support vessels resulting in collision with marine fauna.	Potential injury or death of marine fauna (single animal), including protected species.	E	Environment – Slight, short-term impact (<1 year) on species, habitat (but not affecting ecosystem function), physical or biological attributes.	1	L	Broadly Acceptable
Physical Presence: Introduction of Invasive Marine Species	6.9.10	Invasive species in vessel ballast tanks or on vessels/submersible equipment.	Potential introduction of invasive marine species possibly resulting in an alteration of the localised environment.	E	Environment – Slight, short-term impact (<1 year) on species, habitat (but not affecting ecosystem function), physical or biological attributes.	1	L	Broadly Acceptable

6.2.1 Cumulative Impacts

Woodside has assessed the cumulative impacts of the PAP in relation to other relevant petroleum activities that could realistically result in overlapping temporal and spatial extents. The closest facilities to the Pluto Riser Platform and Pluto Export Pipeline include the Wheatstone platform, 5 km north, and the Stag A platform 8 km south, respectively (Section 4.10.5). However, given the concentration of sources of environmental risks and impacts from the PAP are localised, the potential for cumulative impacts is considered to be low. Cumulative impacts are discussed for sources of risk and impacts where such impacts were deemed to be credible.

6.3 Environmental Performance Outcomes, Standards and Measurement Criteria

Regulation 21(7) of the Environment Regulations requires that an EP includes EPOs, EPSs and MC that address legislative and other controls to manage the environmental risks and impacts of the activity to ALARP and Acceptable levels.

The EPOs, EPSs and MC specified are consistent with legislative requirements and Woodside's standards and procedures. They have been developed based on the Codes and Standards, Good Industry Practices and Professional Judgement outlined in Section 2.6, as part of the acceptability and ALARP justification process.

As defined in Regulation 5 of the Environment Regulations, an EPO "for an activity, means a measurable level of performance required for the management of environmental aspects of the activity to ensure that environmental impacts and risks of the activity will be of an acceptable level".

EPOs are set so that they are consistent with the principles of ESD as defined in the section 3A of the EPBC Act and demonstrated through the acceptability process (described in Section 2.8.2), which is applied to the aspects in Section 6, taking into consideration the principles of ESD. The EPOs for planned activities have been set at a level of environmental performance that is equal to the identified environmental impact.

EPSs and MC are defined to measure environment performance against the EPOs:

- EPSs are statements of performance required of a control measure in order to manage risk and/or impacts to ALARP and an acceptable level. EPSs are used as a basis for environmental performance reporting and demonstrate compliance against the EPOs.
- MCs are outlined defining how environmental performance is measured and sets the criteria to determine whether the EPOs and EPSs have been met during the activity.
- For planned activities, where the activity is undertaken as described and the relevant EPSs are implemented it confirms that the EPOs are being met.

The EPOs, EPSs and MC are presented throughout this section for both operations and Xena-03 Tie-back activities, as relevant. A breach of these EPOs or EPSs constitutes a 'Recordable Incident' under the Environment Regulations (refer to Section 7.13.5).

6.4 Presentation

The analysis and evaluation (ALARP and acceptability), EPOs, EPSs and MC are presented in tabular form throughout this section, as shown in the sample below. Italicised text in this example table denotes the purpose of each part of the table, with reference to the relevant sections of the Regulations and/or this EP.

Context **Description of the context for the impact/risk. Regulation 21(1), 21(2) and 21(3)**		
Description of the Activity – Regulation 21(1)	Description of the Environment – Regulations 21(2)(3)	Consultation – Regulation 25 and 24(b)

Impact and risk evaluation summary

Summary of ENVID outcomes

Source of impact/risk Regulation 21(1)	***Environmental value potentially impacted*** Regulations 21(2)(3)						***Evaluation*** Regulations 21(5)(6)						
	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/ Habitat	Species	Socio-economic	Decision Type	Consequence/ Impact	Likelihood	Risk Rating	ALARP Tools	Acceptability	Outcome
Summary of source of risk/ impact													

Description of source of impact or risk

Description of the identified risk/impact including sources or threats that may lead to the impact/risk or identified event. Regulation 21(1).

Impact or consequence assessment

Environmental Value(s) Potentially Impacted

Discussion and assessment of the potential impacts to the identified environment value/s in accordance with Regulation 21(5) and 21(6).

Description of potential impacts to environmental values aligned to Woodside impacts and risk classifications (Section 2.6).

Demonstration of ALARP

Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[48]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
ALARP/Hierarchy of Control Tools Used – Section 2.8.1				
Summary of control considered to ensure the impacts and risks are continuously reduced to ALARP. Regulation 21(5)(c).	Technical/logistical feasibility of the control. Cost/sacrifice required to implement the control (qualitative measure).	Qualitative commentary of impact/risk that could be averted/ environmental benefit gained if the cost/ sacrifice is made and the control is adopted.	Proportionality of cost/sacrifice vs environmental benefit. If proportionate (benefits outweigh costs), the control will be adopted. If disproportionate (costs outweigh benefits), the control will not be adopted.	If control is adopted, reference to Control Number provided.
Major Environmental Events				

[48] Qualitative measure.

Context Description of the context for the impact/risk. Regulation 21(1), 21(2) and 21(3)			
MEEs are subject to additional analysis and evaluation as outlined in Section 2.7. ALARP is demonstrated through controls being analysed for selection, based on their independence, and prioritised in accordance with hierarchy of controls, and further analysed to consider the type of effect the control provides.			
ALARP Statement Made on the basis of the environmental risk/impact assessment outcomes, use of the relevant tools appropriate to the Decision Type (Section 2.6.1) and a proportionality assessment. Regulation 34(b).			
Demonstration of Acceptability			
Acceptability Statement Made on the basis of applying the process described in Section 2.8.2 and taking into account internal and external expectations, risk/impact to environmental thresholds and use of environment decision principles. Regulation 34(c)			
EPOs, EPSs and MC			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO No. S: Specific performance that addresses the legislative and other controls that manage the activity, and against which performance by Woodside in protecting the environment will be measured. M: Performance against the outcome will be measured through implementation of the controls via the MC. A: Achievability/feasibility of the outcome demonstrated via discussion of feasibility of controls in ALARP demonstration. Controls are directly linked to the outcome. R: The outcome will be relevant to the source of risk/impact and the potentially impacted environmental value[49] T: The outcome will state the timeframe during which the outcome will apply or by which it will be achieved.	C No. Identified control adopted to ensure that the impacts and risks are continuously reduced to ALARP. Regulation 21(5c).	PS No. Statement of the performance required of a control measure. Regulation 21(7)(a).	MC No. Measurement criteria for determining whether the outcomes and standards have been met. Regulation 21(7)(c).

6.5 Environment Risk/Impacts not Deemed Credible

The ENVID identified a source of environmental risk / impact that was assessed as not being applicable (not credible) within or outside the PAA as a result of the Petroleum Activities Program. It therefore does not form part of this EP. This is described in the following sections for information only.

[49] Where impact/consequence descriptors are capitalised and presented within EPOs in Section 6; performance level corresponds with those aligned with the Woodside Risk Matrix (refer Section 2.6.3).

6.5.1 Shallow/Near-shore Activities

The PAP is located in water depths of approximately between 40 m at the state-waters boundary of the Pluto Export Pipeline and 962 m at the greatest depths of the hydrocarbon gathering system. The closest land is 10 km from the Export Pipeline Operational Area at Legendre Island and 32 km from the Facility and Xena-03 Operational Areas at Montebello Islands. Consequently risks/impacts associated with shallow/near-shore activities such as anchoring and vessel grounding were assessed as not credible.

6.6 Indirect Impacts

For the proposed Petroleum Activities Program, potential 'indirect' environmental impacts and risks are those associated with waste brought onshore, mobilisation/demobilisation of vessels to the PAA, and related to emissions associated with the extraction of Pluto gas for onshore processing and third-party transport, regassification, distribution and use. Due to the nature and scale of these potential indirect environmental impacts and risks which could be reasonably attributed to the PAP, and the regulatory frameworks in place to manage them, Woodside considers the potential indirect impacts and risks from these activities to be inherently managed to ALARP and acceptable in its current state.

However, recognising stakeholder and regulatory interest with the processing of Pluto gas onshore and concern regarding the potential for indirect impacts from atmospheric emissions; and GHG emissions from third party use, further information and evaluation has been provided in Sections 6.7.10 and **Error! Reference source not found.**.

6.7 Planned Activities

6.7.1 Physical Presence: Interaction with Other Marine Users

Context		
Facility Layout and Description – Section ` Support Vessel Operations – Section 3.8 Subsea Inspection, Maintenance and Repair Activities – Section 3.10 Xena-03 Drilling &Tie-back Activities – Section 3.11 Vessel-based Activities for the Xena-03 Tie-back – Section 3.12	Socio-economic Environment – Section 4.10	Consultation – Section 5

Impacts and Risks Evaluation Summary

Source of Impact	***Environmental Value Potentially Impacted***							***Evaluation***						
	Soil and Groundwater	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/Habitat	Species	Socio-economic	Decision Type	Consequence/Impact	Likelihood	Risk Rating	ALARP Tool	Acceptability	Outcome
Presence of facility, ASV and vessels displacing and/or excluding other users from PSZ during routine and IMMR activities within the PAA, respectively							x	A	F	-	-	LCS GP PJ	Broadly Acceptable	EPO 1
Presence of MODU, AHVs, installation vessels and other support vessels displacing and/or excluding other users during Xena-03 Tie-back activities							x							
Presence of subsea infrastructure interfering with or displacing third-party vessels (commercial fishing)							x							

Description of Source of Impact

Operations

The facility commenced operation in 2012 and is marked on nautical charts. The riser platform is surrounded by a 500 m radius PSZ, which vessels are prohibited from entering unless authorised by Woodside. The PSZ is a critical safety control intended to reduce the likelihood of interactions between vessels and the platform, which increases safety for both vessels and the facility. Implementation of the PSZ around the riser platform excludes other users from a small area of the sea (approximately 0.079 km²). The riser platform is highly visible under most conditions and is well lit, and the nature of the riser platform (large steel structure) ensures a clear radar return to alert ships fitted with anti-collision radars.

Routine vessel activities (Section 3.8) associated with the Pluto facility to support crewed operations are concentrated within the PSZ (e.g., activities performed by support and resupply vessels at the platform as well as an ASV). Subsea support vessels, or USVs may undertake activities (e.g., IMMR, removal of redundant equipment) within the PAA at any time, including within parts of the PAA which are beyond the PSZ. The duration and location of these activities varies depending on the activity being undertaken.

Planned maintenance campaigns undertaken during routine intervention activities typically occur ten times per year, lasting approximately 14 days per campaign. Vessels required for major projects, including AHV and subsea installation vessels may undertake activities within the PAA as required.

An ASV may be present for up to approximately 90 days during a planned extended maintenance campaign, shutdown maintenance or major project. Whilst such activities are underway, the ASV would be connected to the platform 24 hours per day, seven days per week. An ASV may be used approximately once every 3-6 years.

Subsea infrastructure associated with operations activities may have the potential for interactions with other marine users. The AHO has been notified of the location of all existing subsea infrastructure, for marking on nautical charts. Water depths of the existing subsea infrastructure range between 40 m at the export pipeline state boundary and 180-962 m, at the hydrocarbon gathering system. The Pluto riser platform itself, is located at the edge of the continental shelf at 85 m depth. A number of oil and gas facilities are located in the vicinity of the Operational Areas as are fibre optic cables (Section 4.10.5 and Section 4.10.6).

Presence of MODU, Xena-03 Tie-back activities and associated Subsea Infrastructure

The activity includes mooring system installation, drilling of one well, installation of a wellhead and xmas tree, and connection of the well to the existing Pyxis Hub subsea infrastructure.

Support vessels will be used for MODU mooring system installation activities before the arrival of the MODU, and for retrieval of anchors following completion of drilling when the MODU departs. Each of these phases are intended to last seven to 10 days.

A MODU is planned to be present for approximately 60 days, including mobilisation, demobilisation and contingency activities. When underway, activities will be 24 hours per day, seven days per week. A 500 m safety exclusion zone (SEZ) will be applied to the MODU within the Xena-03 Operational Area for the duration of the drilling activity. A support vessel would be present in proximity to the MODU, which would also be supported periodically by another support vessel to facilitate resupply.

Installation vessels will be used to install, pre-commission and cold commission the flexible flowline, subsea distribution unit, and other subsea infrastructure following completion of drilling of the new well, as described in Section 3.11. This is expected to take approximately three weeks. Installation is expected to be predominantly undertaken by the primary installation vessel (PIV), which will be surrounded by a 500 m SEZ when on-location within the Xena-03 Operational Area. A smaller vessel (IMMR type) may be used to undertake components of the installation activity before or after primary installation has been completed.

Mooring installation, drilling and subsea installation activities are expected to be temporally discrete (i.e., conducted at different times); however, they may overlap. If these activities coincide, a vessel support or PIV type) would be active in the Xena-03 Operational Area while the MODU (supported by two OSVs) is present. A SIMOPS plan would be in place to manage interaction between vessels in the field.

Xena-03 Tie-back activities will include the addition of new infrastructure within the PAA. The proposed Xena-03 wellhead, subsea xmas tree and other subsea infrastructure will remain for the duration of field life. All new infrastructure will be contained within the existing Facility Operational Area.

The AHO will be notified of the Xena-03 well and associated subsea infrastructure locations. Further, once Xena-03 infrastructure is operational, potential interactions with other marine users will be managed as per all other subsea infrastructure associated with Pluto operations.

Impact Assessment

Exclusion and Displacement of Other Users

Interaction with other marine users due to the physical presence of activity-related vessels in the PAP may result in localised changes to the functions, interests or activities of other users.

The duration and extent of potential for interaction will depend on the activity undertaken, and are outlined below:

- Pluto facility operations – ongoing, for the period of the Petroleum Activities Program, limited to the Facility Operational Area. Typically the duration of potential interaction will be 14 days, 10 times a year, but could include a planned extended maintenance campaign, shutdown maintenance or major project involving an ASV and lasting approximately 90 days, which could occur every 3-6 years.
- Xena-03 Tie-back activities – approximately 60 days, limited to the Xena-03 Operational Area.
- IMMR – typically 14 days, throughout the PAA. Frequency varies depending on the type of IMMR activities required which range from once a year to once every 25 years (Table 3-14).

Commercial Fishing

The PAA overlaps four Commonwealth and 15 State managed commercial fisheries management areas. Historical fisheries data indicate that only one Commonwealth fishery and 10 State-managed fisheries have been active within the PAA over the last five years. To identify active fisheries with the potential for interaction, ABARES and FishCube data at the 10 NM and 60 NM CAES reporting blocks overlapping the PAA were identified and fishery effort was assessed (Section 4.10.1).

Routine Operations

The Commonwealth-managed North West Slope Trawl Fishery, and 10 State-managed fisheries are considered to have potential for interaction with activities in the PAA. There is potential to interact with the activity is based on their catch effort drawn from ABARES (Commonwealth) and FishCube (WA State) data. The catch effort is described for each fishery in Table 4-23 in Section 4.10.1.

Fishing activities will be excluded from the PSZ around the platform and from ASV temporary SEZ. As the ASV is located within the facility PSZ potential for cumulative impacts are not credible. Potential impacts to commercial fisheries include loss of commercial catch due to displacement from fishing grounds and potential damage to fishing gear. Fisheries using divers, lines, traps, and pots have little or no potential to interact with subsea infrastructure, hence impacts to such fisheries will be limited to localised displacement from the PSZ and temporary SEZ associated with the ASV. As such, the potential impact is considered to be localised displacement of fishing effort to avoid subsea infrastructure, exclusion zones, and vessels undertaking the petroleum activity

The continued presence of subsea infrastructure over the field life could present a hazard to bottom trawl fisheries due to the risk of equipment entanglement and subsequent equipment damage/loss. The presence of subsea infrastructure could present a hazard to bottom trawl fisheries due to risk of equipment entanglement and subsequent equipment damage/loss. Given the catch effort of commercial fisheries outlined in Table 4-23, anticipated impacts from activities associated with the ongoing presence of infrastructure are assessed as having no lasting effect

Xena-03 Tie-back Activities

During Xena-03 Tie-back activities, additional vessels will be temporarily present in the Xena-03 Operational Area and may restrict the use of the area by the commercial fisheries and tour operators that have been identified as having potential to use the region. Use will particularly be restricted within the 500 m SEZ (temporary) that will be established around the MODU and installation vessel while undertaking drilling and installation activities. The exclusions represent a relatively small area when compared to the extent of the fishery boundaries that overlap. The MODU is planned to be present for approximately 60 days, and the installation vessels for up to three weeks. Potential impacts to commercial fisheries include damage to fishing equipment and physical displacement from some parts of the managed fishery areas for the duration of the Xena-03 Tie-back activities.

Given the distance offshore and previous fishing effort within the Facility Operational Area (discussed above), the Xena-03 Operational Area is not considered to be an area of high commercial fishing activity. Furthermore, the 500 m temporary exclusion zones around the MODU and installation vessel comprise a relatively small area when compared to the extent of the individual fishery boundaries that overlap. As such, any displacement of commercial fisheries due to the Xena-03 Tie-back activities in the Xena-03 Operational Area are not expected to impact commercial fishing activities or the economic viability of the fisheries.

Tourism and Recreation

Tourism and recreation activity in the PAA is expected to be infrequent, with recreational and charter fishing from vessels the only tourism and recreational activities identified as potentially occurring.

The Montebello Islands State Marine Park (~25 km from the PAA), is the closest location for tourism with some charter boat operators taking visitors to these islands. Reported fishing charter catch effort (at 10 NM CAES blocks) within the PAA, is predominantly located along the Export Pipeline. There may be recreational fishing at Rankin Bank, which is ~29 km from the PAA. The Export Pipeline Operational Area is 13 km from the Dampier Archipelago at the state boundary and therefore, low numbers of recreational vessels may be encountered within that nearshore area.

Given the distance from boating facilities, lack of natural attractions and water depth (~85 m) of the Facility Operational Area, very little recreational or charter fishing is expected to occur. In nearshore waters where the Export Pipeline Operational Area has the potential for greater interaction with tourism and recreational activities, given the infrequent and transient nature of IMMR activities and the known presence of current infrastructure, any impacts are not likely to be of significance. Collectively, activities in the PAA are not likely to significantly impact recreational and tourism activities and are expected to be localised with no lasting effect.

Shipping

Commercial shipping occurs in high numbers across the NWS, based on the proximity to key export ports. Commercial shipping traffic comprises vessels, including:

- bulk carriers (e.g., mineral ore, salt) from Port Hedland, Port Walcott and Dampier
- offtake tankers
- support vessels for offshore oil and gas activities
- LNG carriers from Dampier, Barrow Island and Ashburton North.

To reduce the likelihood of interactions between commercial vessels and offshore facilities, AMSA has introduced a series of shipping fairways, within which commercial vessels are advised to navigate. The fairways are not mandatory, but AMSA strongly recommends commercial vessels remain within the fairway when transiting the region. The use of shipping fairways is considered to be good seafaring practice, with AUSREP data from AMSA indicating cargo ships and tankers routinely navigate within the established fairways.

No shipping fairways interact with the Facility and/or Xena-03 operational areas; however, two fairways overlap the Export Pipeline Operational Area:

- A fairway directs north/south-bound vessel traffic from Barrow Island and the southern Montebello Islands.
- A fairway travels parallel to the coast, from Barrow Island to the Dampier Shipping Fairways.

In addition, most vessel activity in the vicinity of the PAA is associated with nodes such as offshore facilities (e.g., Wheatstone) and ports; no such nodes occur within the PAA (aside from the Pluto facility).

The presence of the Pluto riser platform, vessels and subsea infrastructure does not result in impacts to commercial shipping beyond a localised exclusion of shipping traffic from the PSZ and the temporary displacement of commercial shipping from subsea support vessels as a result of vessels undertaking activities in the PAA.

Oil and Gas

Several oil and gas facilities are located within 50 km of the PAA (see Section 4.10.5), the nearest being the Wheatstone platform 5 km north of the Pluto riser platform. Operational history of the facility has shown that interactions with other titleholders has not been an issue to date.

The PAA overlaps WA-48-L which is a production licence held by Chevron Australia Pty Ltd and other (non-Woodside) titleholders with Chevron as operator. No subsea infrastructure associated with the PAP is located in WA-48-L, however, the operational area extends 4000 m from the Xena-03 well and into WA-48-L. The PAA does not overlap any production wells in WA-48-L. All activities on the seabed including drilling will be undertaken within Woodside-operated titles.

Submarine communications infrastructure is also present in the region with the Chevron fibre optic cable intersecting the Export Trunkline Operational Area twice (Section 4.10.6).

Cumulative Impacts

Given the presence of the riser platform, subsea infrastructure and export pipeline as well as support vessels there is the potential for cumulative impacts due to the presence of the Wheatstone platform, subsea infrastructure and support vessels. Additionally, a MODU and support vessels will also be present during Xena-03 Tie-back activities which may incrementally increase cumulative impacts for a shorter period of time ~12 weeks.

Other marine users will be restricted from exclusion zones established around the Pluto riser platform for the duration of this EP and from around the MODU and installation vessels for ~12 weeks. These exclusion zones in combination remain negligible, and partially temporary, relative to the area of overlapping fisheries zones.

Vessel activities in support of both Pluto Facility operations and Xena-03 Tie-back activities are usually of a short duration. Any impacts arising from presence of additional vessels in connection with Xena-03 Tie-back activities are expected to be localised and short-lived with limited, if any, cumulative impacts anticipated.

Demonstration of ALARP

Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Legislation, Codes and Standards				
Contract vessels compliant with Marine Orders for safe vessel operations: • Marine Order 21 (Safety of navigation and emergency procedures) 2016 • Marine Order 27 (Safety of navigation and radio equipment) 2016 • Marine Order 30 (Prevention of collisions) 2016. Compliance with Marine Orders 21, 27 and 30 reduces the likelihood of interactions.	F: Yes. CS: Minimal cost. Standard practice.	Marine Orders 21, 27 and 30 are required under Australian Regulations; implementation is standard practice for commercial vessels as applicable to vessel size, type and class.	Control based on legislative requirement – must be adopted.	Yes C 1.1

Implementation of a 500 m PSZ around riser platform reduces the likelihood of interaction of vessels with the facility.	F: Yes. CS: Minimal cost. Standard practice.	The PSZ is a requirement under Australian Regulations and reduces the likelihood of interactions with third parties and the riser platform.	Control based on legislative requirement – must be adopted.	Yes C 1.2
Establishment of a 500 m SEZ around ASV and communicated to marine users.	F: Yes. CS: Minimal cost. Standard practice.	Establishment of a 500 m safety exclusion zone around ASV reduces the likelihood of interaction with other marine users.	Benefits outweigh cost/sacrifice. Control is also standard practice.	Yes C 1.3
Establishment of a 500 m sez around MODU and primary installation vessel and communicated to marine users.	F: Yes. CS: Minimal cost. Standard practice.	Establishment of a 500 m safety exclusion zone around MODU and the primary installation vessel reduces the likelihood of interaction with other marine users.	Benefits outweigh cost/sacrifice. Control is also standard practice.	Yes C 1.4
For Xena-03 Tie-back activities, reasonable attempts at removal of wellhead(s) will be made in the event of a respud.	F: Yes. CS: Additional cost. Standard practice.	In accordance with OPGGS Act Section 572.	Benefits outweigh cost/ sacrifice. Control is also standard practice.	Yes C 1.5
MODU mooring systems (chains/wires and anchors) will be removed.	F: Yes CS: Additional cost. Standard Practice.	In accordance with OPGGS Act Section 572.	Benefits outweigh cost/sacrifice.	Yes C 1.6
Good Practice				
Location of permanent infrastructure shown on AHO marine charts.	F: Yes. CS: Minimal cost. Standard practice.	Include location of Pluto infrastructure on maritime charts.	Benefits outweigh cost/sacrifice.	Yes C 1.7
Consultation undertaken in support of the Petroleum Activities Program, so that marine users are informed and aware.	F: Yes. CS: Minimal cost. Standard practice.	Consultation ensures marine users, including those associated with the activities of adjacent titleholders, are informed and aware.	Benefits outweigh cost/sacrifice.	Yes C 1.8
Notify AHO of activities no less than four working weeks prior to scheduled activity commencement date (during operations, where vessels will be in the PAA, but outside of the PSZ>3 weeks).	F: Yes. CS: Minimal cost. Standard Practice.	Notification of AHO will enable them to issue a Maritime Safety Information Notifications (MSIN) and Notice to Mariners (NTM) thereby reducing the likelihood of unplanned interactions with other vessels.	Benefits outweigh cost/sacrifice.	Yes C 1.9
Notify AMSA ARC least 24-48 hours before operations commence (during operations if vessels are undertaking activities within the PAA for more than three weeks at a time)	F: Yes CS: Minimal cost. Standard Practice.	Communicating the PAP to other marine users ensures they are informed and aware should emergency response be required.	Benefits outweigh cost/sacrifice.	Yes C 1.10

Notify relevant persons for Xena-03 Tie-back activities within the PAP that commence more than a year after EP acceptance.	F: Yes. CS: Minimal cost. Standard practice.	Communicating the PAP to other marine users ensures they are informed and aware, thereby reducing the likelihood of interference with other marine users.	Benefits outweigh cost/ sacrifice. Control is also standard practice.	Yes C 1.11
Notify DoD no less than four weeks before Xena-03 Tie-back activities commence.	F: Yes CS: Additional cost. Standard practice.	In accordance with request made by DoD during consultation.	Benefits outweigh cost/sacrifice.	Yes C 1.12
Notify relevant government departments, fishing industry representative bodies and licence holders of activities prior to commencement and upon completion of the Xena-03 Tie-back activities.	F: Yes. CS: Minimal cost. Standard practice.	Communication of the PAP to other marine users ensures they are informed and aware, thereby reducing the likelihood of interference with other marine users.	Benefits outweigh cost/sacrifice. Control is also standard practice.	Yes C 1.13
Notify AMSA JRCC at least 24-48 hours before operations commence, if vessels are undertaking activities in, or in close proximity to (within 1 km of), shipping lane	F: Yes CS: Minimal. The control will only apply to IMMR activities undertaken within a shipping lane.	Notification of AMSA ensures they are informed and aware, thereby reducing the risk of unplanned interactions within shipping lanes.	Benefits outweigh cost/sacrifice.	Yes C 1.14
Develop a SIMOPS Plan to manage MODU interactions with other facilities/vessels, where multiple campaigns occur within the PAA (i.e., during xmas tree installation). SIMOPS Plan to contain information on: • minimum separation distances • communications • MODU/vessels/ activities involved in SIMOPS • exclusion zone entry and exit processes • ROV operations • helicopter operations • key roles, responsibilities and emergency contacts • PTW arrangements • incident reporting and investigation • management of change.	F: Yes. CS: Minimal cost. Standard practice.	SIMOPS Management Plans between Woodside operated vessels in the PAA will provide for efficient delivery of the activity.	Benefits outweigh cost/sacrifice.	Yes C 1.15

Professional Judgement – Eliminate				
Reducing the PSZ.	F: No. PSZ is mandated by the OPGGS Act and is an SCE; it cannot be reduced. CS: Not assessed, control not feasible.	Not assessed, control not feasible.	Not assessed, control not feasible.	No
Limit the PAP to avoid peak shipping and commercial fishing activities.	F: No. Shipping occurs year-round and cannot be avoided. SIMOPS with fishing seasons cannot be eliminated as exact timings for all activities are not confirmed. CS: Not considered, control not feasible.	Not considered, control not feasible.	Not considered, control not feasible.	No
Professional Judgement – Substitute				
None identified.				
Professional Judgement – Engineered Solution				
Pluto's collision prevention system is implemented to alert marine vessels of the facility location, which reduces the likelihood of adverse interaction with other marine users.	F: Yes. CS: Minimal cost. Standard practice.	Pluto's collision prevention system equipment has the ability to alert marine vessels of the facility location, which reduces the likelihood of adverse interaction with other marine users.	Control is SCE requirement – must be adopted.	Yes C1.16
Over-trawl protection on subsea infrastructure.	F: Yes. Over-trawl protection on subsea infrastructure could be fitted to Pluto subsea infrastructure. CS: Significant additional cost associated with designing and installing trawl protection on subsea infrastructure.	Over-trawl protection on subsea infrastructure could mitigate the potential for commercial fishing trawl gear to damage infrastructure or result in gear loss.	Given the PAA only overlies a small portion of the fisheries management area open to trawl fishing, the cost of installing over-trawl protection is considered grossly disproportionate to the environmental benefit.	No

ALARP Statement:

On the basis of the environmental impact assessment outcomes and use of the relevant tools appropriate to the decision type, Woodside considers the adopted controls appropriate to manage the potential impacts of the physical presence of the facility, subsea infrastructure, MODU and project vessels on other users.

Identified controls comprehensively cover all legislative requirements, relevant industry codes, standards and guidelines as well as company requirements.

Efforts towards reducing potential for impacts by identifying additional or alternative controls was a key feature of HAZID/ENVID studies informing this EP. As no reasonable additional/alternative controls were identified that would further reduce the impacts without grossly disproportionate sacrifice, the impacts and risks are considered ALARP.

Demonstration of Acceptability

Acceptability Statement:

The approach to risk assessment and implementation strategy is consistent with Woodside policies, procedures and standards ensuring consistency and reliability in our environmental management practices. The management of risk and potential impacts of the activity to other marine users and values are also consistent with legislative and other regulatory requirements including relevant policy documents, guidelines and conservation plans. This ensures our activities are aligned with national standards and objectives.

Woodside has engaged with Chevron and established an Ingress Agreement between Woodside and Chevron to allow required activities within WA-48-L.

Woodside has comprehensively considered the socio-economic context relevant to the activity allowing us to understand and respect the inherent values and sensitivities of other users of the operational area of the activity. We have assessed, responded to and adopted controls from objections and claims received from relevant persons, ensuring community concerns are addressed in our management strategies of the activity. This includes expectations of AMSA and AHO provided in consultation with relevant persons.

The potential impacts are considered broadly acceptable if the adopted controls are implemented. Therefore, Woodside considers the adopted controls appropriate to manage the impacts from the physical presence of the PAP to a level that is broadly acceptable; and demonstrates the EPOs are met.

EPOs, EPSs and MC for Pluto Facility Operations

Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 1 Impacts to relevant marine users from the PAP planned activities will be limited through the provision of appropriate information / notification.	**C 1.1** Contract vessels complying with Marine Orders for safe vessel operations: • Marine Order 21 (Safety of navigation and emergency procedures) 2016 • Marine Order 27 (Safety of navigation and radio equipment) 2016 • Marine Order 30 (Prevention of collisions) 2016. Compliance with Marine Orders 21, 27 and 30 reduces the likelihood of interactions.	**PS 1.1** Vessels contracted whose practices comply with Marine Orders as applicable to vessel size, type and class (Marine Orders 21, 27 and 30).	**MC 1.1.1** Marine verification records demonstrate compliance with standard maritime safety procedures (Marine Orders 21, 27 and 30).

EPOs, EPSs and MC for Pluto Facility Operations			
	C 1.2 Implementation of a 500 m PSZ around riser platform reduces the likelihood of interaction of vessels with the facility.	**PS 1.2** PSZ maintained and monitored for incursions.	**MC 1.2.1** Records of adverse interactions in 500 m PSZ with other marine users are recorded.
	C 1.3 Establishment of a 500 m SEZ around ASV and communicated to marine users.	**PS 1.3** No entry of unauthorised vessels within the 500 m SEZ.	**MC 1.3.1** Daily Operations Reports and Incident records demonstrate breaches by unauthorised vessels within the SEZ are recorded.
	C 1.7 Location of permanent infrastructure shown on AHO marine charts	**PS 1.7** Woodside to notify AHO of location of permanent infrastructure.	**MC 1.7.1** Records demonstrate location of permanent infrastructure is notified to AHO.
	C 1.8 Consultation undertaken in support of the Petroleum Activities Program, so that marine users are informed and aware.	**PS 1.8** Implement a consultation process that conforms to the requirements of the Environment Regulations.	**MC 1.8.1** Records demonstrate a consultation program that conforms to the requirements of the Environment Regulations has been undertaken (refer to Section 5).
	C 1.9 Notify AHO of activities no less than four working weeks prior to scheduled activity commencement date, (during operations, where vessels will be in the PAA, but outside of the PSZ >3 weeks).	**PS 1.9** Woodside to notify AHO of activities where vessels will be in the PAA, but outside of the PSZ >3 weeks.	**MC 1.9.1** Records demonstrate that AHO notifications complete.
	C 1.10 Notify AMSA ARC least 24-48 hours before operations commence, if vessels are undertaking activities within the PAA for more than three weeks at a time.	**PS 1.10** AMSA's JRCC is notified 24 to 48 hrs before mobilisation, for activities in the PAA, but outside of the Petroleum Safety Zone >3 weeks, for awareness should emergency response be required.	**MC 1.10.1** Records demonstrate a once-off notification provided to AMSA's JRCC within required timeframes before mobilisation.
	C 1.14 Notify AMSA JRCC at least 24-48 hours before operations commence, if vessels are undertaking activities in, or in close proximity to (within 1 km of), shipping lane	**PS 1.14** Woodside to notify AMSA JRCC of IMMR activities within shipping lanes 24 to 48 hours before activity commencement.	**MC 1.14.1** Records demonstrate AMSA JRCC has been notified of IMMR activities within shipping lanes.

EPOs, EPSs and MC for Pluto Facility Operations			
	C 1.16 Pluto's collision prevention system implemented to alert marine vessels of the facility location, which reduces the likelihood of adverse interaction with other marine users.	**PS 16.1** (Refer to Loss of Marine Vessel Separation MEE-04). Integrity managed in accordance with Performance Standard(s) and Safety Critical Element Management Procedure (Section 7.4) to prevent environment risk related damage to SCEs for: • P34 Ship Intrusion Detection Systems, to: • alert facility of a potential collision with marine vessels • alert marine vessels of facility location so they may take timely action to avoid the facility and hence reduce the likelihood of collision.	**MC 1.16.1** Records demonstrate implementation of SCE Technical Performance Standard(s) and Safety Critical Element Management Procedure (Section 7.4.2), in order to achieve the functional objective of the control. Records may include implementation and maintain/assure and manage-change information summarised in Section 7.4.2

EPOs, EPSs and MC for Xena-03 Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 1 Impacts to relevant marine users from the PAP planned activities will be limited through the provision of appropriate information / notification.	**C 1.1** Contract vessels compliant with Marine Orders for safe vessel operations: • Marine Order 21 (Safety of navigation and emergency procedures) 2016 • Marine Order 27 (Safety of navigation and radio equipment) 2016 • Marine Order 30 (Prevention of collisions) 2016. Compliance with Marine Orders 21, 27 and 30 reduces the likelihood of interactions.	**PS 1.1** Vessels contracted whose practices comply with Marine Order as applicable to vessel size, type and class (Marine Orders 21, 27 and 30).	**MC 1.1.1** Marine verification records demonstrate compliance with standard maritime safety procedure (Marine Orders 21, 27 and 30).

EPOs, EPSs and MC for Xena-03 Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	C 1.4 Establishment of a 500 m SEZ around MODU installation vessel and communicated to marine users.	**PS 1.4** No entry of unauthorised vessels within the 500 m SEZ.	**MC 1.4.1** Daily Operations Reports and Incident records demonstrate breaches by unauthorised vessels within the SEZ are recorded.
	C 1.5 For Xena-03 Tie-back activities, reasonable attempts at removal of wellhead(s) will be made in the event of a respud.	**PS 1.5** Removal of wellheads attempted during the PAP in the event of a respud.	**MC 1.5.1** Daily Drilling Reports demonstrate reasonable attempts at wellhead removal are made.
	C 1.6 MODU mooring systems (chains/ wires and anchors) will be removed	**PS 1.6** Mooring systems (chains/wires and anchors) will be removed.	**MC 1.6.1** Records demonstrate mooring systems (chains/wires and anchors) were removed.
	C 1.8 Consultation undertaken in support of the Petroleum Activities Program, so that marine users are informed and aware	**PS 1.8** Implement a consultation process that conforms to the requirements of the Environment Regulations.	**MC 1.8.1** Consultation records demonstrate a consultation program that conforms to the requirements of the Environment Regulations has been undertaken (refer to Section 5).
	C 1.9 Notify AHO of activities no less than four working weeks prior to scheduled activity commencement date	**PS 1.9** Notification to AHO of activities and movements to allow generation of navigation warnings (MSIN and NTM) (including AUSCOAST warnings where relevant)).	**MC 1.9.1** Consultation records demonstrate that AHS has been notified before commencing an activity to allow generation of navigation warnings (MSIN and NTM (including AUSCOAST warnings where relevant)).
	C 1.10 Notify AMSA ARC least 24-48 hours before operations commence.	**PS 1.10** Notification to AMSA JRCC to prevent activities interfering with other marine users. AMSA's JRCC will require the MODU's details (including name, callsign and Maritime Mobile Service Identity (MMSI)), satellite communications details (including INMARSAT-C and satellite telephone), area of operation, requested clearance from other vessels and need to be advised when operations start.	**MC 1.10.1** Records demonstrate a once-off notification provided to AMSA's JRCC within required timeframes before mobilisation.

EPOs, EPSs and MC for Xena-03 Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	C 1.11 Notify relevant persons for Xena-03 Tie-back activities within the PAP that commence more than a year after EP acceptance.	**PS 1.11** Relevant persons and/ or organisations will be notified prior to scheduled activity commencement date where Xena-03 Tie-back activities within the PAP commence more than a year after EP acceptance.	**MC 1.11.1** Consultation records demonstrate relevant persons and/or organisations have been notified if Xena-03 Tie-back activities commence more than a year after EP acceptance.
	C 1.12 Notify DoD no less than four weeks before Xena-03 Tie-back activities commence.	**PS 1.12** Woodside will provide DoD activity notification no less than 4 weeks prior to commencement of drilling, well interventions/workovers or subsea installation activities.	**MC 1.12.1** Consultation records demonstrate that DoD and AHO have been notified prior to commencement of drilling or subsea installation activities.
	C 1.13 Notify relevant government departments, fishing industry representative bodies and licence holders of activities prior to commencement and upon completion of the Xena-03 Tie-back activities.	**PS 1.13** AFMA, DCCEEW, CFA, DAFF – Fisheries, Recfishwest, DPIRD, WAFIC and relevant Fishery Licence Holders (North West Slope and Trawl Fishery, Western Deepwater Trawl Fishery) will be notified no less than ten days before activity commences and following completion of activities.	**MC 1.13.1** Consultation records demonstrate that listed relevant persons have been notified prior to commencement and following completion of drilling or subsea installation activities.

EPOs, EPSs and MC for Xena-03 Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	C 1.15 Develop a SIMOPS Plan to manage MODU interactions with other facilities/vessels, where multiple campaigns occur within the PAA (i.e. during xmas tree installation). SIMOPS Plan will contain information on: • minimum separation distances • communications • MODU/vessels/ activities involved in SIMOPS • exclusion zone entry and exit processes • ROV operations • helicopter operations • key roles, responsibilities and emergency contacts • PTW arrangements • incident reporting and investigation • management of change.	**PS 1.15** MODU and applicable vessels compliant with SIMOPS Plan.	**MC 1.15.1** Records demonstrate implementation of SIMOPS Management Plan when MODU working in vicinity of other facilities/vessels, i.e. during xmas tree installation.

6.7.2 Physical Presence: Disturbance to the Seabed

Context		
Facility Layout and Description – Section 3.4 Facility Operations – Section 3.5 Subsea, Inspection, Maintenance and Repair Activities – Section 3.10 Xena-03 Drilling and Tie-back Activities – Section 3.11 Vessel-based Activities for the Xena-03 Tie-back – Section 3.12	Physical Environment – Section 4.4 Habitats and Biological Communities – Section 4.5	Consultation – Section 5

Impacts and Risks Evaluation Summary

Source of Impact	***Environmental Value Potentially Impacted***							***Evaluation***						
	Soil and Groundwater	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/Habitat	Species	Socio-economic	Decision Type	Consequence/Impact	Likelihood	Risk Rating	ALARP Tool	Acceptability	Outcome
Presence of Pluto facility and subsea infrastructure		x	x		x			A	E	-	-	LCS GP PJ	Broadly Acceptable	EPO 2a EPO 2b EPO 30
Subsea operations, inspection, monitoring maintenance and repair activities including installation of pig receivers/launchers at the subsea wells		x	x		x				E					
Presence of redundant infrastructure remaining infield until facility EOFL		x	x		x				F					
Disturbance to seabed from drilling operations		x	x		x				F					
Disturbance to seabed from subsea installation of infrastructure (e.g., flowlines, umbilicals, flying leads) as well as rectification and stabilisation activities (e.g., installation of concrete mattresses)		x	x		x				F					
Disturbance to seabed from ROV operation (including localised sediment relocation from sediment mobilisation techniques and marine growth removal)		x	x		x				E					
Disturbance to seabed from mooring installation		x	x		x				E					

Placement and retrieval of seabed transponders and temporary installation aids		x	x		x				E					

Description of Source of Impact

Seabed disturbance associated with the PAP can occur during operations and Xena-03 Tie-back activities, including:

- physical presence of the facility and subsea infrastructure (operational and redundant) scour, spans, and flowline movement inherent in design
- subsea IMMR activities
- Xena-03 Tie-back activities.

Pluto Operations

Physical Presence

The physical presence of the Pluto facility provides hard substrate habitats from the surface to the seabed via jackets and risers, as well as along the seabed from pipelines, flowlines and manifolds. The presence of subsea infrastructure and the interaction with hydrodynamic processes may result in localised scouring to the seabed and localised sedimentation of fine substrates around infrastructure. An ASV may be present in the PAA as described in Section 3.8.3. The ASV is not expected to anchor or disturb sediment.

Flowline movement may occur as per design and within integrity margins along the flowline corridors. Normal flowline operational movement occurs due to factors such as flowline buckling, walking and varying metocean conditions. Lateral movement can occur within the flowline corridor. Management of flowline buckling and walking, and scouring around subsea infrastructure may necessitate IMMR activities, as part of integrity management practices.

Subsea IMMR Activities

Woodside may be required to undertake routine subsea IMMR activities within the PAA, to maintain the integrity of subsea infrastructure. IMMR activities identified as impacting the benthic environment include:

- inspections – localised sediment resuspension by ROV
- marine growth removal – localised resuspension of sediment; removal of marine biota from subsea infrastructure and the Pluto facility jacket
- sediment relocation – localised modification of benthic habitat and sediment resuspension
- span rectification, pipeline protection and stabilisation – minor, localised modification of benthic habitat within footprint of area subject to rectification/protection/stabilisation
- flowline and umbilical replacement – minor, localised modification of benthic habitat in the vicinity of the flowline/umbilical
- spool repair/replacement – minor, localised modification of benthic habitat in the vicinity of the spool
- temporary placement of tools on the seabed, such as baskets – minor localised modification of the benthic habitat in the vicinity of the items.
- pig launcher/receiver installation and retrieval – minor, localised modification of benthic habitat and sediment resuspension in the vicinity of the receiver.

The area of benthic habitat predicted to be impacted varies depending on the nature and scale of the IMMR activity, however, no impact is expected beyond the PAA. Span rectification is the IMMR activity with the greatest potential to modify benthic habitats, due to the alteration of the existing soft sediment habitat to hard substrate. Woodside's operational experience on the North West Shelf indicates these activities (e.g., span rectification, pipeline protection and stabilisation) are typically restricted to relatively short (tens of metres) linear sections of pipeline, with areas of up to approximately 200 m² impacted. Refer to MEE-02 Subsea equipment loss of containment which includes controls to limit scour and flowline movement within integrity requirements.

Xena Tie-back Drilling and MODU Operations

Drilling activities may result in intermittent or discontinuous direct physical or mechanical disturbance to the seabed up to an approximate 100 m radial distance around the Xena-03 well location due to the installation of the BOP and conductor. Potential impacts to the seabed from the generation and discharge of cuttings and drilling fluids are considered in Section 6.7.8 and Section 6.7.9 respectively.

Mooring Installation and Anchor Hold Testing

The Xena-03 well may be drilled using a moored or hybrid MODU. Seabed disturbance will result from installation of the MODU anchor mooring system (supported by AHVs), including placement of anchors and chain/wire/fibre lines on the seabed, potential dragging during tensioning, and recovery of anchors. Mooring may require an 8 to 12 point pre-laid mooring system, with RAR and buoyed arrangements an option, depending on the time of year. Although the exact anchoring configurations are not finalised, a semi-submersible MODU with an 8 to 12-point anchoring system

could disturb up to 0.013 km² (13,000 m²), allowing for anchor footprint and disturbance from anchor chains (NERA, 2018).

The area of seabed affected by mooring installation depends upon water depth, currents, size of the vessels and anchors, and length of anchor chain (NERA, 2018). Seabed disturbance from mooring installation and anchor hold testing will result in localised, small scale seabed disturbance relating to the benthic habitats described in Section 4.5.

The planned anchoring activities are to be within the parameters defined in the Anchoring of Vessels and Floating Facilities Environment Plan Reference Case (Department of Industry, Innovation and Science, undated) for all anchoring activities performed by vessels and floating facilities (excluding FPSOs and Floating LNG vessels) during the PAP, including:

- installation of moorings, buoys, equipment or other infrastructure for a period of up to two years
- wet storage on seabed of anchor chains, etc. during activities up to two years
- activities with total areas of seabed disturbance less than 13,000 m²
- locations of water depth greater than 70 m. This boundary is set to exclude areas of sensitive primary producer habitats (e.g., corals, seagrass) that occur in shallower waters.

Subsea Installation Activities

Subsea installation will include the installation of subsea infrastructure (including placement of materials/equipment on the seabed), supporting structures (including wellhead, flowline, flying leads, subsea distribution unit, mudmats) and installation aids (clump weights, concrete mattresses, sandbags). Subsea infrastructure components are described in Section 3.4. The estimated total footprint of the Xena-03 Tie-back is 1405 m², with additional subsea infrastructure including the 500 m flowline, wellhead, EHU, concrete mats and UTAs.

Subsea structures (subsea distribution unit, mudmats) will be deployed to the seabed by the installation vessel's primary crane and guided to final position by ROV. Commencement of the flowline installation generally requires tension to the flowline as it transitions from the installation vessel to the seabed. Therefore, commencement of the flowline installation may start with landing the end of flowline termination head into the manifold connection system or on the seabed attached to the initiation anchor (drag anchor or clump weight/dead anchor). This will cause small, localised and temporary impacts to water quality in the vicinity of flowline landout.

Once the termination end is fully landed, the flowline is to be continuously laid using vertical lay system and at the same time, the ROV monitors the touch-down point on the seabed as well as the flexible lay back radius. Flying leads will be deployed to the seabed in deployment baskets, and final subsea tie-in will be completed using ROVs.

Span Rectification

The optimum flexible flowline route will be selected by considering seabed bathymetry, pre-installation ROV surveys and installation risk management, including dropped object risks and buckling/walking impacts. This reduces the potential for spanning and therefore the need for span rectification, while avoiding potential hard substrate habitats.

Where span rectification is required, concrete mattresses may be positioned at the identified free span location using the vessel crane and ROV. The dimensions for each concrete mattress are expected to be 6 m × 3 m × 0.3 m. Post-lay span rectification may involve placing grout bags (multiple ~25 kg) on the seabed, with the extent of any impact limited to the footprint of the installed flexible flowline.

Scouring

Scouring is the movement of sediment around the base of subsea structures due to prevailing wind conditions. Concrete mattresses may be installed at the Xena-03 UTA if required, to mitigate scouring.

Stabilisation

Stabilisation is a post lay activity so that light items, such as HFL, EFL and flowlines, remain at their installed positions; i.e., not being shifted due to strong seabed current, by installing sand bags on top of HFLs, EFLs and flowlines at a predetermined distance apart. Sandbags generally come in a standard size with 20 kg to 40 kg weight. Concrete mattresses may also be used for stabilisation of some sections of the Xena-03 flexible flowline subject to detailed design.

Crossings

Sandbags or concrete mattresses may be installed for crossings over existing umbilicals or flowlines.

Wet Storage of Equipment

Temporary wet storage of installation aids may be required intermittently during Xena-03 Tie-back activities. Installation aids will be recovered at the completion of the Xena-03 Tie-back activities by ROV and project vessels.

ROV Operations

The use of an ROV during drilling and subsea installation activities may result in temporary seabed disturbance and suspension of sediment as a result of working close to, or occasionally on, the seabed. ROV use close to or on the seabed is limited to that required for effective and safe subsea activities. The footprint of a typical ROV is about 2.5 m × 1.7 m (4.25 m²).

Additionally, an ROV may be used to relocate small amounts of sediment material to create a stable, level surface and reduce the potential for scouring from subsea equipment (e.g., BOP).

Marine Growth Removal

Excess marine growth may need to be removed following return to well after a period of suspended drilling. Removing marine growth is undertaken via a high-pressure water and/or brushes or acid, by ROV.

Underwater Transponders

An array of long base line (LBL) transponders may be installed on the seabed as required to support drilling and subsea installation activities. Transponders may be moored to the seabed either by a clump weight or mounted on a seabed frame. The standard clump weights used, made of cement or steel, will likely weigh about 80 kg. A typical seabed frame is 1.5 m × 1.5 m × 1.5 m in dimension and weighs about 40 kg. On completion of the positioning operation, the array transponders moored by clump weight will be recovered by means of a hydrostatic release and the clump weights removed from the seabed. The transponders mounted on seabed frames will be removed by ROV.

Contingency Activities

Woodside may need to intervene or workover the Xena-03 well. Any seabed disturbance would be the same as those described for drilling operations and MODU operations. In addition, in the event of a respud of the Xena-03 well, the base case would be to remove the wellhead. However, if reasonable attempts at wellhead removal are unsuccessful, a wellhead may remain in situ until the end of field life. If this is the case, it will be recorded in a database and monitored and maintained until decommissioned. If a wellhead is left in-situ, there would be localised seabed disturbance at the wellhead location.

Impact Assessment

Drilling, subsea installation, IMMR activities and physical presence of subsea infrastructure can be categorised into two potential impacts:

- direct physical disturbance of benthic habitat
- indirect disturbance to benthic habitats from sedimentation.

ROVs working well above the seabed do not have an impact on the seabed.

Water and Sediment Quality

Seabed disturbance may include localised and temporary decline in water quality due to increased suspended sediment concentrations and increased sediment deposition caused by drilling, subsea installation and IMMR activities near the seabed. Similarly, removal of marine growth from the Pluto jacket for structural integrity maintenance, carried out on an as required basis, would cause localised temporary decrease in water quality and suspended sediment from water jetting activities.

Each discrete IMMR activity near the seabed is likely to cause a single brief disturbance resulting in a transient plume of suspended sediment. This plume will subsequently be deposited down current as particles settle out. Such localised and short-term events may affect small areas of the seabed and consequently, impact the associated biota (typically sparsely distributed infauna and sessile fauna). Given the expected nature and scale of resuspension resulting from IMMR activities, impacts such as smothering or burial are not expected. Rather, impacts are likely to be restricted to increased ingestion of sediments by filter feeders. Biota in the region are well adapted to periodic turbidity events caused by cyclones and tidal movements. As such, impacts from turbidity caused by IMMR activities are not expected to have any lasting effect on benthic biota.

Benthic Habitats

The Pluto facility is located within deeper offshore waters (~85 m) approximately 152 km north-west of Dampier and includes the riser platform, hydrocarbon gathering system and export pipeline, extending through shallower waters to the state-waters boundary. The benthic habitat within the PAA is predominantly soft sediment (Section 4.5) with sparsely associated epifauna, which is broadly represented throughout the NWSP and NP Provinces.

Benthic communities in the soft sediment seabed are characterised by burrowing infauna such as polychaetes, with biota such as sessile filter feeders occurring on areas of hard substrate (such as subsea infrastructure).

Direct seabed disturbance, including permanent modification of benthic communities, may result as a consequence of IMMR activities, such as span rectification, pipeline protection and stabilisation. These activities typically disturb a small area (typically <200 m²) of soft sediment habitat, which is broadly represented in the PAA and wider NWMR region.

Drilling

Physical impacts from drilling activities (excluding impacts from routine and non-routine discharges such as drill cuttings assessed in Section 6.7.8) are expected to be for the most part confined to sediment burrowing infauna and surface epifauna invertebrates, particularly filter feeders, inhabiting the seabed directly around the Xena-03 well. Impacts from the installation of subsea infrastructure are expected to be confined to sediment burrowing infauna and surface epifauna invertebrates, particularly filter feeders, inhabiting the seabed directly around the installation site. Impacts to these broadly represented communities are expected to be highly localised with no significant impact.

Seabed disturbance will be limited to the wellhead (100 m radial distance), subsea infrastructure and anchoring physical footprint (estimated at up to 0.013 km²); a small proportion of the benthic habitat and associated communities of the PAA will be affected. Marine life such as deep water benthic communities epifauna and infauna (living on and in the sediment dominated habitat), may be impacted from the placement of project infrastructure (i.e., Xena-03 wellhead, flowline and subsea infrastructure), or placement of temporary supporting infrastructure (anchors, installation aids) and equipment (e.g. mud mats) on the seabed. Potential impacts include burial or smothering of benthic biota from localised sediment deposition, particularly to sessile epifauna such as sea pens and infauna (polychaetes); and potential clogging or damage to the physiological functioning of certain biota (sea pens, polychaetes) reliant on external respiratory and feeding structures from elevated suspended sediment load (turbidity). Secondary impacts may include highly localised alterations to epifauna and infauna communities (Newell et al., 1998).

Mooring installation activities (MODU) are likely to result in localised physical modification to a small area of the seabed and disturbance to soft sediment. An anchor must travel a certain horizontal distance before penetrating and embedding into the seabed. The drag length of the anchors may be up to a linear distance of 100 m from the drop location (NERA, 2018). The disturbance footprint extends beyond this distance with the anchor chain. The maximum disturbance radius of each anchor drop will therefore not exceed the drag length, plus the additional length of the anchor chain that comes into contact with the sea floor (4000 m). Following recovery of the anchors, impacts from the disturbance (estimated at up to 0.013 km²) are expected to be localised and short-term, with the underlying conditions present to support re-colonisation and recovery after the activity has been completed (Ingole et al., 2005).

ROV activities associated with IMMR and Xena-03 Tie-back operations, near the seafloor and small amounts of sediment relocation may result in slight and short-term impacts to deepwater biota, detailed above, as a result of elevated turbidity and localised sedimentation. However, elevated turbidity and sedimentation would only be expected to be slight and short-term, and is therefore, not expected to have any consequential impact to environment receptors.

Values and Sensitivities

Ancient Coastline at 125 m Depth Contour

The Facility Operational Area overlaps approximately 9 km² of the 16,190 km² Ancient Coastline, which is about 0.06% of the KEF. The Facility Operational Area represents a 1500 m² buffer around the Pluto subsea infrastructure to facilitate vessel operations; the potential for seabed disturbance is much more localised (i.e., within tens of metres of the subsea infrastructure).

Benthic habitat surveys in the region (including within the Ancient Coastline at 125 m depth contour KEF) indicate that benthic habitats within the KEF are characterised by sand interspersed with areas of rubble and outcroppings of limestone pavement (AIMS, 2014b; RPS, 2011). Such habitats are widely distributed in the NWMR. No significant escarpments, species of conservation significance, emergent features or areas of high biological productivity characteristically associated with the Ancient Coastline at 125 m KEF have been observed in the Facility Operational Area. As noted in Section 4.7, the geomorphic feature associated with this KEF is represented worldwide and represents the coastline during a previous glacial period. These impacts are discussed in relation to filter feeders above. Therefore, potential impacts to this regional-scale KEF are expected to be negligible.

Continental Slope Demersal Fish Communities

The Facility Operational Area and the Xena-03 Operational Area overlap the Continental Slope Demersal Fish Communities KEF. Seabed disturbance will have no adverse environmental impact on this KEF and the presence of the riser platform and subsea infrastructure may provide habitat for demersal fish communities potentially having a low level positive environmental impact.

Montebello Australian Marine Park (IUCN IV)

A small portion of the Pluto Export Pipeline Operational Area overlaps the Montebello Marine Park Multiple Use Zone. The Marine Park includes values associated with the shallow shelf environment; however, no pinnacle or terrace seafloor features are found within the Operational Areas.

Direct loss of sediments in the Marine Park may be possible if IMMR activities include the placement of materials on the seabed. In addition, indirect impacts may occur as a result of sedimentation. These impacts are discussed in relation to soft sediment benthic habitats above.

Cultural Heritage

As described in Section 4.10, the PAA overlaps the Ancient Coastline at 125 m depth contour KEF. The wider Xena-03 Operational Area overlaps the Ancient Coastline KEF, the targeted well location and installation activities for the Xena-03 well are not within the Ancient Coastline KEF. Therefore, there may be the potential that Indigenous Cultural features may exist, and these may potentially be impacted during seabed disturbance resulting from operations and associated activities. While no cultural features have been identified in the PAA, consultations with First Nations groups have been undertaken for the Petroleum Activities Program.

Cumulative Impacts

Seabed disturbance may arise from the Pluto facility, subsea infrastructure and IMMR activities as well as Xena-03 tie-back activities at a localised level limited to well within the PAA. At a regional scale, cumulative impacts also arise from the presence of the Wheatstone platform and associated subsea infrastructure and activities. The activities are expected to incur localised and temporary declines in water quality and modification of soft sediment habitat where

infrastructure has a physical footprint. These impacts are considered to be temporary and, in the case of benthic habitat modification, limited relative to the vast representation of similar habitat in the PAA and surrounds as well as regionally. Cumulative impacts are considered to be localised and temporary, or in the case of physical footprints, to be slight relative to the presence of similar habitat in the PAA and regionally.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Legislation, Codes and Standards				
For Xena-03 subsea tie-back activities, reasonable attempt(s) at removal of wellhead will be undertaken in the event of a respud and if unable to be removed, is monitored and maintained.	F: Yes. CS: Additional cost. Standard practice.	In accordance with OPGGS Act Section 572.	Benefits outweigh cost/ sacrifice.	Yes Refer to C 1.5
MODU mooring systems (chains/wires and anchors) will be removed.	F: Yes. CS: Additional cost. Standard practice.	In accordance with OPGGS Act Section 572.	Benefits outweigh cost/ sacrifice.	Yes Refer to C 1.6
A ROV survey will be undertaken post maintenance or repair activity, and post Xena-03 Tie-back activities, to confirm all temporary equipment has been removed and to record location of new subsea infrastructure.	F: Yes. CS: Minimal cost ROV as left survey is standard practice.	In accordance with OPGGS Act Section 572 all equipment is removed when no longer in use.	Legislative requirement.	Yes C 2.1
Location of subsea infrastructure and temporary equipment brought into the PAA, is tracked and recorded.	F: Yes. CS: Minimal cost. Standard Practice.	In accordance with OPGGS Act Section 572 the location of equipment is tracked to enable future removal.	Benefits outweigh cost/sacrifice.	Yes C 2.2
Monitoring and maintenance of redundant infrastructure is undertaken in accordance with the IMMR process.	F: Yes. CS: Minimal cost. Standard practice.	Monitoring and maintenance of redundant subsea infrastructure undertaken to enable cost efficient and safe removal and meet Section 572(2) and (3) of the OPGGS Act.	Legislative requirement.	Yes C 2.3
Remove redundant infrastructure as soon as it is no longer used, nor to be used.	F: Yes. CS: Removal of property throughout the operational life where it is incorporated within or located close to live infrastructure introduces	While subsea equipment is in-situ, risks and impacts to the seabed are considered to be low, so only a minor reduction in sediment/habitat disturbance from less infrastructure in the PAA would be achieved.	Cost of standalone retrieval work scopes are considered disproportionate to the benefit gained when considering the risks of retrieval during current	No

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
	additional complexities and HSE risk that can be avoided if removed during EOFL decommissioning.		operations versus risk of extending duration in-situ. Wet-stored subsea infrastructure is also RBI-assessed and managed while preserved to ensure integrity and retrieval options are maintained for potential full removal.	
Good Practice				
Subsea infrastructure will be positioned within planned footprint to reduce seabed disturbance.	F: Yes. CS: Standard practice.	Ensures risks appropriately addressed for seabed disturbance.	Benefits outweigh cost/sacrifice.	Yes C 2.4
Xena-03 Project-specific Basis of Well Design, which includes an assessment of seabed sensitivity.	F: Yes. CS: Minimal cost. Standard practice.	Reduces the likelihood of anchoring occurring in areas of high sensitivity.	Benefits outweigh cost/sacrifice.	Yes C 2.5
Project-specific MODU Mooring Design Analysis.	F: Yes. CS: Additional costs associated with upgraded MODU mooring design.	The mooring design analysis determines the number and spread of anchors required based on sediment type and seabed topography, reducing the likelihood of anchor drag leading to seabed disturbance.	Benefits outweigh cost/sacrifice.	Yes C 2.6
Positioning technology used to place seabed infrastructure within the design footprint to reduce seabed disturbance.	F: Yes. CS: Minimal cost. Standard practice.	Use of positioning technology to position infrastructure on the seabed with accuracy will reduce seabed disturbance.	Benefits outweigh cost/sacrifice.	Yes C 2.7
Wet parked items will be tracked and removed from the seabed (monitoring and maintenance).	F: Yes. CS: Minimal cost. Standard practice.	Ensures inventory of equipment is maintained and no wet parked items are unintentionally left in situ.	Benefits outweigh cost/sacrifice.	Yes C 2.8
Unexpected finds of potential Underwater Cultural Heritage sites/ features, including First Nations UCH are managed in accordance	F: Yes. CS: Cost of implementation.	Allows management of Unexpected Finds in accordance with legislative requirements, (including Underwater Cultural Heritage Guidance for Offshore	Benefits outweigh cost/ sacrifice.	Yes C 30.1

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
with an Unexpected Finds Procedure set out in Section 7.8.		Developments and the guidelines for assessing and managing impacts to underwater cultural heritage(DCCEEW 2024c),, expert advice and community expectations.		
Report any potential UCH finds to relevant stakeholders and authorities in accordance with the Unexpected Finds Procedure, Underwater Cultural Heritage Act 2018 and the ATSIHP Act	F: Yes. CS: Minimal costs associated with reporting process.	Meets legislative requirements and community expectations.	Benefit outweighs cost/ sacrifice.	Yes C 30.2
Relevant vessel crew, USV remote operators and ROV operators will be advised in an induction of the potential to encounter UCH and requirement to follow the Unexpected Finds Procedure	F: Yes. CS: Minimal costs associated with reporting process.	Ensures workforce are suitably aware of legal and process requirements for managing cultural features and heritage values.	Benefits outweigh cost/ sacrifice.	Yes C 30.3
Professional Judgement – Eliminate				
Vessels used for IMMR/ Support Vessels used for Xena-03 Tie-back activities will not anchor under routine operations.	F: Yes. CS: Minimal. Subsea support vessels undertaking IMMR activities typically do not anchor	By not anchoring, the potential impacts to benthic habitat are reduced.	Benefits outweigh cost/sacrifice.	Yes C 2.9
ASV will not anchor under routine operations.	F: Yes. CS: Minimal. ASV undertaking platform support activities typically do not anchor.	By not anchoring, the potential impacts to benthic habitat are reduced.	Benefits outweigh cost/sacrifice.	Yes C 2.10
Pre-lay survey undertaken prior to installation of flowlines.	F: Yes CS: Minimal cost.	May identify potential environmental sensitivities within subsea infrastructure footprint. Given the relatively small footprint and previous observations in the Operational Area, no particularly sensitive benthic habitats are expected to occur. Pre-lay surveys are routinely undertaken for engineering purposes.	Benefits outweigh cost/sacrifice.	Yes C 2.11

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Do not use ROV close to, or on, the seabed.	F: No. The use of ROVs (including work close to or occasionally landed on the seabed) is critical as the ROV is an integral part of IMMR activities. CS: Not assessed, control not feasible.	Not assessed, control not feasible.	Not assessed, control not feasible.	No
Do not complete anchor hold testing for the MODU.	F: No. Anchor hold testing is a requirement for a moored MODU and it is not technically feasible for the MODU to use DP in the water depth of the well location (about 130 m). Woodside has a demonstrated capacity to manage the environmental risks and impacts from mooring to a level that is ALARP and acceptable. CS: Not assessed, control not feasible.	Not assessed, control not feasible.	Not assessed, control not feasible.	No
Professional Judgement – Substitute				
None identified.				
Professional Judgement – Engineered Solution				
Monitoring and maintenance of subsea infrastructure to manage scour and flowline movement to within integrity envelope.	F: Yes, subsea inspection maintenance and integrity monitoring is undertaken which inherently controls extent of scour and flowline movement. CS: Minimal cost. Standard practice	Monitoring and maintenance of subsea infrastructure confirms benthic seabed disturbance is limited to design flowline corridor.	Control is WMS requirement – must be adopted.	Yes C 2.12 Refer also MEE-02

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Monitoring of seabed surrounding riser platform and subsea infrastructure.	F: Yes. ROV footage collected as part of subsea integrity surveys could be reviewed to observe and detect changed in benthic habitats. CS: Costs associated with the review of collected footage.	Limited environmental benefit (information) gained from monitoring benthic habitats.	Given the sparsely populated infauna habitat and low sensitivity of the environment surrounding the facility and associated subsea infrastructure, any environmental benefit gained is outweighed by costs associated with implementing control.	No
ALARP Statement: On the basis of the environmental impact assessment outcomes and use of the relevant tools appropriate to the decision type, Woodside considers the adopted controls appropriate to manage the impacts of seabed disturbance from Xena-03 Tie-back activities and subsea IMMR activities. As no reasonable additional/alternative controls were identified that would further reduce the impacts without grossly disproportionate sacrifice, the impacts and risks are considered ALARP.				
Demonstration of Acceptability				
Acceptability Statement: The impact assessment has determined that, given the adopted controls, seabed disturbance from subsea activities is unlikely to result in a potential impact greater than slight, short-term impact to benthic habitats and marine sediments and water quality. Further opportunities to reduce the impacts have been investigated above. The adopted controls are considered good oil-field practice/industry best practice. The potential impacts are considered broadly acceptable if the adopted controls are implemented. Therefore, Woodside considers the adopted controls appropriate to manage the impacts of Xena-03 Tie-back activities and subsea IMMR activities to a level that is broadly acceptable; and demonstrate the EPOs are met.				

EPOs, EPSs and MC for Pluto Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 2a Seabed disturbance to be limited to planned activities and impacts described as part of the PAP and to not occur outside the Pluto Operational Area.	**C 2.1** A ROV survey will be undertaken post maintenance or repair activity to confirm temporary equipment has been removed and to record location of new subsea infrastructure.	**PS 2.1** Temporary equipment is removed.	**MC 2.1.1** As-left survey confirms temporary equipment is removed.

EPOs, EPSs and MC for Pluto Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	C 2.2 Location of subsea infrastructure and temporary equipment brought into the PAA is tracked and recorded.	**PS 2.2** Location of equipment, including infrastructure made redundant by the installation of a replacement, is recorded and updated in an inventory.	**MC 2.2.1** Records confirm location of replacement equipment and remaining redundant equipment.
	C 2.3 Monitoring and maintenance of redundant infrastructure is undertaken in accordance with the IMMR process.	**PS 2.3** IMMR/RBI process is applied to redundant equipment.	**MC 2.3.1** Records demonstrate that the IMMR/RBI process has been applied to redundant infrastructure.
			MC 2.3.2 Inspections and maintenance activities have been completed in accordance with the IMMR/RBI process.
	C 2.9 Vessels used for IMMR will not anchor under routine operations.	**PS 2.9.1** Vessels used for IMMR activities will not anchor under routine operations.	**MC 2.9.1** Records demonstrate no anchoring during IMMR activities.
	C 2.10 ASV will not anchor under routine operations.	**PS 2.10** ASV will not anchor under routine operations.	**MC 2.10.1** Records demonstrate no anchoring during ASV activities.
	C 2.12 Monitoring and maintenance of subsea infrastructure to manage scour and flowline movement within integrity envelope.	**PS 2.12** Integrity will be managed in accordance with SCE Management Procedures (Section 7.4) and SCE Technical Performance Standard(s) to prevent environment risk related damage to SCEs for: • P09 – Pipeline Systems, to maintain the minimum required mechanical integrity to prevent loss of containment due to scour/flowline movement.	**MC 2.12.1** Records demonstrate implementation of SCE Technical Performance Standard(s) and Management of Hardware Controls in the Operate Phase Procedure (Section 7.4.2), in order to achieve the functional objective of the control. Records may include implementation and maintain/assure and manage-change information summarised in Section 7.4.2

EPOs, EPSs and MC for Pluto Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 30 No adverse impact to unexpected finds of Underwater Cultural Heritage[50] without a permit[51].	**C 30.1** Unexpected finds of potential Underwater Cultural Heritage sites/ features, including First Nations UCH are managed in accordance with an Unexpected Finds Procedure set out in Section 7.8	**PS 30.1** Relevant IMMR vessel crew and USV remote operators (including ROV operators) are made aware of the requirements of the Unexpected Finds Procedure set out in Section 7.8	**MC 30.1.1** No non-compliance with the Unexpected Finds Procedure.
	C 30.2 Report any potential UCH finds to relevant stakeholders and authorities in accordance with the Unexpected Finds Procedure, *Underwater Cultural Heritage Act* 2018 and the ATSIHP Act.	**PS 30.2** Report any finds of potential UCH in accordance with the Unexpected Finds Procedure (Section 7.8) including to: • WA Museum as requested during EP consultation • Australasian Underwater Cultural Heritage Database via DCCEEW.	**MC 30.2.1** Records demonstrate IMMR vessel crew, and USV remote operators are made aware of potential to encounter UCH.
	C 30.3 Relevant vessel crew and ROV operators will be advised in an induction of the potential to encounter UCH and requirement to follow the Unexpected Finds Procedure	**PS 30.3** In the event that an underwater cultural heritage site or feature is identified implement the Unexpected Finds Procedure set out in Section 7.8	**MC 30.3.1** Records of potential UCH finds reported to relevant authorities and persons.

EPOs, EPSs and MC for Xena-03 Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 2b Seabed disturbance to be limited to planned activities and impacts described as part of the PAP and will not	**C 1.5** For Xena-03 Tie-back activities, reasonable attempts at removal of wellhead(s) will be made in the event of a respud.	**PS 1.5** Removal of wellheads attempted during the PAP in the event of a respud.	**MC 1.5.1** Daily Drilling Reports demonstrate reasonable attempts at wellhead removal are made.

[50] Underwater Cultural Heritage is defined as any trace of human existence that has a cultural, historical or archaeological character and is located under water, in accordance with the UCH Act

[51] Permit for Entry into a Protected Zone or to Impact Underwater Cultural Heritage would be acquired under the UCH Act.

EPOs, EPSs and MC for Xena-03 Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
occur outside the Xena-03 Operational Area.	**C 1.6** MODU mooring systems (chains/ wires and anchors) will be removed	**PS 1.6** Mooring systems (chains/wires and anchors) will be removed.	**MC 1.6.1** Records demonstrate mooring systems (chains/wires and anchors) were removed.
	C 2.1 A ROV survey will be undertaken post Xena-03 Tie-back activities to confirm temporary equipment has been removed and to record location of new subsea infrastructure.	**PS 2.1** Temporary equipment is removed.	**MC 2.1.1** As left survey reports confirm temporary equipment is removed.
	C 2.2 Location of subsea infrastructure and temporary equipment brought into the PAA is tracked and recorded.	**PS 2.2** Location of equipment, including infrastructure made redundant by the installation of a replacement, is recorded and updated in an inventory.	**MC 2.2.1** Records confirm location of replacement equipment and remaining redundant equipment.
	C 2.4 Subsea infrastructure will be positioned within planned footprint to reduce seabed disturbance.	**PS 2.4** All infrastructure will be placed within the design footprint within the Xena-03 Operational Area.	**MC 2.4.1** As-built survey reports verify location installation of equipment within the design footprint within the Xena-03 Operational Area.
	C 2.5 Xena-03 Project-specific Basis of Well Design, which includes an assessment of seabed sensitivity.	**PS 2.5** MODU well site locations consider seabed sensitivities.	**MC 2.5.1** Approved Basis of Well Design includes the assessment of seabed sensitivities.
	C 2.6 Project-specific MODU Mooring Design Analysis.	**PS 2.6** Seabed disturbance from MODU mooring limited to that required to ensure adequate MODU station holding capacity.	**MC 2.6.1** Records demonstrate Mooring Design Analysis approved and implemented during anchor deployment.
	C 2.7 Positioning technology used to place seabed infrastructure within the design footprint to reduce seabed disturbance.	**PS 2.7.1** Infrastructure will be positioned in the planned location where impacts have been assessed.	**MC 2.7.1** As-built survey reports verify installation of equipment within acceptable tolerance[52].

[52] Acceptable tolerance is considered to be ±150 m, given the homogenous and low sensitivity habitat.

EPOs, EPSs and MC for Xena-03 Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
		PS 2.7.2 Transponder equipment, including clump weights/frames, will be removed at the end of the Petroleum Activity Program.	**MC 2.7.2** Records demonstrate removal of transponder As-left survey reports confirm temporary equipment is removed.
	C 2.8 Wet parked items will be tracked and removed from the seabed.	**PS 2.8** Location of equipment, including infrastructure made redundant by the installation of a replacement, is recorded and updated in an inventory.	**MC 2.8.1** Records confirm location of replacement equipment and remaining redundant equipment.
	C 2.9 Support vessels used for Xena-03 Tie-back activities will not anchor under routine operations.	**PS 2.9.2** Vessels used for Xena-03 Tie-back activities will not anchor under routine operations.	**MC 2.9.2** Records demonstrate no anchoring during Xena-03 Tie-back activities.
	C 2.11 Pre-lay survey undertaken prior to installation of flowlines.	**PS 2.11** Pre-lay survey will be undertaken prior to the installation of flowlines.	**MC 2.11.1** Pre-lay survey report demonstrates survey was undertaken prior to installation of flowlines.
EPO 30 No adverse impact to unexpected finds of Underwater Cultural Heritage[53] without a permit[54].	**C 30.1** Unexpected finds of potential Underwater Cultural Heritage sites/ features, including First Nations UCH are managed in accordance with an Unexpected Finds Procedure set out in Section 7.8	**PS 30.3** Relevant MODU, support vessel crew and USV remote operators (including ROV operators) are made aware of the requirements of the Unexpected Finds Procedure set out in Section 7.8	**MC 30.1.1** No non-compliance with the Unexpected Finds Procedure.

[53] Underwater Cultural Heritage is defined as any trace of human existence that has a cultural, historical or archaeological character and is located under water, in accordance with the UCH Act

[54] Permit for Entry into a Protected Zone or to Impact Underwater Cultural Heritage would be acquired under the UCH Act.

EPOs, EPSs and MC for Xena-03 Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	C 30.2 Report any potential UCH finds to relevant stakeholders and authorities in accordance with the Unexpected Finds Procedure, Underwater Cultural Heritage Act 2018 and the ATSIHP Act.	**PS 30.2** Report any finds of potential UCH in accordance with the Unexpected Finds Procedure (Section 7.8)including to: • WA Museum as requested during EP consultation • Australasian Underwater Cultural Heritage Database via DCCEEW.	**MC 30.2.1** Records demonstrate vessel crew, and USV remote operators are made aware of potential to encounter UCH.
	C 30.3 Relevant vessel crew and ROV operators will be advised in an induction of the potential to encounter UCH and requirement to follow the Unexpected Finds Procedure	**PS 30.3** In the event that an underwater cultural heritage site or feature is identified implement the Unexpected Finds Procedure set out in Section 7.8	**MC 30.3.1** Records of potential UCH finds reported to relevant authorities and persons.

6.7.3 Acoustic Emissions: Generation of Noise for Facility Operations

Context		
Facility Layout and Description – Section 3.4 Facility Operations – Section 3.5 Support Vessel Operations – Section 3.8 Helicopter Operations – Section 3.8.6 Subsea IMMR Activities – Section 3.10	Protected Species – Section 4.6	Consultation – Section 5

Impacts and Risks Evaluation Summary

Source of Impact	***Environmental Value Potentially Impacted***							***Evaluation***						
	Soil and Groundwater	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/Habitat	Species	Socio-economic	Decision Type	Consequence/Impact	Likelihood	Risk Rating	ALARP Tool	Acceptability	Outcome
Noise generated from: • Pluto facility and associated subsea infrastructure • vessels (platform support and supply vessels as well as ASV) • helicopters • subsea IMMR activities (routine and non-routine) and positioning equipment						x		A	F	-	-	LCS GP PJ	Broadly Acceptable	EPO 3a EPO 3b

Description of Source of Impact

The facility and associated subsea infrastructure, platform-related vessel activities (platform support and supply vessels as well as ASV), helicopters, IMMR activities and associated positioning equipment will generate noise both in the air and underwater, due to normal operation of machinery noise, propeller movement, and infrequent routine and non-routine activities. Typical noise levels for these sources are provided in Table 6-3, with more detailed descriptions provided below. This noise will contribute to and can exceed ambient noise levels which range from around 90 dB re 1 µPa sound pressure level (SPL) under very calm, low wind conditions, to 120 dB re 1 µPa SPL under windy conditions (McCauley, 2005).

Sound levels will fluctuate over the course of the PAP and will depend on concurrent vessel activities. Generally, sound associated with operations of the NNC Pluto facility and associated subsea infrastructure will be limited. Short-term increases in sound will occur from time to time associated with platform support and supply vessel operations in the vicinity of the Pluto Facility within the PSZ. It is also anticipated, that an ASV may be required at the Pluto Facility in connection with major maintenance campaigns once every 3-6 years for up to 90 days.

In addition to above-mentioned platform-related vessel activities, IMMR vessel activities may also occur intermittently in the vicinity of subsea infrastructure anywhere within the PAA.

Key acoustic sources associated with the PAP are described below. Table 6-3 presents potential concurrent activities contributing to cumulative underwater noise levels. This has been used to inform the worst-case credible sound propagation scenarios for modelling as well as cumulative impact assessment as a result of concurrent operations.

Table 6-3: Indicative source characteristics of underwater noise associated with the PAP as reported in Jiménez-Arranz et al. (2017) and by McCauley (2005) and McCauley (2002)

Acoustic Noise Sources	Estimated SPL (dB re 1 µPa SPL) @1 m unless otherwise stated	Frequency Range (kHz)
Vessels (Continuous)		
Platform support and supply vessels or USV, ASV using DP	182	Broadband
IMMR Activity Noise (Pulsed)		
Multibeam echo sounder (MBES)	210–247	12–675
Side scan sonar (SSS)	200–234	9–675
Sub-bottom profiler (SBP) (Pinger)	167–212	4–12
SBP (Chirp)	161–205	2–23
SBP (Boomer)	205–225	0.3–6
Wellhead, Flowlines and Subsea Infrastructure (Continuous)		
Wellhead	113	Broadband
Choke valve	155	Broadband
Production platforms		
Riser platform	110–130 @100 m	Broadband (mainly < 100 Hz)

** Range provided was not measured at the noise source; therefore, this should be used as an indicative estimate only and cannot be used to estimate exposure thresholds closer to the source.*

Continuous (Non-impulsive) Noise Sources

Platform Machinery and Flaring

Production platforms have machinery mounted on decks raised above the sea, hence, most noise is transmitted to the marine environment from air (i.e., power generation and operational flaring). Machinery noise on-board the riser platform may be radiated into the underwater environment via the jacket legs and risers, which may act as transducers. Monitoring programs have indicated that underwater noise from platforms is typically very low or not detectable (Jiménez-Arranz et al., 2017; McCauley, 2002).

The flare system will generate noise from combustion. Noise from flaring represents a health and safety risk to personnel, and noise from flaring was considered in the design of the facility to manage the occupational health and safety risks associated with noise (e.g., height specification of flare tower). Noise from flaring is emitted at the top of the flare tower, which has a flare boom length of 87 m. Noise from the tip of the flare is not constrained and will spread spherically in all directions.

Gales (1982) assessed noise from 18 oil and gas platforms, including 11 bottom-standing fixed platforms during production operations (i.e., consistent with the Pluto riser platform). The study found the strongest noise levels were relatively low frequency (<100 Hz, and mostly between 4 and 38 Hz), with sound levels of 110 to 130 dB re 1 µPa @100 m (Gales, 1982). Noise from the platforms was found to be lower than levels recorded from support vessels, with a cumulative increase in overall underwater noise of 20–30 dB from the noise produced by a support vessel operating in the vicinity of an operations platform (Gales, 1982).

Noise emitted from machinery on the riser platform is limited relative to other operating facilities due to its NNC status, smaller size and the lack of processing facilities on the riser platform. Therefore, it is likely that the range provided by Gales (1982) is a conservative estimate. Noise from the riser platform is not expected to significantly increase from operation of the Water Handling Module given the nature and duration of the activity. In summary, noise emissions generated by the facility are expected to be minimal.

Wellheads, Pipelines and Subsea Infrastructure

The noise produced by an operational wellhead was measured by McCauley (2002). The broadband noise level was very low, 113 dB re 1 µPa, which is only marginally above rough sea condition ambient noise. For a number of nearby wellheads, the sources would have to be in very close proximity (<50 m apart) before their signals summed to increase the total noise field (with two adjacent sources only increasing the total noise field by 3 dB). Hence, for multiple wellheads in an area, the broadband noise level in the vicinity of the wellheads would be expected to be of the order of 113 dB re 1 µPa and this would drop very quickly to ambient conditions on moving away from the wellhead, falling to background levels within <200 m from the wellhead.

Based on the measurements of wellhead noise discussed in McCauley (2002), which included noise from flowlines, noise emitted along a flowline or the export pipeline may be expected to be similar to that described for wellheads, with the radiated noise field falling to ambient levels within a hundred metres of the flowline or export pipeline.

Woodside has undertaken acoustic measurements on noise generated by the operation of choke valves associated with the Angel facility (JASCO, 2015) similar to the design employed across Pluto subsea valves. These measurements indicated choke valve noise is continuous, and the frequency and intensity of noise emitted is dependent on the rate of production from the well. Noise intensity at low production rates (16% and 30% choke positions) were approximately 154–155 dB re 1 μPa, with higher production rates (85% and 74% choke positions) resulting in lower noise levels (141–144 dB re 1 μPa). Noise from choke valve operation was broadband in nature, with the majority of noise energy concentrated above 1 kHz.

Vessels and Operations of Dynamic Positioning Systems

The main source of noise from vessels (platform support and supply, ASV and subsea IMMR) relates to the use of DP thrusters (i.e., cavitation from thruster propellers). Thruster noise is typically high intensity and broadband in nature, with sound pressure levels of 137 dB re 1 μPa at 405 m from a typical offshore support vessel holding station in strong currents (McCauley 1998). McCauley (2005) measured underwater broadband noise up to approximately 182 dB re 1 μPa at 1 m (SPL) from a support vessel holding station in the Timor Sea; it is expected that noise levels up to this level may be generated by vessels using DP during the Petroleum Activities Program. Thruster noise from vessels holding station is typically the most intense underwater noise source from vessel activities; other sources of underwater noise from vessels (e.g., main engines when underway, machinery noise transmitted through the hull, etc) are typically considerably lower intensity noise (McCauley, 1998). Note that vessels undertaking the PAP inherently minimise the use of DP, and there is little potential to reduce DP use further.

For planned operations and maintenance activities, vessels are expected to be in the field operating 24 hours per day for approximately 14 days, approximately 10 times per year. However, vessels will be present for longer durations or at a higher frequency during pigging operations, corrective maintenance and interventions, major/shutdown maintenance, contingent manning (refer to Section 3.5.3). For example, the ASV may be utilised for campaigns of approximately 90 days duration once every 3-6 years (Section 3.8.3).

Helicopter Transfers

Helicopter activities occur in the PAA, including landing and take-off on the facility or vessel helidecks. Helicopters land and take-off on the riser platform (which occurs typically twice every 10 weeks during normal operations but may occur more often during unplanned maintenance activities) and potentially on subsea support vessels. Sound emitted from helicopter operations is typically below 500 Hz (Richardson et al., 1995). The peak received level diminishes with increasing helicopter altitude, but the duration of audibility often increases with increasing altitude.

Richardson et al. (1995) reports that helicopter sound is audible in air for four minutes before it passed over underwater hydrophones, but detectable underwater for only 38 seconds at 3 m depth and 11 seconds at 18 m depth. Noise levels reported for a Bell 212 helicopter during fly-over was reported at 162 dB re 1 μPa (SPL) and for Sikorsky-61 is 108 dB re 1 μPa (SPL) at 305 m (Simmonds et al., 2004). Water has a very high acoustic impedance contrast compared to air, and the sea surface is a strong reflector of noise energy (i.e., very little noise energy generated above the sea surface) crosses into and propagates below the sea surface (and vice versa) – the majority of the noise energy is reflected). The angle at which the sound path meets the surface influences the transmission of noise energy from the atmosphere through the sea surface, angles >13° from vertical being almost entirely reflected (Richardson et al., 1995). Given this, and the typical characteristics of helicopter flights within the PAA (duration, frequency, altitude and air speed), the opportunity for underwater noise levels to exceed the behavioural thresholds is not considered credible and is not assessed further.

Impulsive Noise Sources

Subsea Inspection, Monitoring, Maintenance and Repair Activities

MBES and SSS are low-energy, high-resolution geophysical survey instruments that may be required for IMMR every one to six years to identify buckling, movement, scour and seabed features. MBES have operating frequencies ranging from 12 kHz to 700 kHz (Jimenez-Arranz et al., 2017) with peak pressure (PK) source levels between approximately 210 and 245 dB re 1 μPa at 1 m (Jimenez-Arranz et al., 2017; Zykov, 2013; MacGillivray et al., 2013). MBES generate micro-pulses of high frequency sound in a highly focused beam directed towards the seabed, which attenuates rapidly underwater compared to lower frequency sound sources. Due to this directionality and short pulse duration, there is relatively low sound energy and very limited horizontal sound propagation. The high operating frequencies of many MBES are typically above the hearing range of the low frequency (LF) cetacean (7 Hz to 35 kHz; Southall et al. 2019) and high frequency (HF) cetacean (150 Hz to 160 kHz; Southall et al. 2019) species that may occur in the Petroleum Activities Area. The high operating frequencies of MBES are also above the hearing ranges of marine turtles (<2 kHz, Finneran et al., 2017) and the majority of fish species (100 Hz to several kHz; Ladich, 2000; Popper et al., 2014). Additionally, sound sources generated closer to the seabed have a lower received noise level in the horizontal direction due to seafloor scattering and absorption.

Similar to MBES, SSS produce micro-pulses of sound in a focussed swath directed at the seabed. SSS operating frequencies may range between 75 kHz and 900 kHz, with sound energy attenuating rapidly with horizontal distance from the main swath (Jimenez-Arranz et al., 2017; Zykov, 2013). Representative source levels range between 200 and 235 dB re 1 μPa PK at 1 m (Jimenez-Arranz et al., 2017; Zykov, 2013). The high operating frequencies of SSS places the

dominant sound frequencies above the hearing range of most marine fauna species, including LF cetaceans, turtles and fish, although some of the lower frequency devices may be audible to HF cetaceans (MacGillivray et al., 2013; Zykov, 2013).

Sub-bottom profiling may also be undertaken every one to six years to identify features under the seabed. Most commercial SBPs are small, low-powered, high-resolution and shallow-penetrating systems, producing electrical pulses across a range of frequencies (Salgado Kent et al., 2016; Jiménez-Arranz et al., 2017). The instruments proposed for the survey produce pulses of sound between approximately 2 kHz and 30 kHz with source levels between approximately 170 and 230 dB re 1µPa PK at 1 m. Indicative source characteristics for typical acoustic survey equipment are provided in Table 6-3.

Positioning Equipment

An array of long baseline (LBL) and/or ultrashort baseline (USBL) transponders may be used for positioning during IMMR activities. Transponders typically emit pulses of medium frequency sound, generally within the range 21 to 31 kHz. The estimated SPL at source ranges from 180 to 202 dB re 1 µPa SPL at 1 m (Jiménez-Arranz et al., 2017). Transmissions are not continuous but consist of short 'chirps' with a duration that ranges from 3 to 40 milliseconds. Transponders will not emit any sound when on standby, and when required for precise positioning they will emit one chirp every five seconds.

Cumulative Noise Sources

Concurrent activities contributing to cumulative underwater noise from vessel activities during routine operations are outlined in Table 6-4.

As a worst-case scenario, the riser platform, when in crewed mode, may be supported by an ASV (in addition to a platform support vessel and supply vessel) within the PSZ and with IMMR activities underway anywhere in the Facility Offshore Operational Area or Export Pipeline Operational Area. Activities utilising single vessels are not expected to contribute significantly to the cumulative noise footprint, due to their relatively small size, short activity duration and separation distances from other activities.

Table 6-4: Concurrent activities contributing to cumulative underwater vessel noise.

Scenario	Platform Mode	Sources	Location	Duration
1. Platform and subsea infrastructure	Uncrewed	Platform and subsea infrastructure No vessels	Within PSZ and location of wells.	Continuous
	Crewed	Platform and subsea infrastructure	Within PSZ and location of wells	Continuous
		1 x platform support vessel (PSV)	Inside PSZ + Outside PSZ but inside Operational Area	Typically in operation for full 14 days of crewed platform period
		1x supply vessel	Within PSZ	24-48 hrs, 1-2 visits per 15 days of crewed platform period
2. Platform and subsea infrastructure with concurrent IMMR activities	Uncrewed	As per Scenario 1	As per Scenario 1	As per Scenario 1
		IMMR activity (1x subsea support vessel or an USV)	IMMR anywhere in Facility offshore operational area or Export Pipeline operational area	Approximately 2 weeks per activity at the frequencies described in Section 3.10
	Crewed	As per Scenario 1	As per Scenario 1	As per Scenario 1
		IMMR activity (1x subsea support vessel or an USV)	IMMR anywhere in Facility offshore operational area or Export Pipeline operational area	Approximately 2 weeks per activity at the frequencies described in Section 3.10
3. Platform and subsea infrastructure with concurrent IMMR activities and ASV	Crewed	As per Scenario 2	As per Scenario 2	As per Scenario 2
		1x accommodation support vessel (ASV)	Within PSZ	ASV may occur up to 90 days during planned maintenance campaigns

				provisionally planned to occur once every 3-6 years. Requirement for an ASV is not scheduled to occur concurrently with Xena-03 tie-back activities.

Sound Transmission Loss Modelling

Noise modelling was commissioned from JASCO by Woodside for the Julimar Appraisal Drilling and Surveys activities (Julimar South-1 well) (Stroot et al., 2022) and Pyxis Drilling and Subsea Installation activities (Xena-02 well) (Wecker, et al., 2022), which is considered broadly comparable or conservative in terms of anticipated noise emissions from the platform and subsea infrastructure as well as associated platform support and supply vessel activities.

The noise profile of the ASV, should it be utilised within the life of the EP, is considered to be covered by analogue modelling for the Xena02 well of a MODU on DP which has a higher sound source level of ~187.7 dB re 1 μPa^2m^2s). For DP vessel activities, noise modelling of a MODU on DP with a support vessel resupply under DP (8 hr) and support vessel resupply on standby (24 hr) is considered to adequately represent the worst case scenario of activities co-occurring at the Pluto Facility.

For the addition of an IMMR vessel operating concurrent with the crewed mode of the Pluto platform, Woodside recently commissioned a cumulative noise study of 5 FPSOs or support/IMMR vessels which conservatively provides for the ensonified area surrounding a suitable model IMMR vessel, Fugro Etive (Li et al. 2024).

Table 6-5: Summary of the modelled scenario at the Xena (Xena-02) field as a worst-case analogue for DP operations for routine operations within the PSZ for the Pluto platform (source: Wecker et al., 2022 and Stroot et al. 2022)

Scenario Number (Wecker et al. 2022, Stroot et al. 2022)	Concurrent activity scenario (Table 6-12)	Description
5	1 – crewed	Anchored MODU Drilling (24h) + OSV resupply, under DP (8h) + OSV on standby (24h)
N/A	2 – crewed	As per scenario number 5 with the addition of an IMMR vessel located at the Xena-03 well.
10	3 – crewed	MODU under DP, (ASV) (24 hr) + support vessel resupply, under DP (8 hr) + support vessel resupply on standby (24 hr) with the addition of an IMMR vessel located at the Xena-03 well.

Impact Assessment

Receptors

Fauna associated with the PAA is predominantly pelagic species of fish, with migratory species such as turtles, whale sharks and cetaceans potentially present in the area seasonally. Noise interference is a key threat to a number of migratory and threatened cetaceans and marine turtles identified as occurring within the PAA (Section 4.6).

Noise interference is a key threat to a number of migratory and threatened cetaceans and marine turtles identified as potentially occurring within the Facility and Xena-03 Operational Areas, including the pygmy blue whale (PBW).

The Export Pipeline Operational Area extends from the Facility Operational Area, across Commonwealth Waters to the boundary with WA State Waters. The fauna associated with the Export Pipeline Operational Area includes both pelagic and demersal species of fish. Additional migratory species associated with the Export Pipeline Operational Area include migrating humpback whales, and marine turtle aggregation areas near State waters and the coastline (**Section 4.6**). Relevant actions included in recovery plans for these species are outlined in Section 6.10**Error! Reference source not found.**.

The key BIAs within the PAA include:

- PBW migration BIA (overlapping the Facility and Xena-03 Operational Areas, approximately 17 km from the Pluto Facility)

- Humpback whale migration BIA (overlapping the Export Pipeline Operational Area, approximately 24 km from the Pluto Facility)
- Flatback turtle (overlapping all Operational Areas) and Hawksbill turtle (overlapping the Export Pipeline Operational Area) internesting BIAs.
- Whale shark foraging BIA (overlapping all Operational Areas)

In addition, habitat critical to the survival of green and hawksbill turtles also overlap the Export Pipeline Operational Area. Habitat critical to the survival of flatback turtles overlap all Operational Areas.

Two key ecological features overlap the PAA. The Facility and Xena-03 Operational Areas overlap the Continental Slope Demersal Fish Communities and the Facility Operational Area also overlaps the Ancient Coastline at 125 m KEF.

Demersal fish from these KEFs may be impacted by noise emissions. While the Ancient Coastline at 125 m KEF may be associated with outcroppings of hard substrate, no evidence of significant reefs has been found in the Facility Operational Area. Note: some demersal fish are also likely to be associated with subsea infrastructure such as the export pipeline (McLean et al., 2017).

In addition to the KEFs, the Montebello Marine Park Multiple Use Zone also overlaps the Facility and Export Pipeline Operational Areas. The perimeter of the Montebello Marine Park is ~420 m from the Pluto facility. This marine park supports a range of species listed under the EPBC Act. Biologically important areas within this marine park include breeding habitat for seabirds, internesting, foraging, mating, and nesting habitat for marine turtles, a migratory pathway for humpback whales and foraging habitat for whale sharks. Impacts to these values are described below.

Potential Impacts of Noise

Elevated underwater noise can affect marine fauna, including cetaceans, fish, turtles, sharks and rays, in three main ways (Richardson et al., 1995; Simmonds et al., 2004):

- by causing direct physical effects on hearing or other organs. Hearing loss may be temporary (temporary threshold shift (TTS) referred to as auditory fatigue), or permanent threshold shift (PTS) (injury)
- by masking or interfering with other biologically important sounds (including vocal communication, echolocation, signals and sounds produced by predators or prey)
- through disturbance leading to behavioural changes or displacement from important areas (e.g., BIAs). The occurrence and intensity of disturbance is highly variable and depends on a range of factors relating to the animal and situation.

Increasing the distance from the noise source usually results in the level of noise reducing, due primarily to the spreading of the sound energy with distance. The way that the noise spreads (geometrical divergence) depend upon several factors such as water column depth, pressure, temperature gradients, and salinity, as well as surface and bottom conditions.

Cetaceans

Species Sensitivity and Exposure Thresholds

Marine mammals and especially cetaceans rely on sound for important life functions including individual recognition, socialising, detecting predators and prey, navigation and reproduction (Weilgart, 2007; Erbe et al., 2015; Erbe et al., 2018). Underwater noise can affect marine mammals in various ways including interfering with communication (masking), behavioural changes, a shift in the hearing threshold (PTS and TTS), physical damage and stress (Erbe, 2012; Rolland et al., 2012). Frequency-specific hearing sensitivity differs among marine mammals, influencing how they are affected by noise exposure. For the purposes of predicting the effects of noise exposure on different groups of cetaceans, blue whales, humpback whales and other large mysticete (baleen) whales are categorised as low frequency (LF) cetaceans, while odontocetes (toothed whales and dolphins) are categorised as high frequency (HF) or very high frequency (VHF) cetaceans (Southall et al., 2019).

The thresholds that could result in behavioural response for cetaceans is expected to be 120 dB re 1 µPa (SPL) for continuous noise sources, and 160 dB re 1 µPa (SPL) for impulsive noise sources (Table 6-6). These thresholds have been adopted by the United States National Oceanic and Atmospheric Administration (NOAA) (National Marine Fisheries Service [NMFS], 2014, 2018; Southall et al., 2019; NOAA, 2019). The adopted thresholds are based on best data available and published in peer-reviewed literature and represent conservative internationally accepted and applied impact evaluation thresholds.

Table 6-6: Thresholds for permanent and temporary threshold shift and behavioural response onset for low-frequency, high-frequency and very high frequency cetaceans for continuous and impulsive noise

Hearing Group	Impulsive					Continuous		
	PTS Onset		TTS Onset		Behavioural Response	PTS Onset	TTS Onset	Behavioural Response
	SEL24h	PK	SEL24h	PK	SPL	SEL24h	SEL24h	SPL

LF cetaceans	183	219	168	213	160	199	179	120
HF cetaceans	185	230	170	224	160	198	178	120
VHF cetaceans	155	202	140	196	160	173	153	120

Source: NMFS (2014, 2018; Southall, 2019; NOAA, 2019).

SEL24h expressed as dB re 1 µPa².s; Peak pressure (PK) and SPL expressed as dB re 1 µPa.

The Conservation Management Plan for the Blue Whale (BWCMP) (Commonwealth of Australia, 2015a), a recovery plan made under the EPBC Act, defines important areas for PBW and these are also described with reference to BIAs in the National Conservation Values Atlas (NCVA), with particular emphasis placed on foraging areas and migration corridors. As noted above and in Section **Error! Reference source not found.**, the Facility and Xena-03 Operational Areas overlap the pygmy blue whale migration BIA, the perimeter of which is approximately 17 km from the Pluto platform. The nearest foraging BIA (Ningaloo possible foraging area) is approximately 232 km to the south of the PAA. Action Area A.2.3 of the BWCMP states: "Anthropogenic noise in biologically important areas will be managed such that any blue whale continues to utilise the area without injury, and is not displaced from a foraging area". Furthermore, the Guidance on Key Terms within the Blue Whale Conservation Management Plan (DAWE, 2021), underwater noise emissions from the PAP must not:

- result in injury[55] (TTS or PTS) to any pygmy blue whale in BIAs, or
- displace a pygmy blue whale from a foraging BIA.

The following assessment of impacts to cetaceans includes consideration of the requirements of the BWCMP with respect to pygmy blue whales.

The National Recovery Plan for the Southern Right Whale (DCCEEW, 2024a) also identified anthropogenic noise as a threat, however the BIAs and habitat critical to the survival are over 250 km away, well outside the area where behavioural responses are expected to extend from the Operational Area and as such, there is not expected to be any anthropogenic noise from the petroleum activity that could displace or interfere with life cycle activities within, or near, the reproduction or migration BIAs and habitat critical to the survival.

The humpback whale migration BIA overlaps with the Export Pipeline Operational Area. The Pluto facility is located outside the humpback whale migration BIA (platform is ~24 km north-west of the BIA boundary, see **Error! Reference source not found.**).

Predicted Underwater Noise Impacts to Cetaceans

Facility and Support Vessel Noise Impacts

Vessels holding station are considered to be the predominant noise source related to the Petroleum Activities Program. Using thruster noise, McCauley (1998) measured underwater broadband noise equivalent to about 182 dB re 1 µPa (SPL) at 1 m from a support vessel holding station in the Timor Sea. Similar noise levels are expected to be generated by vessels used for the Petroleum Activities Program.

PTS and TTS thresholds for LF cetaceans are 199 dB re 1 µPa2 s (SEL weighted) and 179 dB re 1 µPa2 s (SEL weighted), respectively for continuous noise sources (refer Table 6-6). Typical sound exposures generated by the facility and a support vessel using DP would not exceed the PTS threshold for LF cetaceans and only exceed the TTS threshold at very close ranges to the source, so PTS and TTS in LF cetaceans, such as large baleen whales, is not anticipated.

The thresholds that could result in a behavioural response for cetaceans is expected to be 120 dB re 1 µPa (SPL) for continuous noise sources such as vessels (refer Table 6-6).

With the worst-case inclusion of an ASV (concurrent activity scenario 3), an analogue acoustic modelling scenario by JASCO for a MODU on DP (Wecker et al., 2022) was considered conservative. This modelling indicated that PTS and TTS thresholds for low frequency (LF) cetaceans, such as humpback and pygmy blue whales, may be exceeded at a maximum distance of 0.13 km and 2.66 km, respectively. The TTS threshold for HF and VHF cetaceans is exceeded at 0.13 and 2.63 km, respectively. For PTS, the maximum distance at which the threshold is exceeded for HF and VHF cetaceans is 0.09 km and 0.15 km, respectively.

The radii that represent potential for PTS and TTS onset are based on a 24-hour period of cumulative exposure and therefore represent an unlikely worst-case scenario since, more realistically, cetaceans would not stay in the same location or at the same range for 24-hours. It is not considered credible that individual LF, HF and VHF cetaceans that may pass through the Facility Operational Area during DP vessel operations would experience PTS, given individuals would need to remain within 150 m of the PSZ for a period of 24 hours. TTS onset is also considered highly unlikely given the known movement behaviour of cetaceans including key migrating LF whale species such as the pygmy blue whale and humpback whale transiting through the Facility and Export Pipeline Operational Areas, respectively. The PAA is not known to represent significant foraging/aggregation habitat for cetaceans and individuals are not expected to dwell within the area for extended periods.

The behavioural response threshold may be exceeded from platform-related vessel activities at a maximum of 20.7 km if an ASV is in operation (8.85 km if an ASV is not in use) and may thus overlap slightly with the pygmy blue whale migration BIA which is 17 km from the Pluto facility.

Potential impacts to cetaceans from a single support or IMMR vessels operating concurrently with other noise sources may include behavioural disturbance from DP. In 2024, JASCO modelled cumulative noise sources including the model IMMR vessel, Fugro Etive (Li et al. 2024). The distance from the Fugro Etive at which the behavioural impact threshold for cetaceans was no longer exceeded was ~7.5 km. This result was achieved in conjunction with other vessels and FPSOs in the region and is considered conservative relative to a single vessel planned for IMMR activities.

Cetaceans are capable of moving away from potential noise sources, and there are no constraints to their movement within the PAA. LF cetaceans such as humpback whales and PBW may be seasonally present in the PAA, though limited to individuals infrequently transiting through the area. Interactions between PBW or humpback whales with vessels typically result in avoidance behaviour, with whales generally moving away from vessels (Bauer, 1986; Stamation *et al*., 2010).

Given the migration corridor BIAs for PBW and humpback whales overlap the PAA (pygmy blue whale BIA overlaps the Facility Operational Area and humpback whales BIA overlaps the Export Pipeline Operational Area), there is the potential for these species to be exposed to underwater noise from vessels associated with the PAP when they are present in the region during seasonal migrations. However, as the underwater noise levels that may be generated by DP vessels and IMMR activities are below those resulting in impairment or mortality, only behavioural impacts are credible. Impacts are expected to be limited to localised avoidance of the noise source as there are no physical barriers in or near the operational areas that may prevent cetaceans from moving away from vessels.

Aerial surveys of humpback whales show the majority of humpback whales migrate within continental shelf waters along Western Australia (Double et al., 2010, 2012; Jenner et al., 2001). Humpback whales are expected to transit the Export Pipeline Operational Area during their annual north and south migrations between May and November, where vessel activity will be limited to during intermittent IMMR activities. These activities are relatively short-term and occur relatively infrequently and, therefore, are unlikely to impact humpback whales.

PBW are likely to be present when migrating north between April and August and south between October and December. Tagging studies of PBW showed tagged animals were typically in water depths of >1000 m. PBW are expected to transit the subsea hydrocarbon gathering system section of the facility and are unlikely to occur within proximity to the riser platform.

Mid and high frequency cetaceans are known to show behavioural disturbance at a range of received noise levels (Southall et al., 2007a). Mid- and high frequency cetaceans may exhibit short-term behavioural responses to increased levels of underwater noise, such as avoidance or attraction. This is expected to occur mainly within the Export Pipeline Operational Area during IMMR activities, but is unlikely to significantly impact these species (e.g., spotted bottlenose dolphins).

In the unlikely worst-case event that an IMMR vessel is in use within the PAA whilst an ASV is in operation, the noise profile of the Petroleum Activity Program could be further elevated for a short period of time. The worst-case location for co-timing of an IMMR activity with platform-related vessel activities involving also an ASV, would be if IMMR activities were underway in the Xena-03 Operational Area. In such circumstances, the IMMR activities would overlap with the pygmy blue whale migration BIA with behavioural disturbance from a vessel on DP conservatively being out to about 7.5 km. Depending on the precise location of IMMR activities, it is possible that the ensonified area of the IMMR overlapping the pygmy blue whale migration BIA could intersect the ensonified area overlapping the BIA from platform-related vessel activities (20.7 km radii), as the distance between the Xena-03 location and the Pluto platform is ~15.1 km.

The rare use of an ASV to support major maintenance activities (once every 3-6 years for 90 days) and the risk that an IMMR vessel may occur within the pygmy blue whale migration BIA at the time of biological sensitivity, is unlikely. Given, further, that the overlap of the potential ensonified areas with the pygmy blue whale migration BIA is very small relative to the total extent of the BIA in which individuals would be transiting, any behavioural impacts to cetaceans from concurrent vessel activities are considered to be localised with no lasting effect.

IMMR Activities

Zykov (2013) conducted acoustic modelling for five low energy survey instruments off the coast of California, including MBES, SSS and sub-bottom profiler. All equipment types were modelled in the sandy bottom environment, similar to that of the PAA. Although the bathymetry, salinity, water temperature and sub-seafloor sediment type may differ, given the similarities in equipment type and seafloor habitat, the modelling is considered comparable for the nature and scale of the low energy IMMR survey equipment.

The high operating frequencies of MBES and SSS places the majority of sound frequencies above the auditory range of LF cetaceans. Dolphins and other HF cetaceans, which have peak hearing sensitivity up to 110 kHz, with potential for some limited hearing ability up to approximately 160 kHz (NMFS 2018, Southall et al. 2019), may be able to detect a small amount of the sound energy from some instruments in the lower operating frequency ranges available for MBES and SSS (MacGillivray et al., 2013; Zykov, 2013).

The modelling by Zykov (2013) indicates that the sound emissions from MBES and SSS do not exceed PTS and TTS accumulated sound exposure criteria for LF cetaceans at any distance, and do no– exceed criteria for HF cetaceans beyond 2–3 m horizontal distance from the source, which is not considered to be a credible exposure scenario for mobile marine fauna. Zykov (2013) also estimated the maximum distance at which the unweighted 160 dB re 1 µPa (SPL) behavioural disturbance threshold for impulsive sound was reached was 290 m for MBES and 690 m for SSS. Again, it is emphasised that many MBES and SSS instruments may operate at frequencies outside of the hearing range of cetaceans and so these would not be audible or result in behavioural disturbance. For instruments with frequencies that overlap with the hearing ranges of cetaceans, a significant proportion of the sound energy may still be outside of their hearing ranges, therefore, the perceived sound levels are reduced and the horizontal distances at which behavioural disturbances may occur are less than those inferred by the unweighted 160 dB re 1 µPa (SPL) behavioural disturbance threshold. For example, modelling of weighted SPLs by Zykov (2013) for MBES indicated that the 160 dB re 1 µPa (SPL) behavioural threshold was not exceeded for LF cetaceans at any distance and was limited to approximately 205 m horizontal distance for HF cetaceans. For SSS, the modelling of weighted SPLs indicated that the 160 dB re 1 µPa (SPL) behavioural threshold was exceeded at horizontal distances of 110 m for LF cetaceans and 611 m for HF cetaceans.

Acoustic modelling of sub-bottom profilers by Zykov (2013) and McPherson and Wood (2017) indicates limited horizontal sound propagation outside of the main directional field of sound. The modelling studies also indicate PK and SEL24h thresholds for PTS are not exceeded. The potential for TTS resulting from SEL24h is limited to within a few metres from the moving sound source (Zykov, 2013; McPherson and Wood, 2017), which is not considered to be a credible exposure for mobile marine fauna. Exceedance of the 160 dB re 1 µPa SPL behavioural response threshold for impulsive sound is limited to within a few metres in most instances, or up to a maximum of 50 m depending upon which SBP instrument is used, water depth and the seabed sediment characteristics (Zykov, 2013; McPherson and Wood, 2017).

Potential impacts to cetaceans from MBES, SSS and sub-bottom profiler may, therefore, include behavioural disturbance if in close proximity to the survey instruments, but ranges to disturbance are less than or equivalent to disturbance ranges for the IMMR vessel itself. PTS or TTS are not considered credible, given individuals would need to be directly next to the noise sources for prolonged duration.

Transponders used for positioning during IMMR activities have the potential to cause some temporary behavioural disturbance to cetaceans. The typical frequencies of 21 to 31 kHz produced by the transponders are most audible to HF cetaceans such as toothed whales and dolphins rather than LF cetaceans, and the source levels (180 to 202 dB re 1 µPa at 1 m SPL) rapidly attenuate within a very short distance from the source, such that PTS or TTS are not considered credible. Based on empirical spreading loss estimates measured by Warner and McCrodan (2011), received levels from USBL transponders are expected to exceed the cetacean behavioural response threshold for impulsive sources out to about 42 m.

Transmissions are not continuous but consist of short ‘chirps’ with a duration that ranges from three to 40 milliseconds. Transponders do not emit sound when on standby. When required for general positioning, they emit one chirp every five seconds (estimated to be required for 4 hrs at a time). When required for precise positioning, they emit one chirp every second (estimated to be required for 2 hrs at a time). Due to the short duration chirps, the temporary and intermittent use and the mid frequencies used by positioning equipment, the acoustic noise from the transponders is unlikely to have a substantive effect on the behavioural patterns of cetaceans.

Potential impacts from predicted noise levels from the operating facility, project vessels, and IMMR survey activities are not considered to be ecologically significant at a population level for cetaceans.

Marine Turtles

Species Sensitivity and Exposure Thresholds

The Recovery Plan for Marine Turtles (Commonwealth of Australia, 2017) notes there is limited information available on the impact of noise on marine turtles and that the impact of noise on turtle stocks may vary depending on whether exposure is short (acute) or long-term (chronic). However, turtles have been shown to respond to low frequency sound, with indications that they have the highest hearing sensitivity in the frequency range 100–700 Hz (Bartol and Musick, 2003).

McCauley et al. (2000) observed the behavioural response of caged green and loggerhead turtles to impulsive sound (an approaching seismic airgun). For received levels above 166 dB re 1 µPa SPL, the turtles increased their swimming activity and above 175 dB re 1 µPa they began to behave erratically, which was interpreted as an agitated state. The 166 dB re 1 µPa SPL has been used as the threshold level for a behavioural disturbance response by the US NMFS (NSF, 2011) and is applied to this impact assessment. No quantitative (numerical) thresholds have been developed for behavioural effects from continuous sources (e.g., vessel noise) on marine turtles. However, Popper et al. (2014) propose qualitative impact criteria for near-field, intermediate and far-field exposures (Popper et al., 2014). Finneran et al., (2017) presents thresholds for turtle PTS and TTS for both impulsive and continuous sound exposures.

The thresholds listed in Table 6-7 are considered appropriate for the assessment of effects from impulsive and continuous sound sources during the Petroleum Activities Program.

Table 6-7: Thresholds for permanent and temporary threshold shift and behavioural response onset in marine turtles for continuous and impulsive noise

Hearing group	Impulsive	Continuous

	PTS onset thresholds: SEL24h (dB re 1 µPa².s)	TTS onset thresholds: SEL24h (dB re 1 µPa².s)	Behavioural response (dB re 1 µPa)	PTS onset thresholds: SEL24h (dB re 1 µPa².s)	TTS onset thresholds: SEL24h (dB re 1 µPa².s)	Behavioural response (dB re 1 µPa)
Marine turtles	204	189	166* 175+	220	200	(N) High (I) Moderate (F) Low#

*Source: PTS and TTS thresholds (Finneran et al., 2017), * behavioural response threshold (impulsive) (NSF 2011), + behavioural disturbance threshold (impulsive) (McCauley et al. 2000), # behavioural response threshold (continuous) (Popper et al. 2014).*

Note: The sound units provided in the table above for continuous noise include: relative risk (high, medium and low) is given for marine turtles at three distances from the source defined in relative terms as near (N – tens of metres), intermediate (I – hundreds of metres) and far (F – thousands of metres) (after Popper et al. 2014).

Predicted Underwater Noise Impacts to Turtles

Facility and Support Vessel Noise Impacts

As noted above, vessels holding station are considered to be the predominant noise source related to the Petroleum Activities Program, with source levels of approximately 182 dB re 1 µPa SPL at 1 m from a support vessel holding station considered to be representative of noise levels generated by vessels used for the Petroleum Activities Program.

Although there are no quantitative sound exposure thresholds for impacts on marine turtles resulting from continuous noise sources, the relative risk for behavioural response is expected to be high within tens of metres of the source, medium within hundreds of metres and low within kilometres from the source (refer Table 6-7). PTS and TTS thresholds for turtles are 220 dB re 1 µPa2 s (SEL weighted) and 200 dB re 1 µPa2 s (SEL weighted), respectively (refer Table 6-7). Typical noise levels generated by the facility and a support vessel using DP would not exceed these levels (except at extremely close ranges to the source), and prolonged exposure of transient marine turtles at close range is not considered a credible scenario.

Marine turtles are not expected to be in the area in high numbers even during nesting and internesting periods. Marine turtles are also capable of moving away from potential noise sources, and there are no constraints to their movement within the PAA. Therefore, impacts to marine turtles from project vessels or the platform are expected to be of no lasting effect.

IMMR Activities

As outlined above for cetaceans, Zykov (2013) conducted noise modelling for low energy survey instruments, with the modelling for MBES, SSS and sub-bottom profiler considered comparable for the nature and scale of the low energy IMMR survey equipment. The operating frequencies of MBES (12–700 kHz) and SSS (75–900 kHz) are well above the hearing range of turtles (0.1–2 kHz) and so no disturbance is expected. It is possible that some of the lower frequency sound emitted by sub-bottom profilers (2–30 kHz) may be audible to turtles, but again, a large proportion of the sound energy may be at frequencies that are outside of their normal auditory range. Modelling of impulsive sub-bottom profiler sound emissions by Zykov (2013) and McPherson and Wood (2017) indicates that the 166 dB re 1 µPa (SPL) behavioural disturbance threshold for turtles may only be exceeded within metres or tens of metres of the survey instruments. Therefore, behavioural impacts would be highly localised. PTS or TTS is not considered to be credible given the rapid attenuation of sound close to the source and a large proportion of the sound energy is produced at frequencies outside the peak hearing frequency range of turtles.

Transponders used for positioning during IMMR activities typical operate at frequencies of 21 to 31 kHz which is well outside the peak hearing frequency range of turtles (0.1–2 kHz). Therefore, no impacts are considered credible.

Potential impacts from predicted noise levels from the operating facility, project vessels, and IMMR survey activities are not considered to be ecologically significant at a population level for turtles.

Fish, Sharks and Rays

Species Sensitivity and Exposure Thresholds

Fishes are primarily sensitive to the particle motion component of sound at close range to a sound source, while the presence of the swim bladder results in a varying degree of sensitivity of some fishes to sound pressure (Popper and Hawkins, 2018; Popper et al., 2019). Consequently, fishes are broadly categorised into three groups with respect to their hearing capabilities that are relevant to the types of fishes and sharks that may be present in the Operational Area (Popper et al., 2014):

- Fishes with no swim bladder or other gas chamber (e.g., sharks, mackerels) – Sensitive only to particle motion, not sound pressure changes.
- Fishes with swim bladders, but without a direct connection between the swim bladder and the inner ear (e.g., demersal snappers and emperors) – Hearing primarily involves particle motion with some limited ability to indirectly detect changes in sound pressure.

- Fishes with a swim bladder or other gas volume connected directly to the inner ear (e.g. herrings, sardines, pilchards, shads) – These fishes are able to detect both sound pressure as well as particle motion.

Sound exposure criteria applicable to continuous sound sources are presented in Table 6-8. Popper et al. (2014) propose relative risk criteria (high, moderate, low) for injury, impairment and behavioural effects to fishes at three distance categories, near (N) (tens of metres from the source), intermediate (I) (hundreds of metres from the source), and far (F) (kilometres from the source).

Table 6-8: Impact thresholds to fish, sharks and rays for continuous noise

Receptor	Mortality and potential mortal injury	Impairment			Behaviour
		Recoverable Injury	TTS	Masking	
Fish: no swim bladder	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Moderate (I) Low (F) Low	(N) High (I) High (F) Moderate	(N) Moderate (I) Moderate (F) Low
Fish: swim bladder not involved in hearing	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Moderate (I) Low (F) Low	(N) High (I) High (F) Moderate	(N) Moderate (I) Moderate (F) Low
Fish: swim bladder involving hearing	(N) Low (I) Low (F) Low	170 dB SPL for 48-hours	158 dB SPL for 12-hours	(N) High (I) High (F) High	(N) High (I) Moderate (F) Low
Fish eggs and fish larvae	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) High (I) Moderate (F) Low	(N) Moderate (I) Moderate (F) Low

Note: The sound units provided in the table above include relative risk (high, medium and low) is given for fish (all types) at three distances from the source defined in relative terms as near (N – tens of metres), intermediate (I – hundreds of metres) and far (F – thousands of metres) (after Popper et al., 2014).

Predicted Underwater Noise Impacts to Fish

Facility and Support Vessel Noise Impacts

Vessels holding station using DP are expected to produce sound equivalent to about 182 dB re 1 µPa SPL at 1 m. Modelling undertaken by McPherson et al. (2019) of sound produced by facility and vessel operations found that recoverable injury to some types of fish would only be possible if they remained within a distance of less than 10 m for 48 hours, and TTS if fishes remained within 10 m for at least 12 hours. Pelagic fish are highly mobile, and the types of demersal fishes known to occur in the vicinity of the Pluto facility (e.g., snappers, emperors, cods and groupers) will exhibit some fidelity to the area but are still relatively free-swimming and are not constrained to such close ranges (i.e., 10 m). Therefore, free-swimming fish remaining in close range to sound sources for periods that subject themselves to TTS and injury is not considered to be a credible scenario.

There are no quantitative sound exposure thresholds for impacts on fish, sharks and rays resulting from continuous noise sources. The relative risk for behavioural response is expected to be high within tens of metres of the source, medium within hundreds of metres and low within kilometres from the source (refer Table 6-7). In the context of the riser platform, the largest contribution to operational noise is from the topside and near the surface, with lower sound levels produced from subsea infrastructure such as choke valves. Similarly, sound from the PSV would be at the surface. While some localised behavioural avoidance and masking in the vicinity of the loudest sound sources from the riser platform, choke valves and PSV may occur in some fishes, no lasting effect is anticipated. Fish are also known to habituate to continuous noise sources, which is consistent with fish congregating around operating offshore oil and gas structures.

The foraging BIA for whale shark overlaps the PAA, and the species may be seasonally present (particularly between March and July) Currently, there are no quantitative sound exposure thresholds relevant to whale sharks. It is expected that the potential effects of noise on whale sharks are the same as for other fish species, resulting in minor, localised and temporary behavioural change such as avoidance. Therefore, impacts to whale sharks from support vessels or the platform are expected to have no lasting effect.

Other fauna associated with the PAA includes predominantly pelagic species of fish, with migratory species such as rays transiting through the PAA; these species may be similarly affected by noise from the PAP. Potential impacts from predicted noise levels from the operating facility, support vessels and IMMR survey activities are not considered to be ecologically significant at a population level for fish, sharks and rays.

IMMR Activities

As outlined above, Zykov (2013) conducted noise modelling for low energy survey instruments, with the modelling for MBES, SSS and sub-bottom profiler considered comparable for the nature and scale of the low energy IMMR survey equipment. The operating frequencies of MBES (12 to 700 kHz) and SSS (75 to 900 kHz) are well above the peak hearing ranges of fish (100 Hz to several kHz) and so no disturbance is expected. It is possible that some of the lower frequency sound emitted by sub-bottom profilers (2 to 30 kHz) will be audible to fish, but again, a large proportion of the sound energy may be at frequencies that are outside of their normal auditory range. Therefore, behavioural impacts would be highly localised. PTS or TTS is not considered to be credible given the rapid attenuation of sound close to the source and a large proportion of the sound energy is produced at frequencies outside the peak hearing frequency range of fish.

Transponders used for positioning during IMMR activities typical operate at frequencies of 21 to 31 kHz which is well outside the hearing frequency range of fish. Therefore, no impacts are considered credible.

Potential impacts from predicted noise levels from the Pluto facility, support vessels and IMMR activities are not considered to be ecologically significant at a population level.

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/ Sacrifice (CS)**	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
Legislation, Codes and Standards				
EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans, including the following measures[56]: • Support vessels will not travel greater than 6 knots within 300 m of a cetacean (caution zone) and not approach closer than 100 m from a whale. • Support vessels will not approach closer than 50 m for a dolphin and/or 100 m for a whale (with the exception of animals bow riding). • If the cetacean shows signs of being disturbed, support vessels will immediately withdraw from the caution zone at a constant speed of less than 6 knots.	F: Yes. CS: Minimal cost. Standard practice.	Implementation of these controls is primarily intended to reduce the likelihood of a collision with a cetacean, occurring. However, implementation may also provide some reduction in the potential for exposure of these fauna to sound levels in direct proximity to vessels.	Controls based on legislative requirements – must be adopted.	**Yes** **C 3.1**
Department of Parks and Wildlife (2013) Whale shark management with particular reference to Ningaloo Marine Park: • Support vessels will not travel greater than 8 knots within 250 m of a whale shark and not allow the vessel to approach closer than 30 m of a whale shark.	F: Yes. CS: Minimal cost. Standard practice.	Implementation of controls for reduced vessel speed around whale sharks can potentially reduce the underwater noise footprint of a vessel.	Benefits outweigh cost/sacrifice. Good practice.	**Yes** **C 3.2**
Good Practice				

[56] For safety reasons, the distance requirements below are not applied for a vessel holding station or with limited manoeuvrability, e.g., anchor handling, loading, back-loading, bunkering, close standby cover for overside working and emergency situations.

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/ Sacrifice (CS)**	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
Implement adaptive management procedure prior to resupply/IMMR vessel to the riser platform	F: Yes. CS: Schedule delays associated with waiting on pygmy blue whale activity to cease/move on.	Implementation of adaptive management where PBW (or large unidentified whales) are observed means a new noise source (vessel) is not introduced while PBW are sighted. The riser platform is not located in the Pygmy Blue Whale BIA. Limited value in implanting adaptive management procedure outside sensitive areas.	Disproportionate. The cost/sacrifice outweighs the benefit gained.	No
Vary the timing of the PAP to avoid migration periods.	F: No. The PAP occurs continuously over a five-year period, modifying the timing of the PAP is not feasible. CS: Not considered, control not feasible.	Not considered, control not feasible.	Not considered, control not feasible.	No
Management of noise from IMMR activities by varying the timing of the PAP to avoid migration periods.	F: Yes. Migration periods for cetaceans that may occur in the PAA (pygmy blue and humpback whales) are well known. CS: Significant cost and schedule impacts if activities avoid specific timeframes. Increased potential safety and environmental risks due to reduction in maintenance.	The platform is NNC. Maintenance activities including vessel-based activities are not flexible. Avoiding migration periods would reduce the likelihood of impacts to cetaceans. However, given the predicted impacts from noise sources associated with the PAP are considered to be localised with no lasting effect, the overall benefit is minimal.	Disproportionate. The cost/sacrifice outweighs the benefit gained.	No

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/ Sacrifice (CS)**	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
Vessels will not travel greater than 6 knots within 300 m of a turtle (caution zone). If the turtle shows signs of being disturbed, vessels will immediately withdraw from the caution zone at a constant speed of less than 6 knots.	F: Yes CS: Minimal cost. Standard practice.	Implementation of controls for reduced vessel speed around turtles can potentially reduce the underwater noise footprint of a vessel.	Benefits outweigh cost/sacrifice. Good practice.	**Yes** **C 3.3**
Collect data on opportunistic sightings of PBW to gauge presence and behaviour using trained crew.	F: Yes. CS: Time/cost associated with training personnel and person used for observations and in data collection on minimally crewed facility.	Collecting data on pygmy blue whale presence and behaviour is not warranted as the riser platform is located outside the PBW BIA.	Disproportionate. The cost/sacrifice outweighs the benefit gained.	No
Implement a shutdown zone around MBES, SSS and sub-bottom profiler for the following fauna: whales marine turtles whale sharks.	F: Yes. However, as equipment is underwater, effective implementation of zones is challenging from topside observation. CS: Moderate. Requires the provision of a dedicated suitably trained crew member to undertake Marine Fauna Observations.	Limited. The areas of disturbance for these devices are limited and injury, PTS and TTS are not expected to occur. In addition, it is noted that for many MBES and SSS, the frequency range of these devices are outside the estimated frequency hearing range of identified protected species (whales, turtles and whale sharks).	Acoustic MBES, SSS and sub-bottom profiler surveys are infrequently conducted (every 1–6 years) as part of the Petroleum Activities Program. The source levels and frequency range of these devices are mostly outside the estimated frequency hearing range of identified protected species (whales, turtles and whale sharks), so costs are considered disproportionate to benefits.	No
Manage IMMR vessel speed in the HBW and PBW whale BIAs in migration seasons (Apr-Jul & Oct-Jan for PBW and Jun-Sep & Jul-Nov for HBW).	F: Yes, within the limits of navigational safety. CS: Time/cost associated with slower transit speed.	Given the PAA overlaps the pygmy blue whale migration BIA and introduction of vessel noise may present behavioural disturbance risk to migrating pygmy blue whales, reducing vessel speed can result in reduced underwater	Benefit outweighs cost/sacrifice.	Yes C 3.4

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/ Sacrifice (CS)**	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
		noise emissions and overall reduction in potential behavioural disturbance.		
The use of dedicated marine fauna observers (MFOs) on IMMR vessels for the duration of the PAP to watch for whales and provide direction on and monitor compliance with Part 8 of the EPBC Regulations.	F: Yes. However, support vessel bridge crews already maintain a constant watch during operations. CS: Additional cost of MFOs.	Given that support vessel bridge crews already maintain a constant watch during operations and trained crew as MFOs will monitor for pygmy blue whale presence prior to resupply/support vessel moves alongside the MODU and PIV, additional MFOs would not further reduce the likelihood of an individual being within close proximity of the acoustic source during introduction of sounds related to DP or during operations.	Disproportionate. The cost/sacrifice outweighs the benefit gained.	No
Use professional MFOs in lieu of trained crew to observe for pygmy blue whales.	F: Yes. CS: The cost of implementing dedicated MFOs during vessel activities would be tens of thousands of dollars and expose additional personnel to the health and safety risks of working at sea. The cost is grossly disproportionate to the environmental benefit.	The environmental benefit of having dedicated professional MFOs is a potential increase in the likelihood of detecting PBW at the species level, which then permits actions to maintain separation as per the adaptive management procedure. Trained crew will watch for marine fauna during the petroleum activity. Trained crew will implement adaptive management measures if a pygmy blue whale	Disproportionate. The cost/ sacrifice outweighs the benefit gained.	No.

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/ Sacrifice (CS)**	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
		or large unidentified whale is observed. Therefore, while there is an increased likelihood for professional MFOs to detect PBW from other large whale species, the ability to identify marine fauna in comparison with trained crew is negligible.		
Professional Judgement – Eliminate				
Eliminate the use of DP on vessels during the Petroleum Activities Program.	F: No. Both platform and subsea support vessels are required to reliably hold station during the Petroleum Activities Program. Failure to do so may lead to loss of separation between vessels and infrastructure. This would result in unacceptable safety and environmental risk (loss of vessel separation has been identified as an MEE) CS: Not considered, control not feasible.	Not considered, control not feasible.	Not considered, control not feasible.	No
Avoid where practicable, planned IMMR vessel activities, during Pygmy Blue Whale migration (Apr-Jul & Oct-Jan) and humpback whale migration (Jun-Sep & Jul-Nov).	F: Yes CS: Significant increased cost for logistics and restriction of vessel availability due to extensive period (10 months).	Planning to avoid where practicable, planned IMMR activities during PBW migration and humpback whale migration will reduce underwater noise emissions in the PBW and humpback whale	Implementing this control would result in very little benefit, and the cost sacrifice is disproportionate to the benefit gained.	No

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/ Sacrifice (CS)**	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
		migration BIAs and in close proximity to the PBW foraging BIA. However, given the infrequent noise emissions from IMMR vessel(s), the size and extent of the migration BIAs, the extensive period that the whales may be present, and the behaviour of the whales being transitory during migration, it is expected that this would have a very limited benefit, if any, on the migration behaviour of the PBW or humpback whale.		
Professional Judgement – Substitute				
None identified.				
Professional Judgement – Engineered Solution				
Application of bubble curtains to reduce noise propagation.	F: No, Bubble curtain installation and operation in offshore open water not feasible due to technical operation constraints; i.e., water depth/ current.	Not considered, control not feasible.	Not considered, control not feasible.	No
ALARP Statement: On the basis of the environmental impact assessment outcomes and use of the relevant tools appropriate to the decision type, Woodside considers the adopted controls appropriate to manage the potential impacts from acoustic emissions from vessels, helicopters, wellheads, pipelines and the Pluto platform (including machinery). As no reasonable additional/alternative controls were identified that would further reduce the impacts without grossly disproportionate sacrifice, the impacts and risks are considered ALARP.				

EPOs, EPSs and MC for Pluto Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 3a	**C 3.1**	**PS 3.1**	**MC 3.1.1**

No injury of, or mortality to, EPBC Act 1999 listed marine fauna as a result of noise generated by the PAP during operations. **EPO 3b** No displacement of marine turtles or pygmy blue whales from habitat critical during nesting/breeding (inc. internesting periods for turtles) and ensure biologically important behaviour can continue in biologically important areas.	EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans, including the following measures[57]: • Support vessels will not travel greater than 6 knots within 300 m of a cetacean (caution zone) and not approach closer than 100 m from a whale. • Support vessels will not approach closer than 50 m for a dolphin and/or 100 m for a whale (with the exception of animals bow riding). • If the cetacean shows signs of being disturbed, support vessels will immediately withdraw from the caution zone at a constant speed of less than 6 knots.	Vessels will comply with the EPBC Regulations 2000 – Part 8 Division 8.1 (Regulation 8.05 and 8.06) Interacting with cetaceans to manage the risk of fauna collision.	Records demonstrate no breaches with EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans and Woodside Marine Charterers Instructions.
			MC 3.1.2 Records demonstrate reporting cetacean ship strike incidents to DCCEEW.
	C 3.2 Department of Parks and Wildlife (2013) Whale shark management with particular reference to Ningaloo Marine Park: • Support vessels will not travel greater than 8 knots within 250 m of a whale shark and not allow the vessel to approach closer than 30 m of a whale shark.	**PS 3.2** Vessels will comply with Department of Parks and Wildlife (2013) Whale shark management with particular reference to Ningaloo Marine Park: • When within 250 m of a whale shark vessels will not travel greater than 8 knots and vessels will not approach closer than 30 m to a whale shark.	**MC 3.2.1** Records demonstrate no breaches of speed requirements when within 250 m of a whale shark.
	C **3.3** Vessels will not travel greater than 6 knots within 300 m of a turtle (caution zone). If the turtle shows signs of being disturbed, vessels will immediately withdraw from the caution zone at a constant speed of less than 6 knots.	**PS 3.3** When within 300 m of a turtle, vessels will not travel greater than 6 knots.	**MC 3.3.1** Records demonstrate no breaches of speed requirements when within 300 m of a turtle.
	C **3.4** Manage IMMR vessel speed in the HBW and	**PS 3.4**	**MC 3.4.1** Records demonstrate vessel speeds in the

[57] For safety reasons, the distance requirements below are not applied for a vessel holding station or with limited manoeuvrability, e.g., anchor handling, loading, back-loading, bunkering, close standby cover for overside working and emergency situations.

	PBW whale BIAs in migration seasons (Apr-Jul & Oct-Jan for PBW and Jun-Sep & Jul-Nov for HBW).	IMMR vessel speeds in the Operational Area are restricted ≤10kn: • When in the pygmy blue whale migration BIA during PBW migration periods (Apr-Jul & Oct-Jan) • When in the HBW migration BIA during migration periods (Jun-Sep & Jul-Nov).	Operational Area were ≤ 10 knots during whale migration seasons (Apr-Jul & Oct-Jan for PBW and Jun-Sep & Jul-Nov for HBW).

Demonstration of Acceptability
Acceptability Statement: The impact assessment has determined that, given the adopted controls, impacts from acoustic emissions from vessels, helicopters, wellheads, pipelines and the Pluto platform represent a negligible impact/disturbance to marine fauna within the Export Pipeline and Pluto Facility Operational Areas. Further opportunities to reduce the impacts and risks have been investigated above. The impacts are consistent with good oil-field practice/industry best practice. The potential impacts and risks are considered broadly acceptable if the adopted controls are implemented. Therefore, Woodside considers the adopted controls appropriate to manage the impacts of acoustic emissions to a level that is broadly acceptable and demonstrate the EPOs are met.

6.7.4 Acoustic Emissions: Generation of Noise During Xena-03 Tie-back Activities

Context		
Xena-03 Drilling &Tie-back Activities – Section 3.11 Vessel-based Activities for the Xena-03 Tie-back – Section 3.12	Protected Species – Section 4.6	Consultation – Section 5

Impact Evaluation Summary

Source of Impact	***Environmental Value Potentially Impacted***						***Evaluation***						
	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/Habitat	Species	Socio-economic	Decision Type	Consequence/Impact	Likelihood	Risk Rating	ALARP Tools	Acceptability	Outcome
Generation of noise from project vessels (MODU, installation vessels, AHVs and support vessels) during Xena-03 Tie-back activities					x		A	F	-	-	LCS GP PJ	Broadly Acceptable	EPO 4 EPO 3b
Generation of noise from DP systems on project vessels					x			F					
Generation of noise from cutting of well infrastructure and contingency activities					x			F					

Description of Source of Impact

During Xena-03 Tie-back activities, sound will be generated from a number of sources including from vessels involved with installation of the mooring system, the MODU during drilling operations, support vessels, and retrieval of anchors. Noise may also be generated from contingency activities such as respud, sidetrack, well removal and associated underwater acoustic positioning systems. These noise sources will contribute to and have the potential to exceed ambient noise levels which range from around 90 dB re 1 µPa (SPL) under very calm, low wind conditions, to 120 dB re 1 µPa (SPL) under windy conditions (McCauley, 2005).

Vessel Noise

A range of vessels may be used to complete the Xena-03 Tie-back activities, including AHVs, MODU, subsea installation vessels and other support vessels (Section 3.12).

The MODU (hybrid or moored) is expected to be on location for drilling operations for approximately 60 days including mobilisation, demobilisation and contingency. Vessels associated with installation of the mooring system will be on location for up to 10 days prior to arrival of the MODU. Subsea installation and commissioning activities may be on location for up to three weeks. Mooring system anchor retrieval may also take up to 10 days once the MODU departs.

The vessels will generate noise both in the air and underwater, due to the operation of thrusters, engines, propeller movement, etc. Vessels, including the MODU (unless moored/ hybrid), installation vessels, AHVs, general support vessels will use DP where propellers and thrusters are used to hold position, rather than anchoring, unless in an emergency.

MODU Drilling Operations (Moored)

During drilling operations, a moored MODU will produce low-intensity continuous sound. Sound produced from an active MODU is predominantly below 2 kHz, with peak frequencies below 500 Hz.

A range of broadband values, 59 to 185 dB re 1 µPa at 1 m (SPL), have been quoted for various MODUs (Simmonds et al., 2004). McPherson et al. (2021) recorded the source level spectrum of the Ocean Onyx, which is considered

representative of a moored MODU considered for the tie-back campaign. The Ocean Onyx was measured to have a broadband (10 Hz to 31 kHz) source level of 175.4 dB re 1 µPa m while anchored and drilling and is considered representative drilling activity for this EP. The measured source level for the Ocean Onyx is consistent with or slightly higher than levels recorded for other moored MODUs during drilling operations. For example, McCauley (1998) recorded source noise levels for moored MODUs from 149-154 dB re 1 µPa at 1 m while actively drilling (with support vessel on anchor) and Greene (1987) recorded source levels of two moored drillships from 145 to 158 dB re 1 µPa at 1 m during drilling (with support vessels idling nearby). Austin et al. (2018) recorded broadband source levels from MODU operations (excluding DP thrusters) to be 170.7 dB re 1 µPa.

Project Vessels and MODU Operation of DP

Vessels used for the Xena-03 Tie-back activities are detailed in Section 3.12, and are DP capable, as required. As discussed in Section 6.7.3, sound levels and frequencies generated by vessels varies with the size of the vessel, speed, engine type and the activity being undertaken.

Indicative MODU underwater noise measurements were taken for the West Aquarius MODU by JASCO on the Scotian Shelf in Canada (Wecker et al., 2022). The 90th percentile of the broadband radiated sound levels was 186.3 dB re 1 µPa (Martin et al., 2019). This is similar to measurements taken for the Maersk Discoverer drill rig on the North West Shelf (Woodside Energy Limited, 2011), where the system emitted tonal signals between 200 Hz to 1.2 kHz, at a source level between 176 and 185 dB re 1 µPa SPL at 1 m.

Noise levels generated by support vessels on standby is expected to be similar to levels discussed in Section 6.7.3.

Sound Transmission Loss Modelling

Noise modelling was commissioned from JASCO by Woodside for the Julimar Appraisal Drilling and Surveys activities (Julimar South-1 well) (Stroot et al., 2022) and Pyxis Drilling and Subsea Installation activities (Xena-02 well) (Wecker, et al., 2022), which are considered broadly comparable in terms of MODU and vessel activities, and the water depths and seabed substrates at the Xena-03 well location.

For moored MODU scenarios, noise modelling for the Julimar Appraisal Drilling and Surveys activities (Stroot et al., 2022) provides a suitable analogue to the size and type of moored MODU and support vessels planned for use during Xena-03 tie-back activities. A number of moored MODU scenarios were modelled including with an offshore supply vessel (OSV) in ~166 m at the Julimar South-1 well location. Given water depth at the Xena-03 location is 177 m and similar seabed substrate, the modelling of the moored MODU and OSV are regarded as a suitable analogue for similar vessels and activities at the Xena-03 location.

For DP vessel activities, noise modelling for Pyxis Drilling and Subsea Installation activities (Wecker, et al., 2022) provides a similar analogue to the size and type of hybrid MODU and support vessels planned for use during the Xena-03 Tie-back activities. Several DP MODU scenarios were modelled, including with an OSV in ~172 m at the Xena-02 well location. As above, this modelling is considered a suitable analogue for similar vessels and activities at the Xena-03 location.

These scenarios included several permutations of support vessels and the MODU undertaking drilling activities, used to inform the worst-case credible noise propagation scenarios (including concurrent activities).

Table 6-9: Summary of modelled scenarios for drilling activities at the Julimar South-1 well location as an analogue for moored operations (source: Stroot et al., 2022)

Scenario Number	Description
1	Anchored MODU Drilling (24h)
2	Anchored MODU Drilling (24h) + OSV on standby (24h)
3	Anchored MODU Drilling + OSV resupply, under DP (2h)
4	Anchored MODU Drilling (24h) + OSV resupply, under DP (8h)
5	Anchored MODU Drilling (24h) + OSV resupply, under DP (8h) + OSV on standby (24h)

Table 6-10: Summary of modelled scenarios at the Xena (Xena-02) field as an analogue for DP operations (source: Wecker et al., 2022)

Scenario Number	Description
6	MODU under DP, drilling at Xena-02 (24 hr)
7	MODU under DP, drilling at Xena-02 (24 hr) + support vessel resupply, under DP (2 hr)
8	MODU under DP, drilling at Xena-02 (24 hr) + support vessel resupply, under DP (8 hr)
9	MODU under DP, drilling at Xena-02 (24 hr) + support vessel on standby (24 hr)

10	MODU under DP, drilling at Xena-02 (24 hr) + support vessel resupply, under DP (8 hr) + support vessel resupply on standby (24 hr)

Source levels representative of drilling and subsea installation scenarios.

Source levels for relevant vessels that were used to inform the sound transmission loss modelling (Stroot et al., 2022; Wecker et al., 2022) are presented in Table 6-11. The source sounds were applied to the modelling scenarios for drilling and subsea installation activities.

Table 6-11: Vessel source levels used in the acoustic modelling for the Xena-03 Tie-back activities

Vessel	Sound Level (dB re 1 µPa².m2.s)	Reference
Moored MODU	175.4	(Stroot et al., 2022)
MODU under DP	187.7	(Wecker et al., 2022)
OSV stationary under DP (resupply scenario)	187.6	(Stroot et al., 2022)
OSV slow transit	177.8	(Stroot et al., 2022)

Sound Transmission Loss Modelling Scenarios

The acoustic modelling scenarios used in this assessment are presented in Table 6-9 and Table 6-10. Vessel scenarios during Xena-03 Tie-back activities may differ slightly from those modelled from time to time in terms of precise vessel types, proximity and number. However, the magnitude and extent of potential sound propagation and the resultant effects on marine fauna from the modelled worst-case scenario are expected to be comparable to the worst-case scenario or are conservative.

The acoustic modelling studies assessed distances from operations where underwater sound levels were predicted to drop below thresholds corresponding to behavioural response and injury (temporary reduction in hearing sensitivity or TTS and permanent threshold shift or PTS) for marine fauna. The animals considered included marine mammals, turtles, and fish. Due to the variety of species considered, several different thresholds were used for evaluating effects.

The modelling methodologies considered scenario specific source levels and range-dependent environmental properties. Estimated underwater acoustic levels for non-impulsive (continuous) noise sources presented as sound pressure levels (SPL, Lp), and as accumulated sound exposure levels (SEL, LE) as appropriate for different noise effect criteria, behavioural response and injury (TTS and TPS), respectively. In this report, the duration of the SEL accumulation is defined as integrated over a 24-hour period.

The SEL24h is a cumulative metric that reflects the dosimetric impact of noise levels within 24 hours based on the assumption that an animal is consistently exposed to such noise levels at a fixed position. The corresponding SEL24h radii represent an unlikely worst-case scenario. More realistically, marine mammals (as well as pelagic fish and turtles) would not stay in the same location for 24 hours. Therefore, a reported radius for SEL24h criteria does not mean that marine fauna travelling within this radius of the source will be injured, but rather that an animal could be exposed to the sound level associated with injury (TTS or PTS) if it remained in that location for 24 hours.

Contingency Activities (Respud, Sidetrack, Well Removal)

Contingency activities include a well respud or sidetrack and will involve the use of a MODU and vessels, plus drilling operations. Any acoustic emissions generated will be the same as those expected from the planned activities described above.

In the event the wellhead is removed under this EP scope, additional noise from the cutting of the surface casing and conductors is likely to be generated. Underwater noise associated with cutting (diamond wire) of subsea infrastructure is generally indistinguishable above background noise levels at lower frequencies, primarily detected at noise frequencies above 5 kHz (Pangerc et al., 2016). Quijano and McPherson (2021) estimated the source level of a diamond wire saw cutter at 169 dB re 1 µPa at 1 m. The casings and conductors will be cut below the mudline to enable wellhead recovery using either abrasive water jet cutting method, or mechanical cutting method.

Twachtman et al. (2004) concluded that mechanical cutting and abrasive water jetting, as well as diamond wire cutting methods, are generally considered harmless to marine life and the environment. Similarly, Pangerc et al. (2016) found that the sound radiated from the diamond wire cutting of the conductor was not easily discernible above the background noise at the closest recorder located at 100 m from the source. The sound that could be associated with the diamond wire cutting was primarily detectable above the background noise at the higher acoustic frequencies (above around 5 kHz) (Pangerc et. al., 2016) above the hearing range of low frequency cetaceans. Background noise was attributed to surface vessel activity such as DP. Any noise propagating at seabed from either abrasive water jet cutting or mechanical cutting of the wellhead casing and conductors is likely to attenuate to levels at, or close to background ambient levels within <100 m of the source, with ambient levels being significantly elevated by the concurrent presence of a DP vessel immediately above the wellhead location. As such, noise from the cutting of the

casing and conductors will not add to significantly to noise levels for the Xena-03 Tie-back activities and are not assessed further.

Generation of Underwater Noise from Positioning Equipment

An array of long baseline (LBL) and/or ultra-short baseline (USBL) transponders may be installed on the seabed for metrology and positioning. An array of transponders is proposed within a radius of 500 m from the proposed location of the well and will be in place for a period of about three months. During xmas tree installation, ultra-short baseline transponders (USBL) may be installed on the seabed or mounted to the wellhead as required by the subsea installation activities. Transmissions from USBL transponders are similar to LBL transponders.

Transponders typically emit pulses (impulsive noise) of medium frequency sound, generally within the range 21 to 31 kHz. The estimated SPL would be 180 to 206 dB re 1 µPa at 1 m (Jiménez-Arranz et al., 2017). Transmissions are not continuous but consist of short 'chirps' with a duration that ranges from 3 to 40 milliseconds. Transponders will not emit any sound when on standby and are planned to only actively emit sound for about six hours per well. When required for general positioning they will emit one chirp every five seconds (estimated to be required for four hours at a time). When required for precise positioning they will emit one chirp every second (estimated to be required for two hours at a time). An array of transponders will be active whilst the DP MODU is on location.

Rig Anchor Release System

Should a hybrid MODU be used, Rig Anchor Release (RAR) moorings may be installed to allow the DP-capable rig to rapidly disengage from a mooring system. An RAR device will couple each of the moorings to the MODU (eight to 12 devices depending on mooring spread).

RAR devices typically emit pulses (impulsive noise) of low frequency, in the range of 9 to 11 kHz. Transmissions are expected to be limited to short pulses with a duration of minutes, during weekly testing. When activated to release moorings, they are expected to emit pulses of ~two minutes duration for each RAR.

Cumulative Noise Sources

Underwater noise generated during Xena-03 Tie-back activities (~12 weeks) have the potential for cumulative impacts with routine Pluto Facility Operations (Section 6.7.3) with acoustic emissions from routine operations (e.g., machinery, flaring, IMMR activities etc), which may result in slightly elevated acoustic levels.

As described above, Xena-03 Tie-back activities are likely to include AHVs, a MODU and PIV as well as installation and support vessels. SIMOPS with drilling and installation are not planned but are considered as a contingency. During concurrent activities, a number of vessels may be operating. The worst-case credible scenario is considered to be if the MODU, support vessel and installation vessel are required to be in proximity. This is the case used for the following cumulative assessment of potential impacts.

Table 6-12: Concurrent activities considered in the assessment of cumulative underwater vessel noise

Concurrent Activities	Approx. Duration[1]	Vessels	Approximate Distance Between Vessels
MODU drilling Subsea tree installation from installation vessel (or similar activity)	2 days	MODU + supply vessel Installation or IMMR vessel (DP)	<3 km
Pre-commissioning and start-up of Xena-03 tie back Platform operations and supply	5 days	Commissioning (IMMR class) vessel (DP) Platform + DP supply vessel	~11 km

[1] *Relates to period of overlap, not entire duration of activity.*

Impact Assessment

Potential impacts to environmental values

Receptors

The Xena-03 Operational Area is located in waters at ~177 m depth (Section 3.2). The fauna associated with this area will be predominantly pelagic species of fish and cetaceans, with migratory species such as cetaceans, marine turtles and whale sharks occurring in the area seasonally (Section 4.6). Anthropogenic noise interference is a key threat to a number of migratory and threatened cetaceans, marine turtles and whale sharks identified as potentially occurring within the Xena-03 Operational Area.

The migration and distribution BIA for the pygmy blue whale partially overlaps the Xena-03 Operational Area (Section **Error! Reference source not found.**). Migration periods for PBW are April to July and October to January, and some whales can be expected to pass by the Xena-03 Tie-back activities.

The migration BIA for the humpback whale is ~30 km east of the Xena-03 Operational Area with no overlap. The migration period for humpback whale is June to November and the majority of the migrating population will be found further inshore than the Xena-03 Tie-back activities, inside the BIA.

The internesting buffer BIA for the flatback turtle overlaps the Xena-03 Operational Area. Habitat Critical for the flatback turtle is ~10 km from the Xena-03 Operational Area (~12 km from the Xena-03 well location). Given the water depths and distance from shore, the Xena-03 Operational Area does not represent suitable foraging or internesting habitat. Satellite tracking of flatback turtle nesting populations (Barrow Island and mainland sites) indicates this species travels to the east of Barrow Island between nesting events, within WA mainland coastal waters less than 70 m deep (Chevron Australia Pty Ltd, 2015).

The whale shark foraging BIA overlaps with the Xena-03 Operational Area. Peak whale shark numbers are expected in the region from March to July.

The Continental Slope Demersal Fish Communities KEF overlaps the wider Xena-03 Operational Area (Section 4.7) and is recognised for its biodiversity values, including high levels of species endemism (DCCEEW 2023b). The targeted well location is not within the Continental Slope Demersal Fish Communities KEF (Figure 4-10).

The Montebello Marine Park Multiple Use Zone is ~1.75 km from the boundary of the Xena-03 Operational Area, and ~5.8 km from the Xena-03 well. This marine park supports a range of species listed under the EPBC Act. Biologically important areas within this marine park include breeding habitat for seabirds, internesting, foraging, mating, and nesting habitat for marine turtles, a migratory pathway for humpback whales and foraging habitat for whale sharks. Impacts to these values are described below.

Potential Impacts of Noise

Elevated underwater noise can affect marine fauna, including cetaceans, fish, turtles, sharks and rays, in three main ways (Richardson et al., 1995; Simmonds et al., 2004):

- by causing direct physical effects on hearing or other organs; hearing loss may be temporary (temporary threshold shift (TTS) referred to as auditory fatigue), or permanent threshold shift (PTS) (injury)
- by masking or interfering with other biologically important sounds (including vocal communication, echolocation, signals and sounds produced by predators or prey)
- through disturbance leading to behavioural changes or displacement from important areas (e.g., BIAs); the occurrence and intensity of disturbance is highly variable and depends on a range of factors relating to the animal and situation.

Sound Propagation

Increasing the distance from the noise source usually results in the level of noise reducing, due primarily to the spreading of the sound energy with distance. The way the noise spreads (geometrical divergence) depends upon several factors such as water column depth, pressure, temperature gradients, and salinity, as well as surface and bottom conditions.

Cetaceans

Species Sensitivity and Thresholds

Protected species including migratory PBW may be encountered near the Xena-03 Operational Area and therefore could be impacted by acoustic emissions associated with Xena-03 Tie-back activities. Thresholds that could result in a behavioural response, TTS and PTS for cetaceans as a result of continuous and impulsive noise sources are presented in Table 6-13.

Predicted Underwater Noise Impacts to Cetaceans

Results – Modelling of a Moored MODU

A sound transmission loss modelling study was conducted by JASCO for several scenarios at the analogous Julimar South-1 well location (water depth – 166.6 m) as well as a nominated OSV standby location (water depth – 150.2 m), (Stroot et al., 2022). The modelling study indicated that exceedances of the PTS and TTS thresholds for low frequency (LF) cetaceans, such as humpback whale and pygmy blue whale, may occur out to a maximum of 0.07 km and 0.92 km respectively. For HF and VHF cetaceans (toothed whales and dolphins), the maximum distances at which sound levels dropped below PTS and TTS thresholds were 0.21 km and 2.76 km respectively.

During normal operations (the moored MODU drilling with an OSV on standby – Scenario 2), the minimum distance to the TTS threshold is 0.23 km, 0.09 km and 2.57 km for LF, HF and VHF cetaceans respectively. The PTS threshold was only exceeded for VHF for Scenario 2, at a maximum distance of 0.15 km; refer to Table 6-13.

As described above, the PTS and TTS thresholds are based on a cumulative metric that that reflects the dosimetric impact of noise levels over a 24-hour period based on the assumption that an animal is consistently exposed to such noise levels at a fixed position. It is not considered credible that individual LF and HF cetaceans that may pass through the Xena-03 Operational Area during the drilling program would experience PTS or TTS, given individuals

would need to remain within 70 m (PTS) and <1 km (TTS) of the drilling activity for a period of 24 hours. It is also considered highly unlikely that any VHF cetaceans would experience PTS or TTS.

The behavioural response threshold may be exceeded at a maximum of 3.57 km during normal drilling operations, and at a maximum of 8.85 km at times when an additional OSV is present and operating DP. At these distances, the ensonified area of the Pluto facility when in crewed mode (also 8.85 km without an ASV in operation) could slightly overlap as the distance between the Xena-03 well and the Pluto platform is 15.1 km.

Table 6-13: Thresholds for permanent and temporary threshold shift and behavioural response onset thresholds for cetaceans and marine turtles based on Southall et al. (2019) and Finneran et al. (2017)

Hearing Group	Frequency-weighted SEL24h Threshold (LE,24h; dB re 1 µPa²·s)	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
		Rmax (km)	Rmax (km)	Rmax (km)	Rmax (km)	Rmax (km)
PTS						
LF cetaceans	199	-	-	0.05	0.07	0.07
HF cetaceans	198	-	-	0.04	0.05	0.02
VHF cetaceans	173	0.15	0.15	0.19	0.21	0.19
Marine turtles	220	-	-	0.03	0.01	-
TTS						
LF cetaceans	179	0.23	0.23	0.42	0.84	0.92
HF cetaceans	178	0.09	0.09	0.12	0.15	0.13
VHF cetaceans	153	1.42	2.57	1.50	1.73	2.76
Marine turtles	200	-	-	0.05	0.05	0.07
Behavioural response						
Cetaceans	120	1.07	3.57	8.25*		8.85

**Scenario 4 has been omitted from Table 6-13 because Scenario 4 differs to Scenario 3 only by the time duration, and the SPL sound footprints represent the instantaneous sound field, independent on accumulation time. A dash indicates the level was not reached within the limits of the modelled resolution–(20 m).Source: Stroot et al (2022)*

Results – Modelling of a DP MODU

The analogous sound transmission loss modelling study by JASCO for a MODU on DP (Wecker et al., 2022) indicated the PTS and TTS thresholds for low frequency (LF) cetaceans, such as humpback whale and pygmy blue whale, may be exceeded out to a maximum of 0.13 km and 2.66 km respectively across the scenarios modelled. For HF and VHF cetaceans, the maximum distances at which sound levels dropped below PTS and TTS thresholds were 0.15 km (PTS) and 2.63 km respectively. During normal operations (MODU on DP with a support vessel on standby – Scenario 9), the maximum distance at which the TTS threshold is exceeded is 2.17 km, 0.09 km and 2.44 km for LF, HF and VHF cetaceans respectively. For PTS, the maximum distance at which the threshold is exceeded is 0.08 km, 0.02 km and 0.11 km for LF, HF and VHF cetaceans respectively.

As described above, the radii that represent potential for PTS and TTS onset are based on a 24-hour period of exposure and therefore represent an unlikely worst-case scenario since, more realistically, cetaceans would not stay in the same location or at the same range for 24-hours. It is not considered credible that individual LF, HF and VHF cetaceans that may pass through the Xena-03 Operational Area during DP vessel operations, would experience PTS, given individuals would need to remain within 150 m of the drilling activity for a period of 24 hours. TTS onset is also considered highly unlikely given the known movement behaviour of cetaceans including key migrating LF whale species such as the pygmy blue whale transiting through the Xena-03 Operational Area. The Xena-03 Operational Area is not known to represent significant foraging/aggregation habitat for cetaceans and individuals are not expected to dwell within the area for extended periods.

The behavioural response threshold may be exceeded at a maximum of 17.2 km during normal drilling operations and a maximum of 20.7 km at times when an additional support vessel is present and operating DP. At these distances,

the ensonified area would overlap with the location of the Pluto facility 15.1 km away, outside of the pygmy blue whale migration BIA.

Table 6-14: Thresholds for permanent and temporary threshold shift and behavioural response onset thresholds for cetaceans and marine turtles based on Southall et al. (2019) and Finneran et al. (2017)

Hearing Group	Frequency-weighted SEL24h Threshold (LE,24h; dB re 1 µPa²·s)	Scenario 6	Scenario 7	Scenario 8	Scenario 9	Scenario 10
		Rmax (km)	Rmax (km)	Rmax (km)	Rmax (km)	Rmax (km)
PTS						
Low-frequency (LF) cetaceans	199	0.08	0.11	0.13	0.08	0.13
High-frequency (HF) cetaceans	198	0.02	0.07	0.09	0.02	0.09
Very-high-frequency (VHF) cetaceans	173	0.11	0.13	0.15	0.11	0.15
Marine Turtles	220	0.02	0.07	0.09	0.02	0.09
TTS						
Low-frequency (LF) cetaceans	179	1.87	2.12	2.57	2.17	2.66
High-frequency (HF) cetaceans	178	0.09	0.11	0.13	0.09	0.13
Very-high-frequency (VHF) cetaceans	153	2.31	2.35	2.51	2.44	2.63
Marine turtles	200	0.1	0.11	0.14	0.10	0.14
Behavioural response						
Cetaceans	120	17.1	20.5	17.2	20.7	

Source: Wecker et al. (2022)

Impact Assessment

Potential behavioural disturbance to PBW within the distribution range is limited to any overlap with the northbound (April to July) and southbound (October to January) migratory seasons. Migrating humpback whales have shown avoidance behaviours (increased movement rate and dive frequency) when exposed to underwater noise generated by a vessel (Dunlop et al., 2015), and PBW may exhibit similar responses.

There is limited data to indicate that the Xena-03 Operational Area represents an area where opportunistic foraging by PBW occurs. Based on an overlap of three different metrics (occupancy, number of whales in a cell and move persistence), Thums et al. (2022) identified the most important foraging areas for PBW offshore from Western Australia but also recognised such areas are not static but dependent on the interplay of oceanographic and prey dynamics. The included areas encompassed the shelf edge from Ningaloo Reef to the Rowley Shoals, but none of the important foraging areas identified were on the shelf edge or slope offshore from where the Xena-03 Operational Area is located. Hence, it cannot be reasonably predicted that pygmy blue whale foraging is probable in the Xena-03 Operational Area. Furthermore, all of the identified important pygmy blue whale foraging areas identified by Thums et al. (2022) in offshore NW Australian waters are located beyond the maximum range (km) at which the TTS and behavioural impact thresholds for cetaceans are predicted to be exceeded based on modelling presented above.

Humpback whales occur in the region, with the migration BIA ~30 km east of the Xena-03 Operational Area. Aerial surveys of migrating humpback whales in the region showed that the majority of migrating humpbacks occur in the mid- and inner-continental shelf waters, rather than the outer part of the migration BIA (RPS Environment and Planning, 2010). The Xena-03 Operational Area is surrounded by open water, with no restrictions (e.g., shallow waters, embayment's) to an animal's ability to avoid the activities. Behavioural responses by cetaceans (such as PBW and humpback whales) may result in a deviation in course during migration, which is expected to be insignificant in the context of the long distances over which individuals migrate (thousands of kilometres). Cetaceans that are frequently exposed to sounds such as vessel noise may also habituate and adapt to this noise (Richardson et al., 1995; NRCC, 2003). This may be the case for the humpback whale population that regularly passes through areas of significant shipping traffic during their migrations. Furthermore, MODU activities are expected to occur over approximately 50 to 60 days.

Transponders used for positioning have the potential to cause some temporary behavioural disturbance to cetaceans; however, noise levels will be well below injury thresholds. Based on empirical spreading loss estimates measured by Warner and McCrodan (2011), received levels from USBL transponders are expected to exceed the cetacean behavioural response threshold for impulsive sources out to about 42 m. Given the short-duration chirps and the mid frequencies used by positioning equipment, the acoustic noise from a single transponder is unlikely to have any substantial effect on the behavioural patterns of marine fauna. Therefore, potential impacts from transponder noise are likely to be restricted to temporary and localised avoidance behaviour of individuals transiting through the PAA and therefore are considered localised with no lasting effect.

Potential impacts from predicted noise levels from the MODU, project vessels and transponders are not considered to be ecologically significant at a population level.

The National Recovery Plan for the Southern Right Whale (DCCEEW, 2024a) also identified anthropogenic noise as a threat, however the BIAs and habitat critical to the survival are over 250 km away, well outside the area where behavioural responses are expected to extend from the Operational Area and as such, there is not expected to be any anthropogenic noise from the petroleum activity that could displace or interfere with life cycle activities within, or near, the reproduction or migration BIAs and habitat critical to the survival.

Marine Turtles

Species Sensitivity and Thresholds

Turtles have been shown to respond to low frequency sound, with indications that they have the highest hearing sensitivity in the frequency range 100 to 700 Hz (Bartol and Musick, 2003). Lenhardt (1994) observed marine turtles avoiding low-frequency sound.

Acute noise, or temporary exposure to loud noise, may result in the avoidance of important habitats and in some situations physical damage to marine turtles. McCauley et al. (2000) observed the behavioural response of caged sea turtles – green (*Chelonia mydas*) and loggerhead (*Caretta caretta*) – to an approaching seismic airgun. For received levels above 166 dB re 1 µPa, the turtles increased their swimming activity and above 175 dB re 1 µPa (SPL) they began to behave erratically, which was interpreted as an agitated state. No numerical thresholds have been developed for behavioural impacts of continuous sources (e.g., vessel noise) on marine turtles. A Popper et al. (2014) review assessed thresholds for marine turtles and found qualitative results that the risk of behavioural disturbance was high for near field exposure, moderate for intermediate exposure and low for far field exposure (Popper et al., 2014).Sound exposure thresholds and criteria for continuous sound sources (e.g., vessel noise) and impulsive sources (e.g., transponders) applicable to marine turtles are summarised in Table 6-14.

Impact Assessment

Marine turtles may be present in the region, with a flatback turtle internesting BIA, overlapping the Xena-03 Operational Area. Habitat Critical for the flatback turtle is present ~10 km south west of the Xena-03 Operational Area. The Recovery Plan for Marine Turtles (Commonwealth of Australia, 2017) notes there is limited information available on the impact of noise on marine turtles and that the impact of noise on turtle stocks may vary depending on whether exposure is short (acute) or long-term (chronic). However, given the thresholds outlined it is reasonable to expect that marine turtles may demonstrate avoidance or attraction behaviour to the noise generated by the Xena-03 Tie-back activities. Sound transmission loss modelling indicated that the potential for PTS and TTS onset would be limited to within tens of meters of drilling activity, and up to 140 m (TTS) during DP vessel activities. However, marine turtles within the Xena-03 Operational Area are expected to be transient individuals, and unlikely to remain within 140 m of the vessels for 24-hours, and therefore PTS and TTS thresholds are not expected to be reached. Behavioural impacts to marine turtles from continuous noise sources generated by the Xena-03 Tie-back activities are expected to be short-term and localised.

Given the water depths and distance from shore, the Xena-03 Operational Area does not represent suitable foraging or internesting habitat. The defined BIA and Habitat Critical are considered very conservative as they are based on the maximum range of internesting females rather than direct studies that show marine turtles are more likely to remain near their nesting beaches. For example, tracking studies at Barrow and Thevenard islands suggest the majority of internesting flatback turtles remain in shallow water, close (<3 km) to nesting beaches (Whittock et al., 2014). Studies of flatback turtle nesting in the Pilbara region also found that the average distance travelled at each of the beaches ranged between approximately 10 km and 27 km, and typically in water depths of less than 25 m (RPS, 2010; Whittock et al., 2014; Whittock et al., 2016; Waayers and Stubbs, 2016). Hence it is considered highly unlikely that the Xena-03 Operational Area is used by internesting flatback turtles.

Marine turtle presence in general is expected to be infrequent, and potential impacts from predicted noise levels from the project vessels (including MODU and support vessels) are expected to be short-term, intermittent and localised, if they occur and are not considered to be ecologically significant at a population level.

Fish, Sharks and Rays

Species Sensitivity and Thresholds

Fish perceive sound through the ears and the lateral line, which are sensitive to vibration. Some species of teleost or bony fish (e.g., herring) have a structure linking the gas-filled swim bladder and ear, and these species usually have increased hearing sensitivity. These species are considered to be more sensitive to anthropogenic underwater noise sources than species such as cod (Gadus sp.), which do not possess a structure linking the swim bladder and inner

ear. Fish species that either do not have a swim bladder (e.g., elasmobranchs (sharks and rays) and scombrid fish (mackerel and tunas)) or have a much-reduced swim bladder (e.g., flat fish) tend to have a relatively low auditory sensitivity.

Considering these differences in fish physiology, Popper et al. (2014) developed sound exposure guidelines for fish; these are presented in Table 6-15 and are considered appropriate to assess continuous acoustic discharges to fish from the Petroleum Activities Program.

Table 6-15: Impact thresholds to fish, sharks and rays for continuous noise

Receptor	Mortality and Potential Mortal Injury	PTS	TTS	Masking	Behaviour
Fish: no swim bladder	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Moderate (I) Low (F) Low	(N) High (I) High (F) Moderate	(N) Moderate (I) Moderate (F) Low
Fish: swim bladder not involved in hearing	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Moderate (I) Low (F) Low	(N) High (I) High (F) Moderate	(N) Moderate (I) Moderate (F) Low
Fish: swim bladder involving hearing	(N) Low (I) Low (F) Low	170 dB rms SPL for 48-hours	158 dB rms SPL for 12-hours	(N) High (I) High (F) High	(N) High (I) Moderate (F) Low
Fish eggs and fish larvae	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) High (I) Moderate (F) Low	(N) Moderate (I) Moderate (F) Low

Note: The sound units provided in the table above include relative risk (high, moderate and low) is given for fish (all types) at three distances from the source defined in relative terms as near (N – tens of metres), intermediate (I – hundreds of metres) and far (F – thousands of metres) (after Popper et al., 2014).

Impact Assessment

Given the thresholds outlined in Table 6-15, it is reasonable to expect that fish, sharks and rays may demonstrate avoidance or attraction behaviour to the noise generated by the Xena-03 Tie-back activities. However, potential impacts from predicted noise levels from the project vessels (including MODU and support vessels) are not considered to be ecologically significant at a population level.

A number of demersal and pelagic fish species will be present within the Xena-03 Operational Area which overlaps the Continental Slope Demersal Fish Communities KEF. However, given species richness has been shown to correlate with habitat complexity (Gratwicke and Speight, 2005), it is unlikely that the sand/silt sediments that comprise the largest proportion of the Xena-03 Operational Area will support a wide diversity of species.

Maximum-over-depth horizontal distances to PTS and TTS thresholds for fish with a swim bladder involved in hearing as a result of underwater noise from a support vessel are approximately 10 m or less from the source based on modelling from JASCO for the Scarborough field (McPherson et al., 2019). For fish with a swim bladder not involved in hearing, and fish without a swim bladder (including whale sharks) the likelihood of PTS or TTS is low. Based on an intermediate spreading equation to estimate sound propagation loss from the MODU (15Log(R)), noise levels would drop below PTS and TTS thresholds for fish with a swim bladder involved in hearing within 15 m and 78 m respectively. It is expected that potential impact to demersal and pelagic fish and sharks/rays will be limited to a behavioural response. Behavioural responses are expected to be short-lived, with duration of effect less than or equal to the duration of exposure.

Whale sharks do frequent the wider NWS outside their seasonal aggregation period (peak: April and May) within the high-density prey foraging BIA at Ningaloo. The Xena-03 Operational Area overlaps a foraging BIA for whale sharks (Section 4.6.1); however, it is over 200 km from the Ningaloo high density prey foraging BIA and therefore likelihood of whale shark encounters is not considered high but is possible. Acoustic detections of tagged whale sharks at the North Rankin A and GWA platforms during two periods – June to July and October to January – were recorded (Thomson et al., 2021) and supported anecdotal evidence of whale shark presence on NWS. Behavioural disturbance to whale sharks as a result of vessel noise may result in a temporary deviation on their migration route. However, any deviation is considered to be insignificant in the context of the long distances over which whale sharks migrate and normal variation in their movements in the region.

It is reasonable to expect that fish, sharks and rays may demonstrate avoidance or attraction behaviour to the noise generated by the Xena-03 Tie-back activities. However, potential impacts from predicted noise levels from the project vessels (including MODU and support vessels) are not considered to be ecologically significant at a population level.

Cumulative Impacts

As identified above, Xena-03 Tie-back activities will coincide with routine operations of the Pluto facility (but is not planned to be co-timed with major maintenance requiring an ASV) and may result in cumulative impacts from underwater noise emissions. The combined sound fields of the drilling activity and routine facility operations are likely to result in an increase in the maximum range to the behavioural response threshold for LF cetaceans described above (i.e., ~20 km). However, as described above, the Xena-03 Operational Area, in which only temporary activities will occur, is surrounded by open water, with no restrictions (e.g., shallow waters, embayment's) to an animal's ability to avoid the activities. Consequently, if concurrent activities occur and coincide with seasonal migrations, any pygmy blue whales, humpback whales or whale sharks transiting through the area, may deviate, but can continue on their pathway. The intersect of ensonified areas between temporarily concurrent activities within the Xena-03 Operational Area and routine operations at the Pluto facility is likely to affect only a very small area of the pygmy blue whale migration BIA and biologically significant impacts at a population level are not anticipated. Modelling outlined above predicted PTS onset in LF cetaceans within a maximum of 150 m and TTS onset within a maximum of 2.66 km for a combination of three vessels in close proximity. Any cumulative impacts arising from the Pluto Facility Operations will be limited to the duration of Xena-03 Tie-back activities (~12 weeks) and would be discontinuous over this time.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[58]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Legislation, Codes and Standards				
EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans, including the following measures59: • Project vessels will not travel greater than 6 knots within 300 m of a cetacean (caution zone) and not approach closer than 100 m from a whale. • Project vessels will not approach closer than 50 m for a dolphin and/or 100 m for a whale (with the exception of animals bow riding). • If the cetacean shows signs of being disturbed, project vessels will immediately withdraw from the caution zone at a constant speed of less than 6 knots.	F: Yes. CS: Minimal cost. Standard practice.	Implementation of controls for reduced vessel speed around cetaceans can potentially reduce the underwater noise footprint of a vessel and lower the likelihood of interaction above significant thresholds.	Controls based on legislative requirements – must be adopted.	**Yes** **C 3.1**
Department of Parks and Wildlife (2013) Whale shark management with particular reference to Ningaloo Marine Park:	F: Yes. CS: Minimal cost. Standard practice.	Implementation of controls for reduced vessel speed around whale sharks can potentially reduce the	Benefits outweigh cost/sacrifice. Good practice.	**Yes** **C 3.2**

[58] *Qualitative measure*

[59] *For safety reasons, the distance requirements below are not applied for a vessel holding station or with limited manoeuvrability e.g. anchor handling, loading, back-loading, bunkering, close standby cover for overside working and emergency situations.*

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[58]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
• Project vessels will not travel greater than 8 knots within 250 m of a whale shark and not allow the vessel to approach closer than 30 m of a whale shark.		underwater noise footprint of a vessel.		
Good Practice				
Develop a SIMOPS Plan to manage MODU interactions with other facilities/vessels, where multiple campaigns occur within the PAA (i.e. during xmas tree installation). SIMOPS Plan will contain information on: • minimum separation distances • communications • MODU/vessels/ activities involved in SIMOPS • exclusion zone entry and exit processes • ROV operations • helicopter operations • key roles, responsibilities and emergency contacts • PTW arrangements • incident reporting and investigation management of change.	F: Yes. CS: Minimal cost. Standard practice.	SIMOPS management plans between Woodside operated vessels in the PAA will reduce the acoustic emissions from concurrent vessels.	Benefits outweigh cost/sacrifice.	**Yes** **C 1.15**
Implement adaptive management procedure prior to: • resupply vessel moving alongside the MODU with PIV within the PAA, during daylight hours • MODU departing well location (excludes kedging).	F: Yes. CS: Time/cost associated with person used for observations. Schedule delays associated with waiting on pygmy blue whale activity to cease/move on.	Implementation of adaptive management where PBW (or large unidentified whales) are observed means a new noise source (vessel) is not introduced while PBW are sighted. Restricting the introduction of new noise sources when pygmy blue whale presence is detected could lower likelihood of disturbance to PBW so as to not be inconsistent with the Blue Whale Conservation Management Plan.	Benefits outweigh cost/sacrifice.	**Yes** **C 4.1**

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[58]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Vessels will not travel greater than 6 knots within 300m of a turtle (caution zone). If the turtle shows signs of being disturbed, vessels will immediately withdraw from the caution zone at a constant speed of less than 6 knots.	F: Yes CS: Minimal cost. Standard practice.	Implementation of controls for reduced vessel speed around turtles can potentially reduce the underwater noise footprint of a vessel.	Benefits outweigh cost/sacrifice. Good practice.	**Yes** **C 3.3**
Collect data on opportunistic sightings of PBW to gauge presence and behaviour using trained crew.	F: Yes. CS: Time/cost associated with person used for observations and in data collection.	Collecting data on pygmy blue whale presence and behaviour may assist in increasing understanding of their activity in the PAA to inform future activities and support environmental knowledge.	Benefits outweigh cost/sacrifice.	**Yes** **C 4.2**
Implement speed limitations when safe[60] to do so for MODU and PIV within the Xena-03 Operational Area.	F: Yes, within the limits of navigational safety. CS: Time/cost associated with slower transit speed.	Given the Xena-03 Operational Area overlaps the pygmy blue whale migration BIA and introduction of vessel noise may present behavioural disturbance risk to migrating pygmy blue whales, reducing vessel speed can result in reduced underwater noise emissions and overall reduction in potential behavioural disturbance. Additionally, reducing speed to 6 knots is consistent with the EPBC Regs 2000 – Part 8 Division 8.1, interacting with cetaceans, under which project vessels are not to travel greater than 6 knots within 300 m of a cetacean. Application of this speed restriction for the MODU and PIV within the Xena-03 Operational Area is considered to be a precautionary approach to reducing vessel noise and potential disturbance to cetaceans.	Benefit outweighs cost/sacrifice.	**Yes** **C 4.3**

[60] Vessel speeds are at the ultimate discretion of the vessel master, noting speed limitations may be exceeded from time to time to maintain safe navigation.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[58]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Stop or deviate from course[61] if pygmy blue whale (or large unidentified whale) observed during entry of a hybrid MODU and PIV to the Xena-03 Operational Area.	F: Yes. If a whale is observed during mobilisation into the Xena-03 Operational Area, the MODU (if under own propulsion) and PIV could deviate course away from the whale and delay mobilisation. CS: Time/cost associated with deviating and delay to mobilisation into the Xena-03 Operational Area.	Deviating course may reduce potential behavioural disturbance associated with vessel noise.	Benefit outweighs cost/sacrifice.	**Yes** **C 4.4**
Stop or deviate from course if pygmy blue whale (or large unidentified whale) observed during entry of a moored MODU into the Xena-03 Operational Area.	F: No. Stopping or deviating the MODU in an unplanned manner if a pygmy blue whale or large unidentified whale is observed may reduce potential behavioural disturbance associated with vessel noise. However, the action would significantly increase the safety risk profile of the mobilisation activity through reactive interruption of planned course by vessels towing MODU into field. CS: Introduces unacceptable safety risk.	Not considered – introduces unacceptable safety risk.	Not considered – introduces unacceptable safety risk.	No
The use of dedicated marine fauna observers (MFOs) on project vessels for the duration of the PAP to watch for whales and provide direction on and monitor compliance with Part 8 of the EPBC Regulations.	F: Yes. However, support vessel bridge crews already maintain a constant watch during operations. CS: Additional cost of MFOs.	Given that support vessel bridge crews already maintain a constant watch during operations and trained crew as MFOs will monitor for pygmy blue whale presence prior to resupply/support vessel moves alongside the MODU and PIV, additional MFOs would not further reduce the likelihood of an individual being within close proximity of the acoustic source during introduction of sounds	Disproportionate. The cost/sacrifice outweighs the benefit gained.	No

[61] Unless deemed navigationally unsafe by the vessel master.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[58]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
		related to DP or during operations.		
Implement adaptive management procedure prior to: • hybrid MODU energising (turning on) DP system within the Xena-03 Operational Area.	F: No, a DP assist or thruster assist rig is held into position by a mooring spread and may be supplemented by a thruster assisted mooring system. The DP system will be energised and available for emergency use but not planned for use in regular operations. The system operates such that thrusters engage automatically in response to metocean conditions using feedback (signals) from the mooring system. Therefore, it is not feasible to predict when this will occur and hence, pre-emptively apply adaptive management procedures. CS: N/A.	Not considered, control not feasible.	Not considered, control not feasible.	No
Use professional MFOs in lieu of trained crew to observe for pygmy blue whales.	F: Yes. CS: The cost of implementing dedicated MFOs during vessel activities would be tens of thousands of dollars and expose additional personnel to the health and safety risks of working at sea. The cost is grossly disproportionate to the environmental benefit.	The environmental benefit of having dedicated professional MFOs is a potential increase in the likelihood of detecting PBW at the species level, which then permits actions to maintain separation as per the adaptive management procedure. Trained crew will watch for marine fauna during the petroleum activity. Trained crew will implement adaptive management measures if a pygmy blue whale or large unidentified whale is observed. Therefore, while there is an increased likelihood for professional MFOs to detect PBW from other large whale species, the ability to identify marine fauna in comparison with trained crew is negligible.	Disproportionate. The cost/ sacrifice outweighs the benefit gained.	No
Professional Judgement – Eliminate				

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[58]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Remove support vessel on standby at the PAP location.	F: No. Activity support vessel required as per MODU Safety Case, particularly for maintaining the 500 m petroleum safety zone around the MODU/ installation vessel. CS: Introduces unacceptable safety risk.	Not considered, control not feasible.	Not considered, control not feasible.	No
Eliminate generation of noise from the MODU, installation vessel, support vessels or positioning equipment.	F: No. The generation of noise from these sources cannot be eliminated due to operating requirements. Note that vessels operating on DP may be a safety critical requirement. CS: Inability to conduct the Petroleum Activities Program. Loss of project.	Not considered, control not feasible.	Not considered, control not feasible.	No
Professional Judgement – Substitute				
Management of vessel noise by varying the timing of the PAP to avoid migration periods.	F: Yes. Migration periods for cetaceans that may occur in the PAA (pygmy blue and humpback whales) are well known. CS: Significant cost and schedule impacts if activities avoid specific timeframes.	Avoiding migration periods would reduce the likelihood of impacts to cetaceans. However, given the predicted impacts from noise sources associated with the PAP are considered to be localised with no lasting effect, the overall benefit is minimal.	Disproportionate. The cost/sacrifice outweighs the benefit gained.	No
Professional Judgement – Engineered Solution				
Use of additional detection controls (e.g., drones for aerial observations, Passive Acoustic Monitoring for use at night, thermal imaging for use at night) to Identify cetacean presence.	F: Yes. CS: Time/cost associated with additional personnel and technology onboard vessels. Due to distance offshore actual observation times are limited by fuel availability – larger fuel capacity associated with larger aircraft increases cost of the exercise.	May increase likelihood of detection of whales, particularly during periods of poor visibility. Additional detection technologies can be degraded by metocean conditions (e.g., sea state). Additional detection methods would not result in a reduction in the potential consequence level.	Disproportionate. The cost/ sacrifice outweighs the benefit gained. Adequate observations are able to be made from the MODU bridge due to the height and surveillance by trained crew. It is not expected that additional technologies would add significantly more value than this to	No

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[58]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
			warrant deployment.	

ALARP Statement:

On the basis of the environmental risk assessment outcomes and use of the relevant tools appropriate to the decision type, Woodside considers the adopted controls appropriate to manage the impacts and risks of noise emissions from Xena-03 Tie-back activities. As no reasonable additional/alternative controls were identified that would further reduce the impacts without grossly disproportionate sacrifice, the impacts and risks are considered ALARP.

Demonstration of Acceptability

Acceptability Statement

The impact assessment has determined that the generation of noise from project vessels, MODU, and positioning equipment during Xena-03 Tie-back activities is unlikely to result in an impact significance level greater than slight. Relevant recovery plans and conservation advice have been considered during the impact assessment, and the PAP is not considered to be inconsistent with the overall recovery objectives and actions of these recovery plans and conservation advice.

In particular, the Conservation Management Plan for the Blue Whale (Commonwealth of Australia, 2015a) and associated guidance on key terms requires that PBW not be displaced from a foraging area. The nearest recognised foraging BIA is off the Ningaloo Coast, approximately 232 km south-west of the PAA at the closest point. The sound transmission loss modelling studies by JASCO (Stroot et al., 2022; Wecker et al., 2022) predicted that behavioural responses (a conservative surrogate for displacement) could occur up to 8.85 km from the noise source during moored drilling activities or up to 20.7 km from the noise source during DP vessel activities; less than one tenth of the distance to the foraging BIA). Hence, displacement of PBW from this foraging BIA as a result of the Xena-03 Tie-back activities will not occur. The potential impacts are considered broadly acceptable if the adopted controls are implemented and EPO 5 has been applied to demonstrate the activities are not inconsistent with the Blue Whale Conservation Management Plan. Therefore, Woodside considers the adopted controls appropriate to manage the impacts of acoustic emissions to a level that is broadly acceptable and demonstrate the EPOs are met.

EPOs, EPSs and MC for Xena-03 Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 4 No injury of, or mortality to, EPBC Act 1999 listed marine fauna as a result of noise generated by the PAP during Xena-03 tie-back activities. **EPO 3b** No displacement of marine turtles or PBW from habitat critical during nesting/breeding (inc.	**C 3.1** EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans, including the following measures[62]: • Project vessels will not travel greater than 6 knots within 300 m of a cetacean (caution zone) and not approach closer than 100 m from a whale. • Project vessels will not approach closer than 50 m for a dolphin and/or 100 m for a	**PS 3.1** Vessels will comply with the EPBC Regulations 2000 – Part 8 Division 8.1 (Regulation 8.05 and 8.06) Interacting with cetaceans to manage the risk of fauna collision.	**MC 3.1.1** Records demonstrate no breaches with EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans and Woodside Marine Charterers Instructions. **MC 3.1.2** Records demonstrate reporting cetacean ship strike incidents to DCCEEW.

[62] For safety reasons, the distance requirements below are not applied for a vessel holding station or with limited manoeuvrability, e.g., anchor handling, loading, back-loading, bunkering, close standby cover for overside working and emergency situations.

EPOs, EPSs and MC for Xena-03 Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
internesting periods for turtles) and ensure biologically important behaviour can continue in biologically important areas.	whale (with the exception of animals bow riding). • If the cetacean shows signs of being disturbed, support vessels will immediately withdraw from the caution zone at a constant speed of less than 6 knots.		
	C 3.2 Department of Parks and Wildlife (2013) Whale shark management with particular reference to Ningaloo Marine Park: Project vessels will not travel greater than 8 knots within 250 m of a whale shark and not allow the vessel to approach closer than 30 m of a whale shark.	**PS 3.2** Vessels will comply with Department of Parks and Wildlife (2013) Whale shark management with particular reference to Ningaloo Marine Park: When within 250 m of a whale shark vessels will not travel greater than 8 knots and vessels will not approach closer than 30 m to a whale shark.	**MC 3.2.1** Records demonstrate no breaches of speed requirements when within 250 m of a whale shark.
	C **3.3** Vessels will not travel greater than 6 knots within 300 m of a turtle (caution zone). If the turtle shows signs of being disturbed, vessels will immediately withdraw from the caution zone at a constant speed of less than 6 knots.	**PS 3.3** When within 300 m of a turtle, vessels will not travel greater than 6 knots.	**MC 3.3.1** Records demonstrate no breaches of speed requirements when within 300 m of a turtle.
	C 1.15 Develop a SIMOPS Plan to manage MODU interactions with other facilities/vessels, where multiple campaigns occur within the PAA (i.e. during xmas tree installation). SIMOPS Plan will contain information on: • minimum separation distances • communications • MODU/vessels/ activities involved in SIMOPS • exclusion zone entry and exit processes	**PS 1.15** MODU and applicable vessels compliant with SIMOPS Plan.	**MC 1.15.1** Records demonstrate implementation of SIMOPS Management Plan when MODU working in vicinity of other facilities/vessels, i.e. during xmas tree installation.

EPOs, EPSs and MC for Xena-03 Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	• ROV operations • helicopter operations • key roles, responsibilities and emergency contacts • PTW arrangements • incident reporting and investigation management of change.		
	C 4.1 Implement adaptive management procedure prior to: • resupply vessel moves alongside MODU and/or PIV during daylight hours • MODU departing well location (excludes kedging).	**PS 4.1** Implement adaptive management procedure during daylight hours. Adaptive management procedure to include: • Trained crew as marine fauna observers monitor for PBW or large unidentified whales for 30 minutes prior to: – resupply vessel moves alongside the MODU and/or PIV within the Xena-03 Operational Area. – MODU departing well location (excludes kedging). • Proceed with move only when no PBW or large unidentified whales have been sighted, to the limits of visibility, over the 30-minute monitoring period.	**MC 4.1.1** Records demonstrate crew acting as marine fauna observers receive suitable training in detecting marine fauna, including cetaceans, whale sharks and turtles. **MC 4.1.2** Records demonstrate trained crew on watch prior to resupply vessel moves alongside the MODU and/or PIV or MODU departs well location in the Xena-03 Operational Area. **MC 4.1.3** Records demonstrate when pygmy blue whale, or large unidentified whale are present, resupply activity moves have not commenced and/or MODU did not depart well location.
	C 4.2 Collect data on opportunistic sightings of PBW to gauge presence and behaviour using trained crew.	**PS 4.2** Process developed for collecting PBW sighting data. PBW sighting data sent to relevant organisations as required (i.e., Australian Marine Mammal Centre (AMMC)).	**MC 4.2.1** Records demonstrate process developed and communicated to crew for collection of pygmy blue whale sighting data.
	C 4.3 Implement speed limitations when safe[63] to do so for MODU and PIV within the Xena-03 Operational Area.	**PS 4.3** Vessel speed limitations (6 knots) adhered to by MODU and PIV while in the Xena-03 Operational Area, within the limits of navigational safety.	**MC 4.3.1** Records show MODU and PIV travelled at or below 6 knots within the Xena-03 Operational Area, within the limits of navigational safety.

[63] Vessel speeds are at the ultimate discretion of the vessel master and speed restriction may need to be exceeded from time to time to maintain safe navigation.

EPOs, EPSs and MC for Xena-03 Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	C 4.4 MODU (if under own propulsion)/PIV stop or deviate from course[64] if pygmy blue whale (or large unidentified whale) observed during entry to the Xena-03 Operational Area.	**PS 4.4** MODU (under own propulsion)/PIV stops or deviates from course if pygmy blue whale (or large unidentified whale) observed during entry to the Xena-03 Operational Area.	**MC 4.4.1** Records show hybrid/DP MODU and/or PIV stopped or deviated if pygmy blue whale (or large unidentified whale) observed during entry to the Xena-03 Operational Area.

[64] Unless deemed navigationally unsafe by the vessel master.

6.7.5 Routine and Non-routine Discharges: Discharge of Hydrocarbons and Chemicals

Context		
Wells and Reservoirs– Section 3.4.2 Subsea Infrastructure – Section 3.4.6 Facility Operations – Section 3.5 Hydrocarbon and Chemical Inventories and Selection – Section 3.9 Subsea IMMR Activities – Section 3.10 Xena-03 Drilling and Tie-back Activities – Section 3.11	Physical Environment – Section 4.4 Habitats and Biological Communities – Section 4.5	Consultation – Section 5

Impacts and Risks Evaluation Summary

Source of Impact	***Environmental Value Potentially Impacted***							***Evaluation***						
	Soil and Groundwater	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/Habitat	Species	Socio-economic	Decision Type	Consequence/Impact	Likelihood	Risk Rating	ALARP Tool	Acceptability	Outcome
Discharge of subsea control fluids		x	x		x			A	F	-	-	PJ GP	Broadly Acceptable	**EPO 5**
Discharge of hydrocarbons remaining in subsea pipework and equipment as a result of subsea intervention works (including pigging)		x	x		x				E					
Discharge of chemicals remaining in subsea pipework and equipment or the use of chemicals for subsea IMMR activities		x	x		x				F					
Discharge of minor fugitive hydrocarbons from subsea equipment			x		x				F					
Discharge of chemicals, (e.g., MEG), during installation and leak testing of new infrastructure		x	x		x				F					

Description of Source of Impact
Operations

Hydrocarbons and chemicals may be discharged as a result of planned routine and non-routine operations and activities for:

- operational discharges, including:
  - discharge of subsea control fluids – subsea control fluid is used to control valves remotely from the facility; it is an open-loop system, designed to release control fluid from the control system during valve operations (e.g., up to about 6 L per valve actuation)
  - potential non-routine hydraulic or chemical fluid discharge associated with umbilical system losses/weeps
  - discharge of minor fugitive hydrocarbon from wells and subsea equipment (e.g., weeps/seeps/bubbles)
  - discharge of chemicals introduced into subsea infrastructure and the production stream, either as process or non-process chemicals (e.g., corrosion inhibitors, biocides, scale inhibitors); chemicals flow through the production process, with residual hydrophilic chemicals discharged as a component of PW discharged overboard.
- IMMR activities (nominal discharges described in Section 3.10.2), including:
  - discharge of residual hydrocarbons in subsea lines and equipment and small gas releases associated with isolation testing and breaking containment
  - discharge of hydrocarbons associated with pigging activities required as shown in Section 3.10.5
  - discharge of approximately 100–150 L of preservation fluids from flowlines following flushing when the flowlines are cut and plugs installed in either end of the cut section
  - discharge of residual chemicals in subsea lines and equipment, or the use of chemicals; these chemicals are used and discharged intermittently in small volumes. Small quantities of chemicals may remain in the flushed infrastructure, which may be released to the environment after disconnection.

Xena-03 Tie-back Activities

The activities that may result in the discharges of small quantities of flowline and subsea installation preservation and pre-commissioning fluids are:

- discharges during barrier testing
- discharges during disconnection of caps from installed structures (manifold, xmas tree, UTA)
- discharges from flexible flowline and flying leads during tie-in and reconfiguration activities
- discharges from installation vessel's pre-commissioning equipment or subsea infrastructure during leak testing activities
- discharges post leak test, during depressurisation to marine environment.

In addition, there is potential for discharge of minor fugitive hydrocarbons from the suspended Xena-03 well prior to xmas tree installation (e.g., weeps, seeps, bubbles).

Flexible Flowline Fluids

The flexible flowline and subsea distribution unit will be installed filled with a chemically treated mixture of up to 50 wt% MEG/water. The MEG concentration must be fibre-grade (99.9 wt%) before mixing with water. The flexible flowline will not require further flooding post-installation, but pressure test top-up fluid may be required in the event of test failure.

Installation and tie-in of the flexible flowline to the manifold and xmas tree may result in small quantities of fluids within the flowline being released to the environment. These volumes are expected to be small (1 m^3 per tie-in point) as the pressure within the flowline is equal to the hydrostatic pressure and the flowline is uncapped for a short duration during tie-in. Water jetting and/ or acid injection (~400 L acid) may be used to clean the connections on the infrastructure prior to tie-in.

A leak test/system pressure test will be performed to test the integrity of the subsea connections, flowline and flowlines, which may result in ~4 m^3 of MEG/treated potable water and ~0.6 to 1.2 L of treatment chemicals (including corrosion inhibitor, biocide, oxygen scavengers and dye) being released to the environment at the locality of the subsea infrastructure. A contingency secondary leak test may also be required, with similar discharge volumes.

Xmas Tree

The xmas tree will be installed with a preservation mixture in the production and annulus bore. There will be a small discharge of preservation fluid associated with testing after connection to the THS (estimated 100 to 150 L).

Hydrocarbons

Testing of manifold isolations may be undertaken to verify that suitable isolations are available for safe tie-in to the subsea distribution unit and flexible flowline. The testing and tie-in may release gas and condensate (up to 400 L) over a 48-hour period. This testing is required to verify that suitable isolations are available for safe tie-in and cannot reasonably be eliminated. The estimated mass of hydrocarbons is considered to be a worst-case, with the actual release volume expected to be smaller.

Well Unload

During well unloading activities, all completion and reservoir fluids will be directed to the Pluto facility and be handled by the systems onboard the platform, in accordance with Section 3.10.10. All non-hydrocarbon fluids will be discharged overboard with the produced water.

Should well unloading fluids not be directed to the Pluto facility, they may be flared or discharged to the environment via the well test package onboard the MODU. The base oil column, completion fluid, hydrocarbons and produced/condensed water will be measured, handled, separated, treated for overboard discharge (non-hydrocarbon) and flared/burned (hydrocarbon) through the temporary production system on the MODU.

Well Intervention (contingency)

Well intervention activities have been considered within the Petroleum Activities Program, for contingency purposes. During intervention activities, including post xmas tree installation testing and TIV valve operations, local control of the xmas tree may be required. Valve actuation of the trees may be required, which will result in small releases of subsea control fluids to be released to the environment.

All subsea chemicals will be selected, assessed and approved in accordance with a defined framework and set of tools so that the potential impacts are acceptable, ALARP and meet Woodside's expectation for environmental performance, outlined in Section 3.9. This procedure is used to demonstrate that the potential impacts of the chemicals selected are acceptable and ALARP (subject to technical and economic constraints).

Impact Assessment

There is potential for localised water column pollution and adverse effects on marine biota as a result of planned routine and non-routine hydrocarbon and chemical discharges during operations and Xena-03 Tie-back activities. However, planned discharges of hydrocarbons and chemicals are minor and are minimised as far as practicable via flushing of the lines back to the facility during IMMR activities, and unloading wells to host during tie-back activities. Discharge locations during routine operations are either the PW stream, subsea valves (subsea control fluid), at dis/connection points in subsea infrastructure, including during installation of pig receivers or launchers, or via the export pipeline to the onshore process. During tie-back activities, discharges may also occur at connection points and during leak testing.

Water Quality

During operations, subsea control fluids are discharged at relatively small volumes during valve actuations (typically <6 L) and IMMR activities at or near the seabed. On release the subsea control fluids are expected to mix rapidly and dilute in the water column. Pigging activities are infrequent and result in relatively small releases of hydrocarbon.

During Xena-03 Tie-back activities, leak testing and tie in of new infrastructure may result in discharges of small amounts of MEG and hydrotest fluids as described above. Contingency activities, such as well intervention may result in minor discharges of subsea control fluids from the xmas tree, similar to valve actuation releases discussed above. On release, impacts of MEG and hydrotest fluids will be localised to the immediate vicinity of the release location with short-lasting impacts. This is based on the low potential for toxicity and bioaccumulation of MEG, small volumes/rates of discharge and rapid dilution in the marine environment.

Gas and condensate may be released during IMMR activities that break containment of isolated subsea infrastructure or during verification testing of the subsea distribution unit. Hydrocarbons will become dispersed as bubbles in the water column, which will rise to the surface. Methane is the principal component of the gas and is relatively insoluble in water. As such, methane is expected to rise until it reaches the sea surface, where it will be readily dispersed in the atmosphere. The concentration of methane will not be sufficient to form an explosive atmosphere or result in asphyxiation. Water-soluble components of the gas, such as carbon dioxide and sulphur dioxide will dissolve in the seawater as the gas bubbles rise in the water column. These soluble gasses occur naturally and are present in relatively low amounts. No measurable impacts to water quality are expected to occur as a result of the gas release.

The insoluble condensate release during verification testing will be buoyant and rise in the water column. The condensate will be released with gas which will act to disperse the condensate within the water column as it rises to the sea surface. The resulting condensate droplets will rise slowly in the water column and may be transported away from the release location by currents. Upon reaching the sea surface, the condensate will almost entirely evaporate, with a relatively small portion remaining entrained in the water column. Condensate droplets are not expected to reach the surface in sufficient quantities to result in surface slicks above thicknesses that result in biological impacts, although a sheen may be visible. Any condensate reaching the surface will spread and weather rapidly. Soluble hydrocarbons will be distributed in the water column through natural water movement and the buoyancy of the condensate droplets and are expected to drop below concentrations recognised as causing biological impacts within tens to hundreds of metres of the release location.

There is potential for slight, localised decrease in water quality at planned discharge locations and potential impacts on marine biota. Impacts to pelagic fish are expected to be limited to avoidance of the localised area of the discharge and short-term, localised decline in planktonic organisms in the immediate vicinity of the discharge.

Ecosystems

Sediments in the PAA are expected to be broadly consistent with those in the NWS Province (as described in Section 4.5), with filter feeders such as sponges, ascidians, soft corals and gorgonians associated with areas of hard substrate. Subsea control fluids and installation fluids are non-toxic and do not have the potential to bioaccumulate.

Receptors that may be impacted by a condensate release during verification testing are in-water receptors within the vicinity of the release location. These receptors include plankton, pelagic fishes and potentially cetaceans. Potential impacts to these receptors include:

acute toxic effects to planktonic organisms near the release location from soluble hydrocarbons. Only a very small portion of the planktonic community at a bioregional scale would credibly be impacted. Planktonic communities have high turnover rates, and recovery from any impacts would occur rapidly. Given the small volume of soluble hydrocarbons, the planktonic community in the upper part of the water column will not be impacted.

temporary displacement of pelagic fishes. Large-scale oil spills in open water typically do not result in fish kills, and it is assumed that fishes in open water will actively avoid harmful concentrations of hydrocarbons. Given the relatively small volume of hydrocarbons released and the resulting localised impact, it is unlikely that displacement of pelagic fishes will occur.

Given the nature and scale of planned discharges, potential impacts are considered to be slight and short term (expected to recover once routine and non-routine discharges cease).

KEFs

The Ancient Coastline at 125 m Depth Contour and Continental Slope Demersal Fish Communities KEF, overlap the PAA (Figure 4-10). The Continental Slope Demersal Fish Communities KEF overlaps the wider Xena-03 Operational Area and the Pluto Facility Operational Area. No significant escarpments, species of conservation significance, emergent features or areas of high biological productivity characteristically associated with the Ancient Coastline at 125 m KEF have been observed in the PAA. Therefore, potential impacts to these regional-scale KEFs are not expected.

A small portion of the Pluto Export Operational Area overlaps the Ancient Coastline at 125 m Depth Contour KEF. Potential impacts to this KEF would be limited to IMMR activities. Given the infrequent and small volumes of discharges associated with IMMR activities, potential impacts to the KEF are not expected.

Cumulative Impacts

Given the adopted controls, the overall impacts from the discharge of hydrocarbons and chemicals to the marine environment is Slight (E) based on short term (<1 year) on species, habitat (but not affecting ecosystems function), physical or biological attributes.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Legislation, Codes and Standards				
None identified.				
Good Practice				
Implement Woodside's Chemical Selection and Assessment Environment Guideline: • Where Gold, Silver, E or D OCNS rating (and no OCNS substitution or product warning), chemicals are selected – no further control required. • If chemicals with a different OCNS rating, sub warning or non-OCNS rated	F: Yes. Routinely implemented to the chemical selection process for Woodside facilities. CS: Minimal cost. Standard practice.	Selection and assessment of chemicals in accordance with the Woodside process, reduces environmental impacts associated with planned chemical discharge.	Control is a WMS requirement – must be adopted.	Yes C 5.1

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
chemicals are required, chemicals will be assessed in accordance with the guideline prior to use.				
Subsea infrastructure flushed where practicable prior to disconnection to reduce volume/ concentration of hydrocarbons released to the environment.	F: Yes. Subsea infrastructure has been designed such that much of the hydrocarbon containing elements can be flushed back to the riser platform. CS: Minor. Flushing may prolong the cessation of production required for subsea IMMR activities, leading to reduced production.	Flushing reduces the volumes/ concentration of hydrocarbons released to the environment.	Benefit outweighs cost/sacrifice.	Yes C 5.2
Monitoring subsea control fluid use, investigate material discrepancies, and using control fluid with dye marker to support identification of potential integrity failures. Where fluid losses are unexplained relative to expected usage trends (dependent on operational demand for system activation), potential integrity issues are investigated	F: Yes. The use of control fluid is monitored to maintain adequate fluid in the system. CS: Minimal cost.	Limits the volumes of subsea control fluid discharged to the marine environment.	Benefit outweighs cost/sacrifice.	Yes C 5.3
Implement Woodside Engineering Operating Standard - Subsea Isolation). Proven isolation in place for relevant IMMR activities.	F: Yes CS: Minimal cost. Standard practice.	Maintaining and testing the ability to isolate wells and pipelines will ensure barriers are in place and verified limiting the volume of hydrocarbon released.	Control is a WMS requirement – must be adopted.	Yes C 5.4
For Xena-03 Tie-back activity fluids, six-monthly chemical reviews are performed during active drilling campaigns.	F: Yes. CS: Minimal cost. Standard practice.	More frequent reviews will ensure chemicals selected remain ALARP. During routine operations chemicals are reviewed as the Chemical Selection and Assessment Environment Guideline.	Benefits of increased review frequency outweigh cost/sacrifice.	Yes C 5.5

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
ROV inspection during leak test (during Xena-03 Tie-back activities).	F: Yes. CS: Minimal cost. Standard practice.	A procedure for leak testing work that includes inspection (including by ROV) during testing to identify leakage and trigger activity to stop will reduce likelihood of impacts.	Benefits outweigh cost/sacrifice.	Yes C 5.6
Test subsea manifold isolation valves prior to tie-in.	F: Yes. CS: Minimal cost. Standard practice.	Testing of the isolation valves will provide a valve pass rate to be used to assess isolation requirements and determine the isolations required to confirm to the relevant internal Woodside standards.	Benefits outweigh cost/sacrifice.	Yes C 5.7
Pre-commissioning and flexible flowline subsea installation procedures developed.	F: Yes. CS: Minimal cost. Standard practice.	A procedure for pre-commissioning and subsea installation will reduce likelihood of impacts.	Benefits outweigh cost/sacrifice.	Yes C 5.8
Subsea isolations conform to the relevant internal Woodside standards, which include: • A double block isolation is used. • If it is not practicable to establish a double block isolation, then one effective, proven and monitored barrier (single block isolation) shall be in place, with the following conditions: • It must be possible to isolate the reservoir by remote operation of tree isolation valves. • The residual risks must be shown to be ALARP by a documented isolation risk assessment. • Procedures and response plans for the activity must be developed and implemented and address all applicable hazards	F: Yes. CS: Minimal cost. Standard practice.	Pass rate (≤0.05 kg/s) across valve with proven single block isolation. Conditions for single block isolation reduce the likelihood and consequence of an uncontrolled release.	If valve testing confirms proven barrier (≤0.05 kg/s pass rate), slight environmental impact associated with hydrocarbon release is disproportionate to requirement to shut in the well to achieve double isolation. Benefit for additional conditions for single isolation outweigh cost. Benefit outweighs cost.	Yes C 5.9

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
appropriately, including provision for closing tree isolation valves.				
Monitor and track subsea fugitive hydrocarbon emissions to support identification of potential integrity failures in accordance with the Subsea and Pipelines Integrity Management Procedure.	F: Yes. CS: Minimal cost. Standard practice	Tracks and manages fugitive hydrocarbons discharged to the marine environment, and supports integrity management assessments.	Benefits outweigh cost/sacrifice. The subsea anomaly and its scale is noted in the anomaly/inspection report and recorded in the Company's centralised subsea Inspection Database. The anomaly is then assessed to determine integrity risks, future monitoring, and/or corrective actions.	Yes C 5.10
Professional Judgement – Eliminate				
Reduce volume or not use preservation and pre-commissioning chemicals including MEG.	F: No. Preservation and pre-commissioning fluids are required to verify the structural integrity of the subsea infrastructure and avoidance of hydrate formation. The volumes selected are required to achieve verification. CS: Potential loss of production due to loss of integrity, possibly leading to a larger environmental incident.	Not considered, control not feasible.	Disproportionate. The cost/sacrifice outweighs the benefit gained.	No

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Do not conduct leak testing activities.	F: No. Leak testing activities are required to control the potential for corrosion of the flexible flowlines and to determine if any unacceptable restrictions and/or obstructions exist in the line. CS: Potential loss of production due to loss of integrity, possibly leading to a larger environmental incident.	This would eliminate any potential impacts from the leak testing activities but increases the likelihood of loss of integrity during operation and potentially greater environmental impacts.	Disproportionate. The cost/sacrifice outweighs the benefit gained.	No
Professional Judgement – Substitute				
Installing closed-loop subsea valve control system.	F: Yes. Closed-loop subsea valve control systems can be installed; however, they may not perform as quickly/reliably as open-loop systems. CS: Significant. The design, procurement and retrofitting of a closed-loop valve control system would result in considerable offshore logistics, exposure to safety hazards during installation, and significant financial burden through direct costs and lost production.	The potential consequence of the discharges is ranked as incidental, based on the volume, frequency, location, and types of fluid discharged in an open-ocean environment, and avoiding the discharges would provide little or no environmental benefit.	When considering the negligible effect from the release of control fluids, the risk and costs of retrofitting a closed-loop subsea valve control system is considered to be grossly disproportionate to the environmental benefit.	No
Professional Judgement – Engineered Solution				
Poppetted hydraulic lines in control connections (to minimise release of control/preservation fluids).	F: Yes. CS: Minimal cost. Standard practice	Poppeted connections minimise discharge to marine environment in pressurised hydraulic lines.	Benefits outweigh cost/sacrifice.	Yes C 5.11

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Routing hydrocarbons to vessel during disconnection of subsea infrastructure.	F: Yes. However, to do so would introduce significant safety risks to the vessel crew (fire, explosion, asphyxiation). CS: Significant. Equipping and training crew on-board subsea support vessels to safely route hydrocarbons to the vessel would result in significant additional costs (in addition to the increased safety risk identified above).	Small environmental benefit from preventing low concentration hydrocarbon discharge.	Given the increased safety risk and the very low environmental impact from hydrocarbon releases during subsea IMMR activities, the cost of routing hydrocarbons to the vessel is grossly disproportionate to the environmental benefit.	No
Decreasing the frequency of valve actuation.	F: Yes. However, decreasing the frequency of valve actuation may adversely impact the safe functionality and reliability of valves. Reducing the performance of subsea valves may introduce operability impacts, and increased safety and environmental risk associated with loss of containment events. CS: Minimal cost.	The potential consequence of the discharges is ranked as incidental, based on the volume, frequency, location and types of fluid discharged in an open-ocean environment, and reducing the number of discharges would provide little or no environmental benefit.	Decreasing the frequency of valve actuations would lead to a potential decrease in safe functionality and reliability of valves. When considering the potential safety and environmental risks from such a performance degradation, along with the minor impact from the release of control fluids, the cost of decreasing the frequency of valve actuations is considered to be grossly disproportionate to the environmental benefit.	No
ALARP Statement: On the basis of the environmental risk assessment outcomes and use of the relevant tools appropriate to the decision type, Woodside considers the adopted controls appropriate to manage the impacts of planned routine and non-routine hydrocarbon and chemical discharges. As no reasonable additional/alternative controls were identified that would further reduce the impacts without grossly disproportionate sacrifice, the impacts and risks are considered ALARP.				
Demonstration of Acceptability				
Acceptability Statement: The impact assessment has determined that, given the adopted controls, planned routine and non-routine hydrocarbon and chemical discharge represents a localised short-term impact that is unlikely to result in a potential impact greater than slight short-term effects on water quality, marine sediment or ecosystem habitat. Further				

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
opportunities to reduce the impacts have been investigated above. Fluid discharges from the subsea system during operations, IMMR activities, flexible flowline commissioning and well intervention are routine in the oil and gas industry. The adopted controls are considered good oil-field practice/industry best practice. The potential impacts are considered broadly acceptable if the adopted controls are implemented. Therefore, Woodside considers the adopted controls appropriate to manage the impacts of planned routine and non-routine hydrocarbon and chemical discharges to a level that is broadly acceptable and demonstrates the EPOs are met.				

EPOs, EPSs and MC for Pluto Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 5 Impacts from routine and non-routine discharges from subsea operations and activities will be limited to planned activities and impacts described as part of the PAP.	**C 5.1** Implement Woodside's Chemical Selection and Assessment Environment Guideline: • Where Gold, Silver, E or D OCNS rating (and no OCNS substitution or product warning), chemicals are selected – no further control required. • If chemicals with a different OCNS rating, sub warning or non-OCNS rated chemicals are required, chemicals will be assessed in accordance with the guideline prior to use.	**PS 5.1** All chemicals intended or likely to be discharged to the marine environment will be assessed and approved prior to use in accordance with the Chemical Selection and Assessment Environment Guideline (described in Section 3.9) to ensure the impacts associated with use are ALARP and acceptable.	**MC 5.1.1** Chemical assessment register demonstrates the chemical selection, assessment and approval process for selected chemicals is followed.
	C 5.2 Subsea infrastructure flushed where practicable prior to disconnection to reduce volume/ concentration of hydrocarbons released to the environment.	**PS 5.2** Producing subsea infrastructure containing hydrocarbons flushed to facility (where practicable) to a hydrocarbon concentration where further dilution provides disproportionate cost to environmental benefit, prior to disconnection.	**MC 5.2.1** Records demonstrate subsea infrastructure flushing (to facility) where practicable.

EPOs, EPSs and MC for Pluto Facility Operations			
	C 5.3 Monitoring subsea control fluid use, investigate material discrepancies, and using control fluid with dye marker to support identification of potential integrity failures. Where fluid losses are unexplained relative to expected usage trends (dependent on operational demand for system activation), potential integrity issues are investigated	**PS 5.3** Subsea control fluid use monitored and, where losses are unexplained, relative to expected usage trends (dependent on operational demand for system activation), potential integrity issues are investigated	**MC 5.3.1** Records demonstrate subsea control fluid use is documented, and unexplained discrepancies investigated.
	C 5.4 Implement Woodside Engineering Operating Standard – Subsea Isolation. Proven isolation in place for relevant IMMR activities.	**PS 5.4** Proven isolation in place in compliance with Woodside Engineering Operating Standard – Subsea Isolation.	**MC 5.4.1** Records demonstrate that there was a proven isolation in place as required.
	C 5.10 Monitor, track and assess subsea fugitive hydrocarbon emissions to support identification of potential integrity failures in accordance with the Subsea and Pipelines Integrity Management Procedure.	**PS 5.10** Subsea fugitive hydrocarbon emissions are monitored, tracked and assessed to determine future monitoring and/or corrective actions.	**MC 5.10.1** Subsea fugitive emissions anomalies are noted in the anomaly/inspection report and recorded in the Company's centralised Inspection Database.

EPOs, EPSs and MC for Xena-03 Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 5 Impacts from routine and non-routine discharges from subsea operations and activities will be limited to planned activities and impacts described as part of the PAP	**C 5.1** Implement Woodside's Chemical Selection and Assessment Environment Guideline: • Where Gold, Silver, E or D OCNS rating (and no OCNS substitution or product warning), chemicals are selected – no further control required. • If chemicals with a different OCNS rating, sub warning or non-OCNS rated chemicals are required, chemicals will be assessed in accordance with the guideline prior to use.	**PS 5.1** All chemicals intended or likely to be discharged to the marine environment will be assessed and approved prior to use in accordance with the Chemical Selection and Assessment Environment Guideline (described in Section 3.9) to ensure the impacts associated with use are ALARP and acceptable.	**MC 5.1.1** Chemical assessment register demonstrates the chemical selection, assessment and approval process for selected chemicals is followed.
	C 5.5 For Xena-03 Tie-back activity fluids, six-monthly	**PS 5.5** Acceptability of chemicals is re-evaluated to ensure	**MC 5.5.1** Records confirm six-monthly reviews have

EPOs, EPSs and MC for Xena-03 Tie-back Activities			
	chemical reviews are performed during active drilling campaigns.	ALARP, and alternatives are considered.	occurred during active drilling campaigns, and any actions/changes are being tracked to closure.
	C 5.6 ROV inspection during leak test (during Xena-03 Tie-back activities).	**PS 5.6** ROV inspection during leak test to identify leakage and trigger activity to stop.	**MC 5.6.1** Records demonstrate ROV inspection during leak test and record any instances of activity required to stop due to identified leak(s).
	C 5.7 Test subsea manifold isolation valves prior to flexible flowline tie-in during Xena-03 Tie-back activities.	**PS 5.7** Valve testing undertaken prior to flexible flowline Xena-03 tie-in.	**MC 5.7.1** Records demonstrate testing of isolation valves is completed.
	C 5.8 Pre-commissioning and flexible flowline subsea installation procedures developed during Xena-03 Tie-back activities.	**PS 5.8** Flexible flowline is installed in accordance with the pre-commissioning and flexible flowline installation procedure to reduce the likelihood of discharges during installation.	**MC 5.8.1** Records demonstrate flexible flowline installed in accordance with procedures.
	C 5.9 Subsea isolations conform to the relevant internal Woodside standards which include: • A double block isolation is used. • If it is not practicable to establish a double block isolation, then one effective, proven and monitored barrier (single block isolation) shall be in place, with the following conditions: – It must be possible to isolate the reservoir by remote operation of tree isolation valves. – The residual risks must be shown to be ALARP by a documented isolation risk assessment. – Procedures and response plans for the activity must be developed.	**PS 5.9** Subsea isolations that are implemented conform with the relevant internal Woodside standards and any single isolation will have a proven barrier (pass rate of ≤0.05 kg/s).	**MC 5.9.1** Records demonstrate isolations are implemented and compliant with the relevant internal Woodside standards. **MC 5.9.2** Where a single isolation was used records demonstrate that during testing of valves the pass rate was ≤0.05 kg/s.

EPOs, EPSs and MC for Xena-03 Tie-back Activities			
	C 5.11 Poppetted hydraulic lines in control connections (to minimise release of control/preservation fluids).	**PS 5.11** Poppetted hydraulic lines in control connections are in place.	**MC 5.11.1** Records demonstrate poppetted hydraulic lines in control connections are in place.

6.7.6 Routine and Non-routine Marine Wastewater Discharges: Utility Systems and Drains

Context		
Facility Operations – Section 3.5 Utility Systems – Section 3.6 Support Vessel Operations – Section 3.8 Tie-back Activities – Section 3.11 Vessel-based Activities for the Xena-03 Tie-back – Section 3.12	Physical Environment – Section 4.4	Consultation – Section 5

Impacts and Risks Evaluation Summary

Source of Impact	***Environmental Value Potentially Impacted***							***Evaluation***						
	Soil and Groundwater	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/Habitat	Species	Socio-economic	Decision Type	Consequence/Impact	Likelihood	Risk Rating	ALARP Tool	Acceptability	Outcome
Discharge of sewage, grey water and putrescible waste from the Pluto facility, MODU, ASV, installation and support vessels to the marine environment			x					A	F	-	-	LCS GP PJ	Broadly Acceptable	EPO 6
Discharge of deck, bilge and drain water from the Pluto facility, MODU, ASV, installation and support vessels to the marine environment			x					A	F	-	-			
Discharge of brine and cooling water from the Pluto facility, MODU, ASV, installation and support vessels to the marine environment			x					A	F	-	-			

Description of Source of Impact

Sewage, Putrescible Waste and Grey Water

No sewage is discharged from the facility when it is uncrewed. When the facility is crewed, the sanitary drainage system is a combined black and grey water system, with black and grey water discharged to the marine environment as untreated, un-macerated waste. Sewage is disposed via a dedicated overboard caisson (7.5 m below LAT). Putrescible waste (principally food scraps) bagged and transported to shore for disposal as domestic waste.

The volume of sewage and greywater generated is estimated to be in the order of 1.8 m^3 per day (based on an average volume of 75 L/person/day), from the facility when crewed. The actual volume of discharge varies depending on personnel requirements on the facility. Refer to Section 3.6.6 for further details.

Treatment systems on the facility may require routine maintenance or repair during operations, requiring infrequent short periods in which sewage is directly discharged overboard.

During maintenance campaigns or major projects, an ASV may be utilised inside the PSZ for periods of approximately 90 days to accommodate crews of around 100 POB. The ASV will discharge sewage, putrescible waste and grey water, managed in accordance with MARPOL requirements.

Vessels may also discharge sewage, grey water and putrescible wastes within the PAA, but outside of the facility PSZ. Sewage on-board operational vessels is routinely treated (either sewage treatment plant or macerator) prior to discharge.

The MODU and project vessels routinely generate/discharge small volumes of treated sewage, putrescible wastes and grey water to the marine environment (impact assessment based on approximate discharge of 15 m^3 per vessel/MODU per day), using an average volume of 75 L/person/day and a maximum of 200 persons on board. However, it is noted that vessels such as the AHV and support vessels will have considerably fewer persons on board.

During tie-back activities the facility will be crewed during the commissioning phase, in addition to the presence of the MODU, installation vessels and other support vessels, resulting in cumulative volumes of sewerage, putrescible waste and grey water over approximately 12 weeks (Section 0).

Drain and Bilge Water

Pluto's hazardous open drains system collects wash water and waste liquids from major process and utility equipment and diesel/chemical storage areas, including plated area deck drains, drain tundishes and equipment drip trays in hazardous areas. Drainage into the hazardous open drains system discharges into two collection tanks (working volume 11.6 m^3 and 10.7 m^3), which are periodically pumped to a waste oil storage tank (capacity 4 m^3) then transported onshore for disposal. The transfer of liquids from the PLA open drain collection tank to the waste oil storage tank is a manual operation only undertaken while the facility is crewed. Pump-out from the module open drain collection tank can be remotely operated to decant to the PLA open drain collection tank.

The non-hazardous area open drains system collects liquids from areas designated as non-hazardous. It is segregated from all other drainage systems to eliminate the risk of hydrocarbon vapour transmission from hazardous to non-hazardous areas. Water and any contamination are routed to the non-hazardous area open drains collection tank, which is 2 m^3 (with max capacity of 2.6 m^3). The collected liquids are manually drained to the hazardous area open drains collection tank during every facility campaign maintenance visit.

The MODU, ASV, installation and support vessels routinely generate and discharge relatively small volumes of bilge water. Bilge tanks receive fluids from many parts of the vessel, including machinery spaces. Bilge water can contain water, oil, detergents, solvents, chemicals, particles and other liquids, solids or chemicals. The MODU and vessels may also discharge drainage water from decks directly overboard or via deck drainage systems; deck drainage may also contain traces of chemicals. Water sources could include rainfall events and/or from deck activities such as cleaning/wash-down of equipment/decks.

Cooling Water and Brine

No brine water is produced on the facility as potable water is supplied from onshore. Additionally, no seawater cooling is undertaken on the facility.

Potable water, primarily for accommodation and associated domestic areas, may be generated on the MODU, ASV, installation and support vessels using a reverse osmosis (RO) plant. This process will produce brine, which is diluted and discharged at the sea surface.

During the distillation process, relatively small volumes of reject brine is produced and discharged. Reject brine discharge is typically 20 to 50 percent higher in salinity than the intake seawater (depending on the desalination process used) and may contain low concentrations of scale inhibitors and biocides, which are used to avoid fouling of pipework (Woodside, 2014).

Models developed by the US EPA (Frick et al., 2001) for temporary brine discharges from vessels assuming no ocean current (i.e., 0 m/s) found that brine discharges from the surface dilute 40–fold at 4 m from the source. This modelling can be used as an indicator for predicting horizontal attenuation and diffusion of reject brine; and suggests that the salinity concentration drops below environmental impact thresholds within 4 m of the discharge point.

Seawater is pumped on board and used as a heat exchange medium for the cooling of machinery engines and high temperature drilling fluid on the MODU. Seawater is drawn up from the ocean, where it is subsequently de-oxygenated and sterilised by electrolysis (by release of chlorine from the salt solution) and then circulated as coolant for various equipment through the heat exchangers (in the process transferring heat from the machinery), prior to discharge to the ocean. It is subsequently discharged from the MODU to the sea surface at potentially a higher temperature. Cooling water is often treated with additives including scale inhibitors and biocide to avoid fouling of pipework. Scale inhibitors and biocide are usually used at low dosages, and are usually consumed in the inhibition process, so there is little or no residual chemical concentration remaining upon discharge. In addition, the scale inhibitors and brine are selected and assessed using the Woodside chemical selection process.

Alternatively, MODUs may utilise closed-loop cooling systems. In these systems, fresh water is used in a closed circuit to cool down the engine room machinery, and then further cooled by sea water in a seawater cooler. Seawater used for cooling purposes would be routinely discharged at a temperature expected to be less than 70°C and rates ~50 m^3/d.

Impact Assessment

Sewage, Putrescible Waste and Grey Water

The environmental impact associated with ocean disposal of sewage, grey water and putrescible waste is eutrophication. Eutrophication occurs when the addition of nutrients, such as nitrates and phosphates, causes adverse changes to the ecosystem, such as oxygen depletion and phytoplankton blooms. Other contaminants of concern occurring in these discharges may include ammonia, E. coli, faecal coliform, volatile and semi-volatile organic compounds, phenol, hydrogen sulphide, metals, surfactants and phthalates.

No significant impacts from planned (routine and non-routine) discharges to the marine environment are anticipated, given the minor volumes involved, the localised mixing zone (as indicated by dilution modelling at the facility and high level of dilution into the open water marine environment of the PAA. This is supported by historical water quality and sewage discharge monitoring undertaken by Woodside around the nearby Goodwyn Alpha platform. The Goodwyn Alpha platform is approximately 72 km northeast of the PAA; therefore, conditions are comparable. Water quality monitoring around the Goodwyn Alpha platform (which is a crewed platform) indicates there was no detectable decrease in oxygen saturation, nutrients or increase in oxygen demand at the Goodwyn Alpha platform (BMT Oceanica, 2015a). In addition, monitoring of sewage discharges demonstrated that a 10 m^3 sewage discharge reduces to approximately 1% of its original concentration within 50 m of the discharge location (Woodside, 2008).

The tieback is expected to take up to 12 weeks including mobilisation, demobilisation and contingency with subsea installation and pre-commissioning. MODU and installation and support vessel routine discharges are expected to be intermittent in nature for the duration of the tie-back activity. Therefore, impacts to water quality within the PAA are expected to be localised with no lasting effect due to the small mass, relative to daily turnover, the assimilative capacity of the receiving environment, intermittent nature of discharges, and the variable discharge location due to project vessel movement.

Although the NWS Province is characterised as a low nutrient environment (DEWHA, 2008), studies of adjacent shelf water have found the area to be “a highly productive ecosystem in which nutrients and organic matter are rapidly recycled” (Furnas and Mitchell, 1999). The estimated daily loading from sewage and putrescible waste (Facility ~1.8 m^3 per day; MODU/project vessels ~15 m^3 per day) is not significant in comparison to the daily turnover of nutrients in the area. Furthermore, installation and support vessels are typically moving when in the PAA, which facilitates mixing of sewage, putrescible wastes and grey water when discharged.

The impact of nutrients associated with discharge of sewage, grey-water and putrescible waste is considered to have a localised impact with no lasting effect due to the small mass, relative to daily turnover, and the assimilative capacity of the receiving environment.

Drain and Bilge Water

Drain water from the facility and bilge and deck drainage water from the MODU and installation and support vessels are expected to mix rapidly in the marine environment upon discharge. Deck drainage and treated bilge may contain a range of chemicals, oil, grease and solid material. This particulate matter can cause an increase in the turbidity of the receiving waters close to the point of discharge. The addition of these substances into the marine environment will result in a change ambient water quality; however, these discharges will disperse and dilute rapidly, with concentrations significantly dropping with distance from the discharge point. The PAA is located more than 12 nm from land exceeding the exclusion zones required by Marine Order 96 (Marine pollution prevention – sewage) 2018 and Marine Order 95 (Marine pollution prevention – garbage) 2013.

No significant impacts from the planned routine discharges are anticipated, because of the minor quantities involved, the expected localised mixing zone and high level of dilution into the open water marine environment of the PAA. Based on the detailed evaluation and low levels of potential contaminants, the magnitude of potential impact of a change in water quality is considered highly localised with no lasting effects.

Cooling Water and Brine

The key physicochemical stressors that are associated with reject brine and cooling water discharge from MODU and project vessels include salinity, pH, temperature and chemical toxicity.

The potential impacts on water quality due to cooling water discharge include chlorine toxicity and increased water temperatures. Woodside undertook modelling of continuous wastewater discharges (including cooling water) for its Torosa South-1 drilling program in the Scott Reef complex (Woodside, 2014). This study predicted that discharge water temperature decreases quickly as it mixes with the receiving waters, with the discharge water temperature being <1°C above ambient within 100 m (horizontally) of the discharge point, and 10 m vertically (Woodside, 2014). As such, any potential impacts to water quality are expected to occur within approximately 100 m of the source of the discharge, where concentrations are highest.

Reject brine will sink through the water column, owing to the 20% to 50% increase in salinity (Frick et al., 2001), where it will be rapidly mixed with receiving waters and dispersed by ocean currents, decreasing in salinity rapidly as distance from source increases.

The scale inhibitors used in the prevention of fouling within cooling systems are typically low in molecular weight and phosphorous compounds that are water-soluble and only have acute toxicity to marine organisms approximately two orders of magnitude higher than typically used in the water phase (Black et al., 1994). The biocides typically used in the industry are highly reactive and degrade rapidly (Black et al., 1994).

Based on the detailed risk evaluation, the magnitude of the potential impact of a change in water quality from routine and non-routine brine and cooling water discharges is assessed as having no lasting effect on the receiving environment.

Cumulative Impacts

Given the activities that may be conducted during the Petroleum Activities Program, there is the potential for cumulative impacts from routine discharges of sewage, putrescible waste, grey water, PW, bilge water or drain water, due to:

- periodic, repeated discharges at the same location (riser platform) over the course of the PAP
- cumulative discharges from differing point sources (riser platform and various vessels, e.g. ASV, MODU, installation vessels).

Because of the nature of these routine discharges, normal operations are unmanned (and therefore no discharges), the localised spatial extent of impacts and the well mixed receiving environment, the cumulative impacts from these discharges are not considered to result in impacts more than slight short-term impact (i.e., Environment Impact – E). Given the highly localised nature of the impacts of routine discharges, no cumulative impacts are expected from similar discharges from other production facilities (e.g., Wheatstone), Xena-03 drilling and tieback activities, or support vessels.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[65]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Legislation, Codes and Standards				
TEMS	F: Yes. CS: Minimal cost. Standard practice.	Marine Orders required under Australian Regulations; implementation is standard practice for commercial vessels as applicable to vessel size, type and class.	Controls based on legislative requirements – must be adopted.	Yes C 6.1
Good Practice				
Implement Woodside's Chemical Selection and Assessment Environment Guideline: • Where Gold, Silver, E or D OCNS rating (and no OCNS substitution or product warning), chemicals are selected – no further control required. • If chemicals with a different OCNS rating, sub warning or non-OCNS rated chemicals are required, chemicals will be assessed in accordance with	F: Yes. Woodside routinely implements a chemical selection process based on the OCNS at the facility. CS: Minimal. The OCNS is widely used throughout the industry, and chemical suppliers are aware of the requirements of the scheme.	Selection and assessment of chemicals in accordance with the Woodside process reduces environmental impacts associated with planned chemical discharge.	Control is a WMS requirement – must be adopted.	Yes C 5.1

[65] Qualitative measure.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[65]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
the guideline prior to use.				
Where there is potential for loss of primary containment of oil and chemicals on the MODU, deck drainage must be collected via a drainage water management system.	F: Yes. CS: Minimal cost. Standard practice.	Requirements for deck drainage and management of oily water would reduce the likelihood of contaminated deck drainage water being discharged to the marine environment. No change in consequence would occur.	Benefits outweigh cost/sacrifice.	Yes C 6.2
Professional Judgement – Eliminate				
Capturing and treating all drainage.	F: No. Discharge from deck drainage is produced from rainfall events and is unavoidable. Collecting drainage during uncrewed operations is not possible as there is a risk of the collection tank overfilling, resulting in potential spillage of hydrocarbons. CS: Eliminating the discharge by collecting all contaminated run-off and storing it is not practicable due to the size/ weight and the uncrewed philosophy.	Not considered, control not feasible.	Not considered, control not feasible.	No
Storing, transporting and treating/disposing onshore of sewage, greywater, and bilge wastes.	F: No. Would present additional safety and hygiene hazards resulting from the storage, loading and transport of the waste material. CS: Not considered, control not feasible.	Not considered, control not feasible.	Not considered, control not feasible.	No
Storing, transporting and treating/disposing of putrescible waste onshore from the riser platform.	F: Yes. CS: Minimal cost. Standard practice.	Eliminates localised nutrient enrichment, organic and particulate loading	Feasible, and provides some limited benefit due to the intermittent nature of visits to the platform.	Yes – inherent in design. Overboard

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[65]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
		from food wastes, and limits topsides maintainable equipment in line with NNC philosophy.		disposal pathway not installed.
Professional Judgement – Substitute				
None identified.				
Professional Judgement – Engineered Solution				
Treating or macerating sewage from Pluto facility prior to overboard discharge.	F: Yes. CS: Significant. Installation of a sewage treatment system onboard the facility would require design, procurement and installation costs.	Little reduction in impacts due to eutrophication as the facility is NNC and therefore, sewage discharges are low volume and intermittent.	Sewage discharge is inherently controlled (substituted) for the riser platform by pursuing a NNC design philosophy and maintaining this position through efficient operation and maintenance practices. Installation would require considerable retrofit costs and topsides piping modifications. This would Increase maintenance load not in line with key safety principles required for the NNC facility. Installation of maintainable items for limited benefit inherently increases manning durations and associated sewage discharges. Compared to caisson discharge at depth, further treatment via treatment system/ maceration would deliver only a negligible reduction in environmental impact, with the sacrifice considered to be grossly disproportionate to the environmental benefit.	No
Facility open hazardous and diesel drain system integrity maintained to contain potential spilled liquid hydrocarbon in areas as appropriate to safe integrated facility design.	F: Yes. CS: Minimal cost. Standard practice.	The open hazardous drain and diesel drain systems are maintained to support appropriate disposal of environmentally hazardous liquids.	Benefits outweigh cost/sacrifice.	Yes C 6.3

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[65]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
ALARP Statement: On the basis of the environmental impact assessment outcomes and use of the relevant tools appropriate to the decision type, Woodside considers the adopted controls appropriate to manage the impacts of discharge of sewage, putrescible waste, grey water, bilge water, drain water, cooling water and brine from the Pluto Offshore facility, MODU, ASV, installation and support vessels. As no reasonable additional/alternative controls were identified that would further reduce the impacts without grossly disproportionate sacrifice, the impacts and risks are considered ALARP.				
Demonstration of Acceptability				
Acceptability Statement: The impact assessment has determined that, given the adopted controls, routine and non-routine discharges of sewage, putrescible waste, grey water, bilge water, drain water, cooling water and brine from the Pluto Offshore facility, MODU, ASV, installation and support vessels are not expected to result in potential impacts greater than localised contamination not significantly above background levels outside a localised mixing zone. Further opportunities to reduce the impacts have been investigated above. The adopted controls are considered good oil-field practice/industry best practice and meet legislative requirements under Marine Orders 91, 95 and 96. The potential impacts and risks are considered broadly acceptable if the adopted controls are implemented. Therefore, Woodside considers the adopted controls appropriate to manage the impacts and risks of these discharges to a level that is broadly acceptable and demonstrate the EPOs are met.				

EPOs, EPSs and MC for Pluto Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 6 Impacts from routine and non-routine marine wastewater discharges will be limited to planned impacts and activities described as part of the PAP.	**C 6.1** Contract vessels complying with Marine Orders for safe vessel operations: • Marine Order 91 (Marine pollution prevention – oil) • Marine Order 95 (Pollution prevention – garbage) • Marine Order 96 (Pollution prevention – sewage). Marine Orders 91, 95 and 96 (pollution prevention) reduce the potential impact of marine wastewater discharges on water quality.	**PS 6.1** Vessels contracted whose practices comply with Marine Orders as applicable to vessel size, type and class (Marine Orders 91, 95 and 96).	**MC 6.1.1** Records demonstrate vessels are compliant with standard maritime safety procedures (Marine Orders 91, 95 and 96).

EPOs, EPSs and MC for Pluto Facility Operations			
	C 5.1 Implement Woodside's Chemical Selection and Assessment Environment Guideline: • Where Gold, Silver, E or D OCNS rating (and no OCNS substitution or product warning), chemicals are selected – no further control required. • If chemicals with a different OCNS rating, sub warning or non-OCNS rated chemicals are required, chemicals will be assessed in accordance with the guideline prior to use.	**PS 5.1** All chemicals intended or likely to be discharged to the marine environment will be assessed and approved prior to use in accordance with the Chemical Selection and Assessment Environment Guideline (described in Section 3.9) to ensure the impacts associated with use are ALARP and acceptable.	**MC 5.1.1** Chemical assessment register demonstrates the chemical selection, assessment and approval process for selected chemicals is followed.
	C 6.3 Facility open hazardous and diesel drain system integrity maintained to contain potential spilled liquid hydrocarbon in areas as appropriate to safe integrated facility design.	**PS 6.3** Integrity will be managed in accordance with SCE Management Procedures (Section 7.4) and SCE Technical Performance Standard(s) to prevent environment risk related damage to SCEs for F22 – Open Hazardous and Diesel Drains, to: • prevent escalation of an incident following loss of containment, fire and/or explosion by removing or containing flammable liquid from hazardous areas • support appropriate containment and disposal of environmentally hazardous liquids to avoid damage to the environment.	**MC 1.16.1** Records demonstrate implementation of SCE Technical Performance Standard(s) and Management of Hardware Controls in the Operate Phase Procedure (Section 7.4.2), in order to achieve the functional objective of the control. Records may include implementation and maintain/assure and manage-change information summarised in Section 7.4.2

EPOs, EPSs and MC for Xena-03 Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 6 Impacts from routine and non-routine marine wastewater discharges will be limited to planned impacts and activities described as part of the PAP. .	**C 6.1** Contract vessels complying with Marine Orders for safe vessel operations: • Marine Order 91 (Marine pollution prevention – oil) • Marine Order 95 (Pollution prevention – garbage) • Marine Order 96 (Pollution prevention – sewage).	**PS 6.1** Vessels contracted whose practices comply with Marine Orders as applicable to vessel size, type and class (Marine Orders 91, 95 and 96).	**MC 6.1.1** Environmental and MARPOL inspection records demonstrate vessels are compliant with standard maritime safety procedures (Marine Orders 91, 95 and 96).

	Marine Orders 91, 95 and 96 (pollution prevention) reduce the potential impact of marine wastewater discharges on water quality.		
	C 5.1 Implement Woodside's Chemical Selection and Assessment Environment Guideline: • Where Gold, Silver, E or D OCNS rating (and no OCNS substitution or product warning), chemicals are selected – no further control required. • If chemicals with a different OCNS rating, sub warning or non-OCNS rated chemicals are required, chemicals will be assessed in accordance with the guideline prior to use.	**PS 5.1** All chemicals intended or likely to be discharged to the marine environment will be assessed and approved prior to use in accordance with the Chemical Selection and Assessment Environment Guideline (described in Section 3.9) to ensure the impacts associated with use are ALARP and acceptable.	**MC 5.1.1** Chemical assessment register demonstrates the chemical selection, assessment and approval process for selected chemicals is followed.
	C 6.2 Where there is potential for loss of primary containment of oil and chemicals on the MODU, deck drainage must be collected via a drainage water management system.	**PS 6.2** Contaminated drainage contained, treated and/or separated prior to discharge.	**MC 6.2.1** Environmental inspection records demonstrate MODU has a functioning bilge/oily water management system.

6.7.7 Routine and Non-routine Discharges: Produced Water

Context		
Produced Water System – Section 3.5 Well Start-up and Commissioning – Section 3.11.4 Platform Well Management and Maintenance Activities – Section 3.5.3	Physical Environment – Section 4.4 Habitats and Biological Communities – Section 4.5	Consultation – Section 5

Impacts and Risks Evaluation Summary

Source of Impact	***Environmental Value Potentially Impacted***							***Evaluation***						
	Soil and Groundwater	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/Habitat	Species	Socio-economic	Decision Type	Consequence/Impact	Likelihood	Risk Rating	ALARP Tool	Acceptability	Outcome
Discharge of produced water during routine and non-routine operations		x	x		x			B	E	-	-	LCS GP PJ RB A	Acceptable if ALARP	EPO 7

Description of Source of Impact

Produced water (PW) is condensed water (water vapour within gas/condensate that condenses when brought to the surface) or formation water (derived from a water reservoir below the hydrocarbon formation) or a combination of both.

Separation of produced water from reservoir fluids is not 100%-effective and therefore, PW often contains small amounts of naturally occurring contaminants including dispersed oil, dissolved organic compounds (aliphatic and aromatic hydrocarbons, organic acids and phenols), inorganic compounds (e.g., soluble inorganic chemicals or dissolved metals) and residual process chemicals (including MEG or methanol on a non-routine basis) as well as production chemicals such as water clarifier, demulsifier, and corrosion inhibitor. Non-routine PW discharge operations are required during intermittent activities such as production restarts and water cut well restarts.

A description of the PW system and expected operating scenarios has been provided in Section 3.5. Intermittent PW discharge operations occurred at low flow rates (scenario 2) during 2024, with commissioning primarily occurring through April and May. During 2024, there were 204 days with PW discharge occurring, averaging 87 m^3/day with 95% of daily totals less than 207 m^3/day. A total of 11 days through the year saw discharges between 200 m^3/d and maximum recorded of 500 m^3/d which were mostly associated with non-routine commissioning and optimisation activities. The overall flow-weighted average OIW concentration performance through the year achieved 25.6 mg/L.

As wells cut water volumes of PW are expected to increase. It is difficult to anticipate with high confidence when wells will begin to cut water from each reservoir or how much water will be produced however the estimated profile is shown below in Figure 6-1. The graph shows the 10% predicted low PW rates (blue), the predicted 50% PW rates (orange) and the 90% high WP rates (grey) illustrating the range expected.

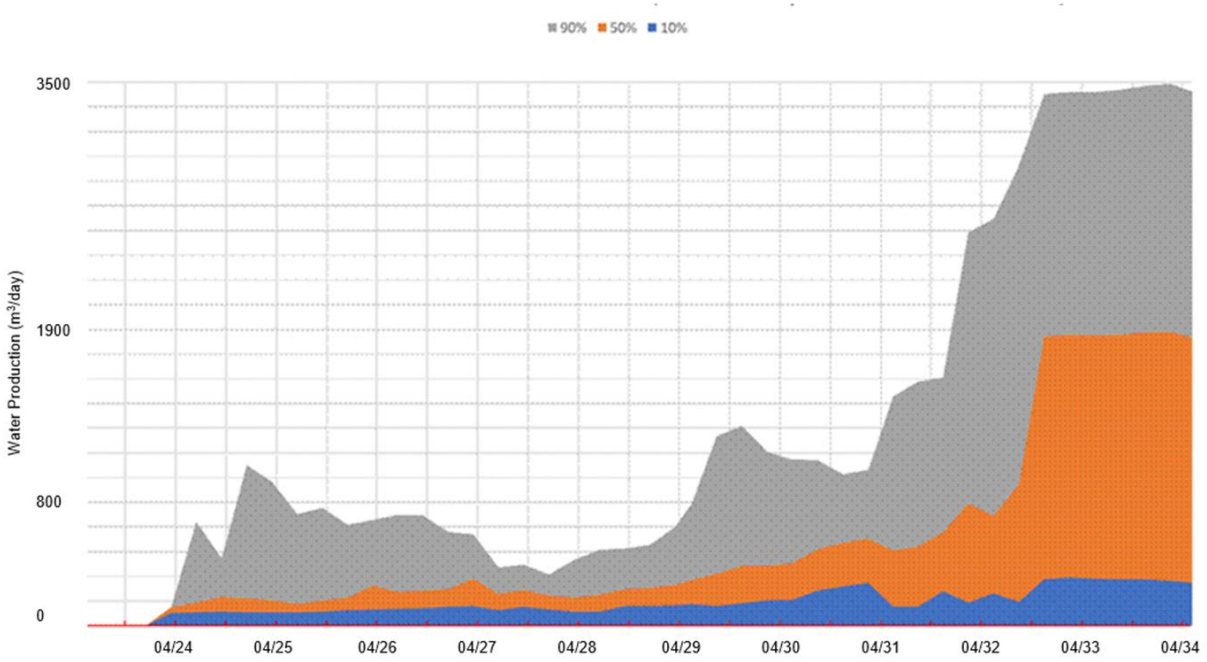


Figure 6-1: Predicted probabilistic PW profile.

Monitoring and Management Framework

Overview

This section describes the monitoring and management framework which Woodside has developed to support the monitoring of PW discharges from offshore assets. The monitoring and management framework comprises of:

- baseline monitoring (prior to discharge)
- operational monitoring of OIW
- initial monitoring following commissioning (in progress)
- routine monitoring.

Further details are provided in Section 7.2.3 which describes Woodside's Offshore Marine Discharge Adaptive Management Plan (OMDAMP). The monitoring and management of produced water will be implemented in accordance with the OMDAMP which details guidelines (ANZG 2018) for water and sediment quality monitoring including chemical assessments (metals, BTEX, PAH, phenols, organic acids, TPH and TRH), and ecotoxicity testing.

Operational Monitoring

Oil in Water

OIW monitoring during routine operations is undertaken via an online analyser prior to discharge. Online analyser information is sent via transmitter instantaneously and reported to the control system and is also captured within the process historian database (PHD). The control system facilitates visibility in the Central Control Room (either from local central control room at PLP or remote central control room in Perth), for manual or automated process control changes to be made, and/or annunciate alarms (e.g., high oil-in-water specification). PHD information is available onshore for analysis and trending. During each planned intervention visit, on an approximately five-weekly basis or up to ten campaigns per year, operators manually sample PW and undertake manual analyser QC checks either at the onshore lab or on the facility.

Any discrepancies that are identified between instrument readings outside of expected tolerance or known causes are investigated to determine the cause. As discussed in the Section 3.5.5.2, two analysers have been installed on the facility. If an analyser is faulty or breaks down, any anomalies that are identified are investigated to determine the cause and may be addressed by corrective maintenance during the next intervention visit.

Oil in water verification

At low flow rates (< 800 m^3/day), the online analysers are unable to be calibrated to the full range of operation due to fluctuations in flow rate and equipment turn down (minimum flow velocity) limitations. During this initial stage, overboard discharge is limited to small volumes of condensed water (~100 m^3/day) which has low concentrations of

OIW, and intermittent intervals of higher flow produced formation water (up to 800 m^3/day) from well trials, process optimisation and early well watering events. These intervals of short-term higher flow produced formation water introduce higher OIW concentrations which require active OIW management (e.g. recalibration of online analysers, manual sampling) to accurately determine OIW concentrations if significant fluctuations in flow rate and process performance occur.

During the initial monitoring, a suite of sampling and testing (chemical characterisation, whole effluent testing (WET testing), settling velocity and particle size distribution) was collected to verify overboard discharge stream characteristics are within anticipated composition used for impact assessment. This verification will continue to inform management and monitoring activities as part of the initial produced water characterisation (see initial monitoring – produced water).

Loss of Signal Management

If there is a loss of signal from both OIW analysers, operators attempt to troubleshoot remotely and monitor process stability for changes. If analysers cannot be restored and there are no observable changes to a stable operating process, low water cut, and high confidence of compliance with OIW standards, the next intervention visit will include reinstatement of the analyser operation if the next planned intervention is within seven days. If the next planned intervention is greater than seven days away, a 'reactive intervention' visit takes place to repair the analysers. Similarly, if analysers cannot be restored and there are no observable changes to a stable operating process, low water cut, and high confidence of compliance with OIW standards the reactive intervention visit will be performed within seven days.

If there is a lack of certainty around results risking OIW measurements exceeding criteria for more than 12 consecutive hours, and a risk of OIW exceedance (24-hour rolling average) is anticipated, the asset may undertake a 'reactive intervention visit' via helicopter to verify results. A react visit if required is deployed to the platform within 48 hours, if weather and time-of-day allow. A Standard Operating Procedure for loss of signal is in place, with decision criteria to allow clear interpretation and facilitation of compliance with OIW standards.

High OIW Management

If the analyser is online and the OIW measurement exceeds criteria for more than 12 consecutive hours, an Operational Risk Assessment will be performed to determine if the high OIW could have occurred as a result of faulty equipment. If the risk of OIW exceedance (24-hour rolling average) is anticipated, the asset may undertake a 'reactive intervention visit' via helicopter to verify results, manually intervene to manage discharge operations, and support through additional manual sampling. The asset will manage discharges to prevent impacts beyond the mixing zone boundary through well management and monitoring of process stability in conjunction with OIW analysers and sampling.

Baseline Monitoring – Water and Sediments

As per EPBC Act condition requirements for the Pluto Gas condensate field (EPBC 2006/2968, condition 1(c) ii), Woodside completed a pre-discharge monitoring program in 2021 which included water, sediment, biological and physical monitoring. The assessment determined that pre-discharge of PW conditions (sediment and water quality) met the ANZG (2018) default guideline values (DGV) and that benthic habitats present were typical of the Northwest Shelf in similar depths (BMT, 2022). The only exception to meeting the ANZG DGVs was copper (0.33 µg/L) in waters which exceeded the 99% DGV (0.3 µg/L) at sites both inside the mixing zone and reference sites. It was also noted that zinc in receiving waters had concentrations (5.75 µg/L) measured approaching the ANZG 99% DGV (previously 7 µg/L recently revised to 3.3 µg/L) at sites both inside the mixing zone and reference sites (BMT, 2022).

Initial Monitoring

Post commissioning initial samples of PW are being collected to characterise the discharge stream and potential effluent toxicity (first sample event completed August 2024). The first sample included settling velocity and particle size distribution, chemical characterisation and WET testing. A further three chemical characterisation and single species toxicity testing events are scheduled to develop a comprehensive understanding of the discharge stream characteristics during discharge. Only one event has been completed to date due to the facility not discharging.

PW samples should represent normal operations, so sampling should only be undertaken during periods of normal production for the facility. Sampling should, as far as reasonably practicable, provide a representative sample. Representative samples are taken at a time when as many formation water-producing wells are online as reasonably practicable with a consideration of chemicals that may be present in the discharge stream.

Initial monitoring includes the following:

- Chemical characterisation to identify if toxicants with the potential to bioaccumulate exceed the ANZG recommended DGV at end of pipe. If toxicants with the potential to bioaccumulate are predicted to exceed DGV's at end of pipe, further investigations are required as described in the Offshore Marine Discharges Management Plan (OMDAMP).
- Chemical characterisation of the PW identify toxicants with the potential to drive changes in WET results.
- WET testing to verify 99% species protection safe dilutions (as per SSD (species sensitivity distribution)) for comparison with the approved mixing zone dilutions.

- Sedimentation and particle size distribution analysis to ascertain the potential for contaminants to flocculate or precipitate and settle out of solution and impact sediment quality. If an exceedance in water quality occurs, the results of these studies will inform if non routine sediment sampling is required.

Results from the August 2024 sample are described in the “Impact Assessment” section below.

Routine Monitoring

Produced water is monitored and managed in accordance with the OMDAMP (see Section 7.2.3). The OMDAMP details routine monitoring assessment against guideline values (ANZG 2018), analytical methods and management actions if a guideline value is exceeded. The trigger values are applied through a risk-based approach that is intended to capture uncertainty around the level of impact by staging monitoring and management responses according to the degree of risk of environmental impact. This approach provides a level of confidence that management responses are not triggered too early (i.e. when there is no actual impact) or too late after significant or irreversible damage to the surrounding ecosystem (EPA 2016). Changes in discharge contaminants and PW toxicity can be detected early and can indicate the potential for an impact prior to an impact occurring allowing for timely management. WET testing confirms if there is a potential for impact on biota. Chemical characterisation is undertaken to understand toxicants that may be driving toxicity in the WET test and used as an indicator to assess whether the discharge has changed significantly from the last WET test.

WET tests are undertaken on a broad range of taxa of ecological relevance. A minimum of eight toxicity tests are carried out with each PW sample during WET testing. Specific toxicity tests are listed in the OMDAMP which include a range of mainly tropical, Australian marine species and are selected based on their ecological relevance, known sensitivity to contaminants, availability of robust test protocols and known reproducibility and sensitivity as test species for assessing PW in marine environments. Tests can be exchanged over time if tests are not available, or become obsolete, however, preference would be for tests that mimic the receiving environment as closely as possible (i.e. for most facilities this would be tropical, marine water tests) (Warne et al. 2018). The dilutions required to protect 99% and 95% of species is calculated using the ANZG (2018) statistical distribution methodology on the results of direct toxicity assessment using sub-lethal chronic endpoints. The protection of 99% of species maintains a high level of ecological and conservation value at the boundary of the approved mixing zone and is considered appropriate to account for the uncertainty in composition and proximity to the Montebello Marine Park Multiple User Zone. The approved mixing zone boundary is defined below.

Given the proximity of the discharge point to the Montebello Marine Park Multiple Use Zone (~420 m south from the facility) the PW mixing zone has potential to extend into the Montebello Marine Park Multiple Use Zone. The approved mixing zone boundary has been defined to achieve 99% species protection safe dilutions at the boundary of the MUZ.

Table 6-16 Trigger values and frequency of routine monitoring

Routine Monitoring	Trigger Value	Frequency
Chemical characterisation: End of pipe sample – physio chemical and toxicants	Results that are predicted to be higher than the 99% DGV at boundary of the approved mixing zone and are above the results from the earlier toxicity year[1] or above the toxicity year when no guideline was available.	Annual
	Results that are predicted to be higher than the 99% DGV at the AMP boundary (416 m) and are above the results from the earlier toxicity year[2] or above the toxicity year when no guideline was available.	Annual
WET testing	The 99% species protection safe dilutions derived from earlier toxicity year are not predicted to be achieved at boundary of the approved mixing zone.	Three yearly (calendar year), Conducted in parallel with annual chemical characterisation
	The 99% species protection safe dilutions derived from earlier toxicity year[2] are not predicted to be achieved at the AMP boundary.	
Review of continuous operational monitoring results	Increases in the average monthly OIW concentration by 5 mg/L total over six consecutive months or by 10 mg/L total over two consecutive months.	Monthly

Discharge volume	Monthly mean discharge volume (m³/day) is equal to or less than modelled flow rates used to define approved mixing zone based on earlier toxicity year[1].	Monthly
	Monthly mean discharge volume (m³/day) is equal to or less than modelled flow rates used to confirm 99% species protection based on earlier toxicity year[2] can be met at the AMP boundary.	Monthly

Note: 1 earlier toxicity year means the GWA design WET test (2,000 dilutions).

2 earlier toxicity year means the year in which the most recent WET test occurred.

Results of chemical characterisation and WET testing are compared against OMDAMP trigger values Table 6-16). Exceedances of trigger values require further investigation, including multiple lines of evidence. If further investigations confirm the trigger value has been exceeded, a review of single species testing is conducted[66], plus additional WET testing if required. Monitoring is conducted in accordance with the OMDAMP and where appropriate routine monitoring triggers, methodologies and standards applied (e.g. requirements for WET testing) to ensure consistency and comparability of data.

Approved mixing zone

The mixing zone extends 1300 m from the facility, except to the south, where it only extends to the Montebello marine park multiple user zone boundary (416 m from the facility)., How this mixing zone is derived is described under 'Potential Impacts to Biological Indicators' below.

Impact Assessment

Potential impacts of PW discharge include:

- changes to water quality
- toxicity to biota
- changes to sediment quality.

The maximum discharge rate is 3,500 m³/day. Since commencement of discharge PW discharge rates varied fluctuating typically between 20 m³/day – 200 m³/day significantly less than the maximum rate. As the total volume of PW is expected to increase as the fields age, the environmental impacts have been assessed against maximum discharge rates and the expected 50% probabilistic discharge of 1,900 m³/day (Figure 6-2).

Potential Impacts to Water Quality

Potential impacts to water quality are to be assessed through chemical characterisation of the end of pipe discharge. Variability in the chemical composition is managed via the Monitoring and Management Framework and the OMDAMP (Section 7.2.3).

Chemical Characterisation of PW (Physio-chemical Parameters and Toxicants in Water)

Initial monitoring of undiluted PW collected end of pipe commenced in August 2024, post commissioning, during an overboard discharge flowrate of 168 m³/day. Chemical characterisation, WET testing settling velocity and particle size distribution were undertaken. Samples were analysed for key physio-chemical parameters and toxicants. In most cases results are below the limit of reporting and ANZG DGVs as presented in Table 6-17.

Table 6-17: Pluto initial monitoring chemical characterisation - Metals.

Metal and Metalloid (mg/L)	ANZG 99% DGV [a]	ANZG 95% DGV	Initial monitoring (August 2024) end of pipe)
Silver	0.0008 (moderate)	0.0014	<0.0001
Aluminium		b	0.07
Arsenic	b b	b b	< 0.001 < 0.001

[66] Single species testing is conducted in parallel to chemical characterisation to support further investigations (See Section 7.2.4)

Cadmium	0.0007 (very high)	c	<0.0001
Chromium	0.0077 (III) (low) 0.00014 (VI) (very high)	0.027 (III) 0.0044 (VI)	0.008 < 0.001
Cobalt	0.000005 (high)	0.001	0.0006
Copper	0.0003 (very high)	0.0013	<0.0003
Manganese	0.08 (unknown)	b	0.15
Nickel	0.007 (very high)	c	0.004
Lead	0.0022 (low)	0.0044	<0.0001
Zinc	0.0033 (very high)	c	0.022
Mercury (inorganic)	0.0001 (very high)	c	<0.0001

a 99% species protection DGV (ANZG 2018) ranking of reliability is shown in parenthesis.

b No DGV or low reliability DGV only available.

c ANZG recommends 99% DGV for application for slightly to moderately disturbed ecosystems (to protect key species from chronic toxicity or due to bioaccumulating nature).

The composition of PW may also consist of phenols and hydrocarbon components such as volatile aromatic compounds (benzene, toluene, ethylbenzene, xylenes (BTEX)) and polycyclic aromatic hydrocarbons (PAHs). The initial chemical characterisation of the PW discharge stream at the end of pipe found concentrations of PAHs below the 95% DGVs, BTEX concentrations required <10 dilutions to achieve PNEC and phenols only required 5 dilutions to achieve PNEC.

PW may include low levels of naturally occurring radionuclides (NORMs). In particular, uranium 238 and thorium 232 decay chains and the longer-lived radionuclides lead 210, polonium 210, radium 226 (Ra-226) and radium 228 (Ra-228) (Coleman and West, 2000). These radionuclides can occur in produced water either in solution or as fine mineral suspended solids (OSPAR Commission, 2009).

Valeur and Petersen (2013) assessed the ecological hazard related to NORMs in PW discharged to the marine environment. They concluded that NORMs have a strong affinity for particulate matter and discharged NORMs would be adsorbed onto fine grained sediments and particulate matter relatively soon after introduction to the marine environment. In high energy environments, NORMs associated particles would settle and resuspend numerous times until they eventually settle in low energy environments in deep parts of the sea that serve as accumulation areas for fine grained sediments. Over time these particles would be buried beneath the benthic mixing layer of the seabed where they will become isolated from the biosphere and are unlikely to exceed background levels.

The average concentration of radioactivity (mainly K-40) in surface waters is 13.6 Bq/kg water (Walker and Rose 1990). Currently there are no ANZG (2018) guidelines or international guidance for concentrations of radionuclides in marine water. In the event that meter readings indicate an increased risk of NORMs as reported in the NORMs facility register on the facility, the treated PW will be tested for NORMs (Ra-226 and 228).

Residual Process Chemicals

Residual process chemicals may be present in the PW stream. Process chemicals are subject to Woodside's chemical selection and approval process. The largest chemical by volume is MEG. MEG is rated OCNS Group E (lowest hazard) and is considered PLONOR. Corrosion inhibitor required for the operation of the PW module and subsea system is assessed as having a CHARM assessment calculation rating of Gold. Chemicals will decrease the water quality in the immediate area of the release (i.e. surface waters at the release location); however, the consequence is expected to be temporary and localised due to dilution in the open ocean mixing environment, distance from sensitive receptors and relatively low discharge volumes.

Impact

Potential impacts to water quality are expected to be localised to the immediate vicinity of the platform and a small area of the AMP if maximum discharge rates (3,500 m^3/day) were to be realised (Figure 6-2). Potential impacts to water quality are limited to the immediate vicinity of the platform at expected probabilistic discharge rates (1,900 m^3/day) (**Error! Reference source not found.**) with a Negligible (F) effect on water quality in both scenarios. .

Potential Impacts to Biological Indicators

Chemical characterisation and WET testing of the PW has been completed to establish actual toxicity and to verify the required dilutions are being achieved within the approved mixing zone.

WET Testing

Most treated PW has low to moderate toxicity (Neff et al., 2011), with actual toxicity of discharge dependant on the chemical constituents of the PW and any added process chemicals, the level of treatment and dilution with condensed water prior to release, and the dilution of the discharge as it mixes with seawater. Most hydrocarbons in PW are

considered non-specific narcotic toxins with additive toxicities; therefore, the toxicity of a PW will, in part, depend on the total concentration and range of bioavailable hydrocarbons (Neff, 2002).

WET testing is undertaken to allow for interactions between toxicants and consider toxicants that cannot readily be measured or are not known to be present in the sample. For the WET testing a range of tropical and temperate Australian marine species are selected based on their ecological relevance, known sensitivity to contaminants, availability of robust test protocols, and known reproducibility and sensitivity as test species (ANZG, 2018).

Woodside has extensive operational experience with PW characterisation from gas condensate facilities on the North West Shelf of Western Australia. During design of the PW handling module, the then available suite of Woodside PW WET testing results guided the conservative selection of the GWA species protection safe dilutions as 1:2000 – which is the basis for Pluto QSRA studies and informing the approved mixing zone (2019 Environment Plan). Actual 99% and 95% species protection safe dilutions have been provided from initial monitoring WET testing as shown in Table 6-18.

Recent WET testing data collected in 2022 and 2023 from existing operating facilities (Table 6-18) was reviewed, to verify a reasonable level of conservatism is included in the impact assessment to ensure 99% species protection safe dilutions will be met at the approved mixing zone boundary and at the Montebello Marine Park multiple user zone boundary. Results from Pluto's first WET testing sampling in August 2024 verify the assumptions made during the impact assessment that sufficient dilutions are being achieved prior to the approved mixing zone boundary for 3,500 m^3/day. Suitable dilutions are not achieved at the AMP boundary for maximum discharge rates of 3, 500 m^3/day but are met at the expected discharge flow rate of 1,900 m^3/day.

Table 6-18: Actual 99% and 95% species protection level safe dilutions at Woodside's current PW discharging facilities

Facility	Year	99% Safe Dilutions	95% Safe Dilutions
Pluto A	2024	1:1,112	1:260
Angel	2022	1:417	1:278
Goodwyn Alpha	2023	1:1,388	1:205
North Rankin	2020	1:1,428	1:435
Okha FPSO	2023	1:157	1:110

Determination of Approved Mixing Zone

The principal aim of the modelling was to quantify the likely extents of the near-field and far-field mixing zones and therefore the potential impact of the PW to the marine environment. Three modelling methods were integrated to simulate the potential dispersion, an oceanic hydrodynamic model (HDROMAP) for current data, a near-field discharge model (PDS surface discharge model), and a far-field advection and dispersion model (MUDMAP) (APASA, 2017). The dispersion of contaminants will depend, initially, on the geometry and hydrodynamics of the discharge itself, where the induced momentum and buoyancy effects dominate over background processes. This region is generally referred to as the near-field zone and is characterised by variations over short time and space scales. As the discharge mixes with the ambient waters, the momentum and buoyancy signatures are eroded, and the background, or ambient, processes become dominant.

The far-field modelling expands on the near-field work by allowing the time-varying nature of currents to be included, and the potential for recirculation of the plume back to the discharge location to be assessed. The near-field simulations consider steady-state unidirectional currents, while the far-field simulations account for currents that vary in speed and direction over time and space, far field modelling represents minimum dilutions achieved 95% of the time. Validation of the current data used for the modelling was performed using infield current measurements located approximately 30 km to the southwest of the Pluto riser platform location, two-point current measurements nearest to the surface, at depths of approximately 10 m and 70 m were used to evaluate the modelled current data. The outcome of the comparison was good agreement at all current speeds, and the modelled data product was suitable for PW discharge modelling. Validation of tidal predictions was performed using the model output and independent predictions of tides. All comparisons demonstrated that the model produces a very good match to the known tidal behaviour for a wide range of tidal amplitudes and clearly represents the varying diurnal and semi-diurnal nature of the tidal signal.

The dilution modelling results are based on the maximum design flow rates of 3500 m^3/day representing the worst-case load to the environment. At lower actual discharge rates, dilutions levels are predicted to be achieved far closer to the discharge point than those predicted by the design-case modelling due to reduced loading to the environment.

Once initial monitoring of the discharge has been completed, the mixing zone boundary will be assessed to ensure it is adequately conservative. Once sufficient PW flows are achieved, the assessment of the mixing zone boundary will

be completed by a field survey to collect in-situ plume measurements and analysis of plume dilutions and mixing characteristics (including water quality monitoring at the approved mixing boundary).

Near Field

Modelling indicated that, irrespective of the season, given the elevation of the discharge above the water surface, the plume will initially plunge downward into the water column creating a turbulent mixing zone. Once the initial jet momentum ceased, the plume would remain sufficiently buoyant to rise to the surface to continue to mix with ambient waters, though at a slower rate. As a result of the mixing during the initial plunge and buoyant rise, the salinity and temperature of the discharge plume are predicted to reach background level over a short distance.

During low current speeds, the discharge will plunge the deepest (~11.5 m below sea level) and resurface close to the riser platform. Under medium and high current, the plunge depth becomes progressively shallower (approximately 7.5 and 5.5 m below sea level, respectively) due to the increasing deflection of the plume as it enters the water. Under all current conditions, the plume is predicted to resurface and remain in the upper layer of the water column (5 to 10 m).

Far Field

The far field modelling for all simulations indicated that the discharge plume would drift horizontally with the currents prevailing in the near surface layer while undergoing vertical and horizontal dispersion. Variable and patchy concentrations were predicted within the plume, attributed to large variation in current flows past the discharge point. The annual dilutions are provided below in Figure 6-2.

Generally, the overall plume footprints were observed to vary between season, with a noticeable north to north-westerly drift during the summer months and a south to south-westerly drift during the winter months. In the transitional months, more variation in the transport patterns was evident.

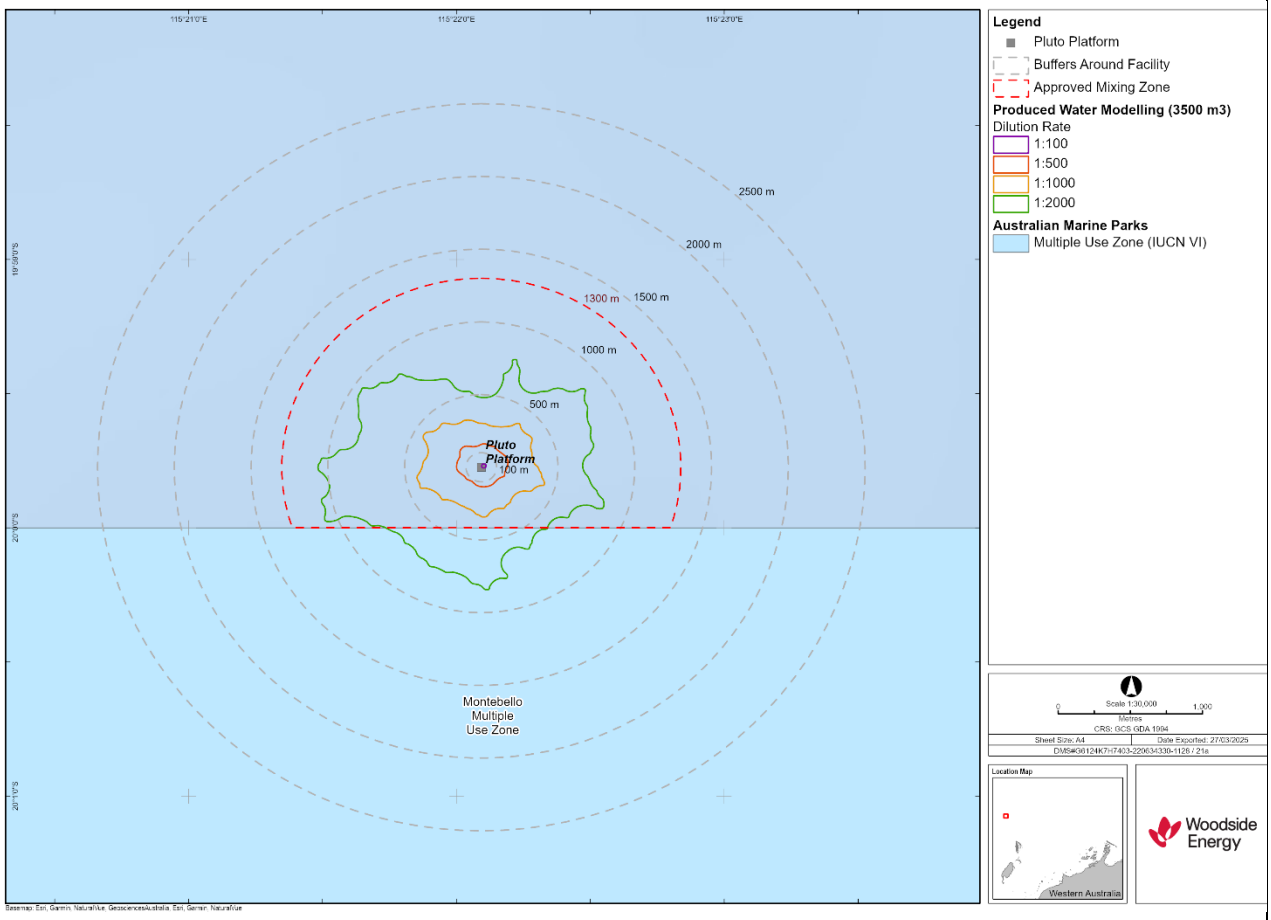


Figure 6-2: Annual dilution contours for a 3,500 m³/day discharge from the Pluto riser platform

Modelling shows 99% species protection safe dilutions used for design (2,000 dilutions) can be achieved at maximum discharge rates (3,500 m^3/day) in all conditions at 1,300 m. However, 99% species protection safe dilutions (both 2,000 dilutions used for design and actual Pluto 2024 WET value of 1,112) cannot be achieved at the AMP boundary.

Additional modelling was undertaken for a lower discharge rate of 1,900 m^3/day (RPS, 2023). Modelling indicated that, irrespective of season, the plume will plunge deepest (~12.8 m) and resurface close to the platform during low current speeds, Under medium and high currents, the plunge depth becomes progressively shallower (~6.9 m and ~4.2 m, respectively) due to the increasing deflection of the plume as it enters the water. Under all current conditions, the

plume is predicted to resurface and remain in the upper layer of the water column (5-10 m). The overall plume footprints were observed to vary between months, with a noticeable easterly and westerly drift during the summer months and a south to south-westerly drift during the winter months. In the transitional months, more variation in the transport patterns was evident. The annual dilutions are provided below in **Error! Reference source not found.**.

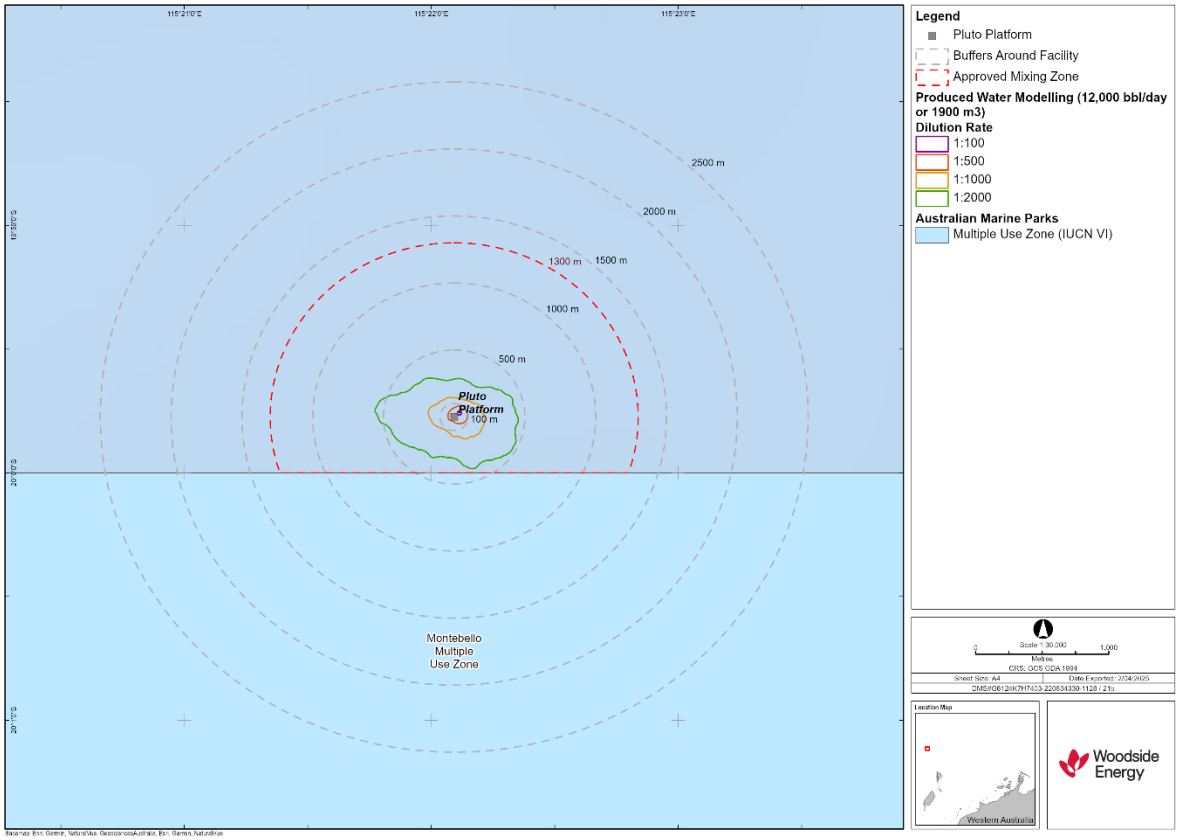


Figure 6-3: Annual dilution contours for 1,900 m^3/day discharge from the Pluto riser platform.

Modelling of a 1,900 m^3/day discharge indicates while the design 99% species protection safe dilutions (2000) cannot be met at the AMP boundary if GWA PW toxicity was encountered, requiring species protection level safe dilutions as 1:2000. The actual Pluto 2024 WET value of 1,112 dilutions achieves 99% species protection levels by 300 m in all conditions.

Bioaccumulation

Bioaccumulation refers to the amount of a substance taken up by an organism through all routes of exposure (water, diet, inhalation, epidermal). The Bioaccumulation Factor is the ratio of the steady-state tissue concentration and the steady-state environmental concentration (assuming uptake is from food and water). The test developed to measure the ability of a substance to bioaccumulate, namely, the octanol-water partition (P_{ow}), is based on the preferential partitioning of lipophilic organic compounds into the octanol phase. Partitioning into octanol can be correlated with the attraction for such compounds to the fatty tissue (lipid) of organisms.

Initial monitoring of BTEX in PW discharged from the facility was 3.2 mg/L (Worley 2025). Bioaccumulation of BTEX compounds has been observed to occur in the laboratory, only at concentrations far in excess of that discharged from facilities on the NWS (for example refer to Berry, 1980); hence it is unlikely that BTEX would bioaccumulate at the exposure concentrations that may be experienced by biota around the Pluto facility.

In contrast to BTEX compounds, PAH compounds have high P_{ow} values indicative of the potential for bioaccumulation (Vik et al., 1996). Neff and Sauer (1996) compiled available literature for laboratory and field studies investigating the bioaccumulation of PAHs. The bioaccumulation values for PAHs in marine organisms collected near PW discharges in the Gulf of Mexico reported by Neff and Saur (1996) indicate that the highest bioaccumulation factor was in the tissues of bivalve molluscs and the lowest in the muscle tissue of fish.

The most comprehensive field study assessing bioaccumulation of hydrocarbons and metals from PW discharged into offshore waters is that by Neff et al. (2011). At the request of the United States Environmental Protection Agency (USEPA), the Gulf of Mexico Offshore Operators Committee sponsored a study of bioconcentration of selected PW chemicals by marine invertebrates and fish around several offshore production facilities discharging more than 731 m^3 per day of PW to outer continental shelf waters of the western Gulf of Mexico (by comparison Pluto discharges will be up to 3500 m^3/day). The target chemicals identified by USEPA included five metals (As, Cd, Hg, 226^{Ra} and 228^{Ra}),

three volatile monocyclic aromatic hydrocarbons (MAH) – benzene, toluene and ethylbenzene – and four semi-volatile organic chemicals – phenol, fluorene, benzo(a)pyrene and di (2 ethylhexyl) phthalate. Additional MAH (m-, p-, and o-xylenes) and a full suite of 40 parent and alkyl PAH and dibenzothiophenes were also analysed by Neff et al. (2011) in PW, ambient water, and tissues at some platforms.

Concentrations of MAH, PAH and phenol as determined by Neff et al. were orders of magnitude higher in PW than in ambient seawater. There was no evidence of MAH or phenol being bioconcentrated. All MAH and phenol were either not detected (>95% of tissue samples) or were present at trace concentrations in all invertebrate and fish tissue samples. Concentrations of several petrogenic PAHs, including alkyl naphthalene's and alkyl dibenzothiophenes, were slightly, but significantly, higher in some bivalve molluscs, but not fish, from discharging than from non-discharging platforms. These PAH could have been derived from PW discharges or from tar balls or small fuel spills. Concentrations of individual and total PAH in mollusc, crab and fish tissues were well below concentrations that might be harmful to the marine animals or to humans who might collect them for food at offshore platforms (Neff et. al., 2011).

Mercury in the marine environment exists mainly as complexes of mercury (II) and as organomercurials (Hart 1982). Of particular concern is inorganic forms of mercury (of relatively low toxicity and availability to bioconcentrate) that may be converted by bacteria in situ into organomercury complexes (particularly methylmercury), which are more toxic and tend to bioaccumulate (Mason et at 2012). Neff et al (2011) attempted to measure bioaccumulation of four metals (arsenic, barium, cadmium, and mercury), by two species of bivalve molluscs from platform legs and five species of fish collected within 100 m of produced water discharging and non-discharging platforms in the Gulf of Mexico. The study found no difference in metal concentrations between impact and control sites. Potential impacts to biota from heavy metals would be localised to the immediate vicinity of the facility. Therefore, based on outcomes from studies (Neff et al 2011) and given the size of the mixing zone and the wide distribution of most species potential impacts would be limited to individuals and not impact on populations. It is expected that bioaccumulation is unlikely to result in increased levels of BTEX in biota surrounding the riser platform; however, there may be an elevation in PAH levels. Given the similarity of the chemical characterisation of PW discharges from Woodside facilities to those elsewhere in the world including those in the Gulf of Mexico (Rob Phillips Consulting, 2016), the results from Neff et al. (2011) can be used to infer the very low potential for adverse bioaccumulation effects to marine organisms, or to humans, if they were to consume any affected fish, molluscs or crabs found on upper near-surface legs of the facility.

The potential environmental impact associated with bioaccumulation of PW constituents in the water column is considered to be slight and a localised effect on a small number of non-threatened species in waters immediately surrounding the facility. The potential risk to fisheries is further reduced to ALARP as a result of negligible exposure given the PSZ that prohibits fishing from or near the platform. Given the nature of the PW discharge from the riser platform, the potential for bioaccumulation of PW contaminants (particularly BTEX) is considered to be minor and restricted to sessile organisms growing on the legs of the platform.

Marine Fauna

Given that PW will be managed to achieve 99% species protection safe dilutions at the AMP boundary and at the approved mixing zone boundary, potential for impacts to marine fauna are limited to a localised area in proximity to the facility. In addition, toxicants are expected to rapidly diluted and are not considered to cause acute toxicity. Therefore, impacts would be limited to fish communities associated with the facility exposed to water quality changes. While transiting cetaceans, whale sharks or turtles may pass through the plume they are not anticipated to spend long durations within the mixing zone and no impacts are expected.

Plankton

A change in water quality as a result of PW discharges has the potential to result in the injury or death of planktonic species within the water column through toxicity effects. Early life stages of fish (embryos, larvae) and other plankton would be the most susceptible organisms to exposure from hydrocarbons and chemicals in the discharges, as they are omnipresent and are therefore likely to be exposed to the plume. Impacts are predicted to be limited to within 1300 m of the platform and impacts are expected to be slight. These types of organisms are known to have high levels of natural mortality and a rapid replacement rate (UNEP, 1985). Plankton is generally abundant in the upper layers of the water column and is the basis of the marine food web, so localised impacts in any one location are unlikely to have long-lasting impacts on plankton populations at a regional level. Reproduction by survivors or migration from unaffected areas is likely to rapidly replenish losses (Volkman et al., 2004).

Impacts to Australian Marine Parks, KEFs and Biologically Important Areas

The facility is located y ~420 m from the boundary of the Multiple Use Zone (IUCN Category VI) of the Montebello Marine Park. This zone is managed to allow ecologically sustainable use while conserving ecosystems, habitats and native species (Section 4.8). The 1,300 approved mixing zone (predicted for GWA PW toxicity and 3,500 m^3/day discharge rate) overlaps <0.05% (1.6 km^2 of the 3,412 km^2) of the Multiple Use Zone however a 99% species protection safe dilution has been adopted at the marine park boundary. This is predicted to be achievable at 1,900 m^3/day or less adopting the PLA 2024 WET testing results. The management objective is to ensure long-term protection and maintenance of biological diversity with a sustainable flow of natural products and services to meet community needs. Potential to impact the values of the Montebello Marine Park are not expected and are considered below.

Table 6-19 Values of the Montebello Marine Park

Value	Potential Impact
Ancient Coastline at the 125 m depth contour	The KEF is located approximately 6.5 km from the PW discharge point and is outside of the approved mixing zone. Modelling predicts the PW will form a buoyant plume extending less than 1,300 m from the discharge point, therefore, no contact and no impacts to biological indicators associated with the KEF are expected from the plume.
Species including species listed as threatened, migratory, marine or cetacean under the EPBC Act	A number of threatened migratory, marine or cetacean species may be present in the approved mixing zone (Section 4.6). Given that PW will be managed to achieve 99% species protection dilutions at the boundary potential for impacts to marine fauna are not predicted. Given the minor reduction in water quality and small area of impact and noting while transiting cetaceans, or whale sharks (noting that there are no BIAs or critical habitats within the mixing zone) may pass through the plume they are not anticipated to spend long durations within the mixing zone and no impacts are expected As such, the magnitude for fish, whale sharks, rays, cetaceans has been identified as no lasting effect (F).
BIA flatback turtle internesting buffer around the Montebello Islands (Oct to Mar)	The Montebello Islands, located approximately 41 km from the PW discharge, are the nearest emergent land and potential nesting habitat (minor) for flatback turtles. During internesting turtles remain close to the nesting beach or rookery (DOEE, 2017). Typically, internesting habitat is located immediately seaward of designated nesting habitat (DOEE, 2017). The approved mixing zone is within the Pilbara flatback turtle 60 km internesting buffer zone (October–March) however given the approved mixing zone is over 40 km from the nearest nesting beach internesting turtles are not anticipated to remain in the approved mixing zone for prolonged periods of time or in large numbers. Chronic discharge is identified as a moderate risk threat in the Recovery Plan for Marine Turtles for the Pilbara flatback population (DOEE, 2017). Given the localised area of impact, 99% species protection safe dilutions at the boundary of the marine park and the distance to nesting habitat the magnitude for marine reptiles has been identified as no lasting effect (F).
BIA foraging for whale sharks along the 200 m isobath, with seasonally high use (Apr to Jun)	The 200 m isobath is located about 17 km outside the approved mixing zone. Given the localised area of impact and that whale sharks are transiting the area, no impacts are expected.
BIA breeding habitat for seabirds	There is no nesting habitat within the approved mixing zone, therefore aggregations of breeding birds are unlikely to be present in the approved mixing zone. Foraging areas are located outside the approved mixing zone. No impacts are expected to this value.
BIA pygmy blue whale migration corridor (northern migration Apr to Aug; southern migration Oct to Jan) from Indonesian Waters to southwest Australia	The pygmy blue whale migration is thought to follow deep oceanic routes (DEWHA, 2008). In the NWMR, PBW migrate along the 500 m to 1000 m depth contour on the continental slope where they are likely to opportunistically feed on ephemeral krill aggregations (DEWHA, 2008). Given the BIA is located outside the approved mixing zone and that PW forms a surface buoyant plume, no impacts are expected to this value.
Cultural values	Cultural and spiritual values have been identified in Section 4.9 and assessed in Section 6.11.
Heritage values	No international, Commonwealth or national listings apply to the Montebello Marine Park currently. The Western Australia Barrow Island and the Montebello–Barrow Island Marine Conservation Reserves are outside of the approved mixing zone and therefore are not predicted to be impacted. Two historic shipwrecks, the Trial and Tanami, are located about 30 km outside of the approved mixing zone and PW forms a surface buoyant plume, therefore no impacts are expected to this value.

The Montebello Marine Park special protection zone for benthic habitat and sanctuary zone boundaries are located approximately 36 km to the south of the riser platform. As such, there are no impacts anticipated in these zones.

There are no impacts anticipated to the values of the Montebello Marine Park (including natural, cultural, heritage and socio-economic values). Wider water quality and sediment impacts are considered in respective sections above. Discharges are monitored and managed to achieve a 99% species protection safe dilution via the OMDAMP at the AMP boundary.

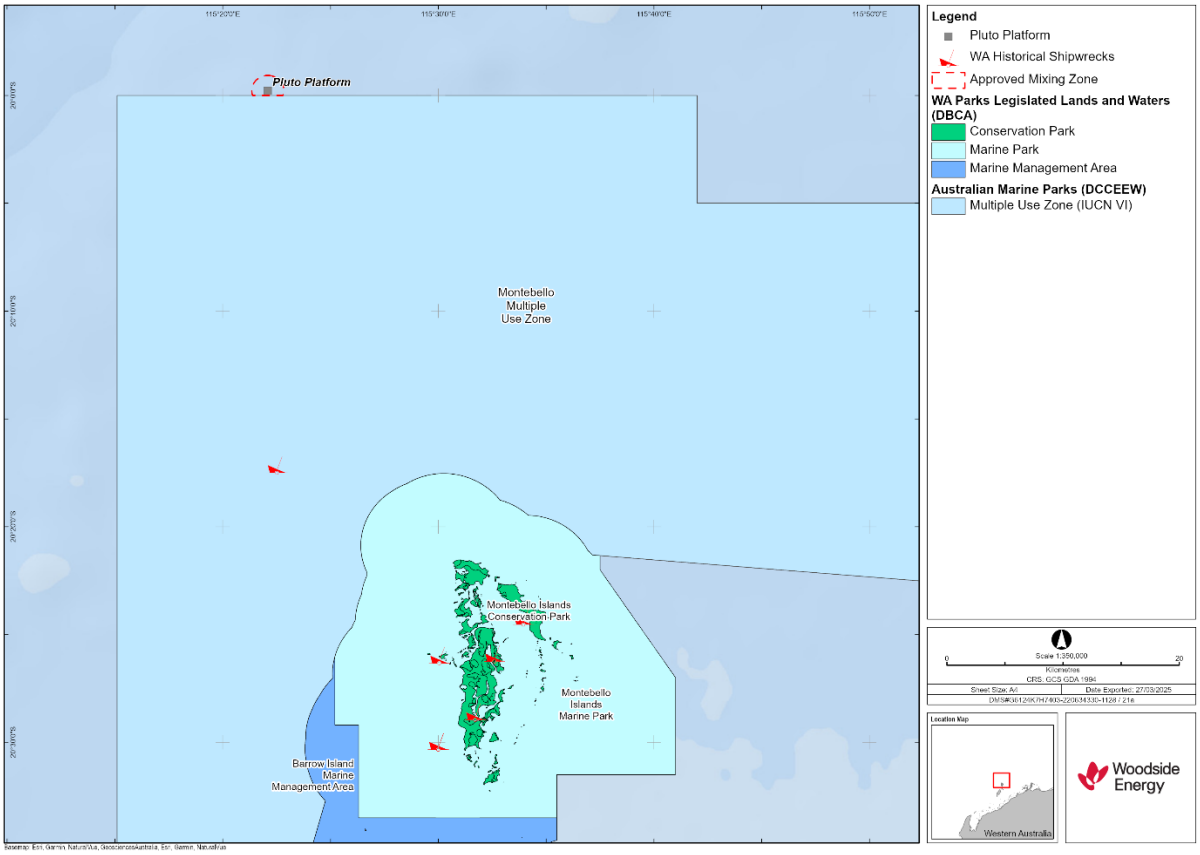


Figure 6-4: Montebello Marine Park zones and heritage values

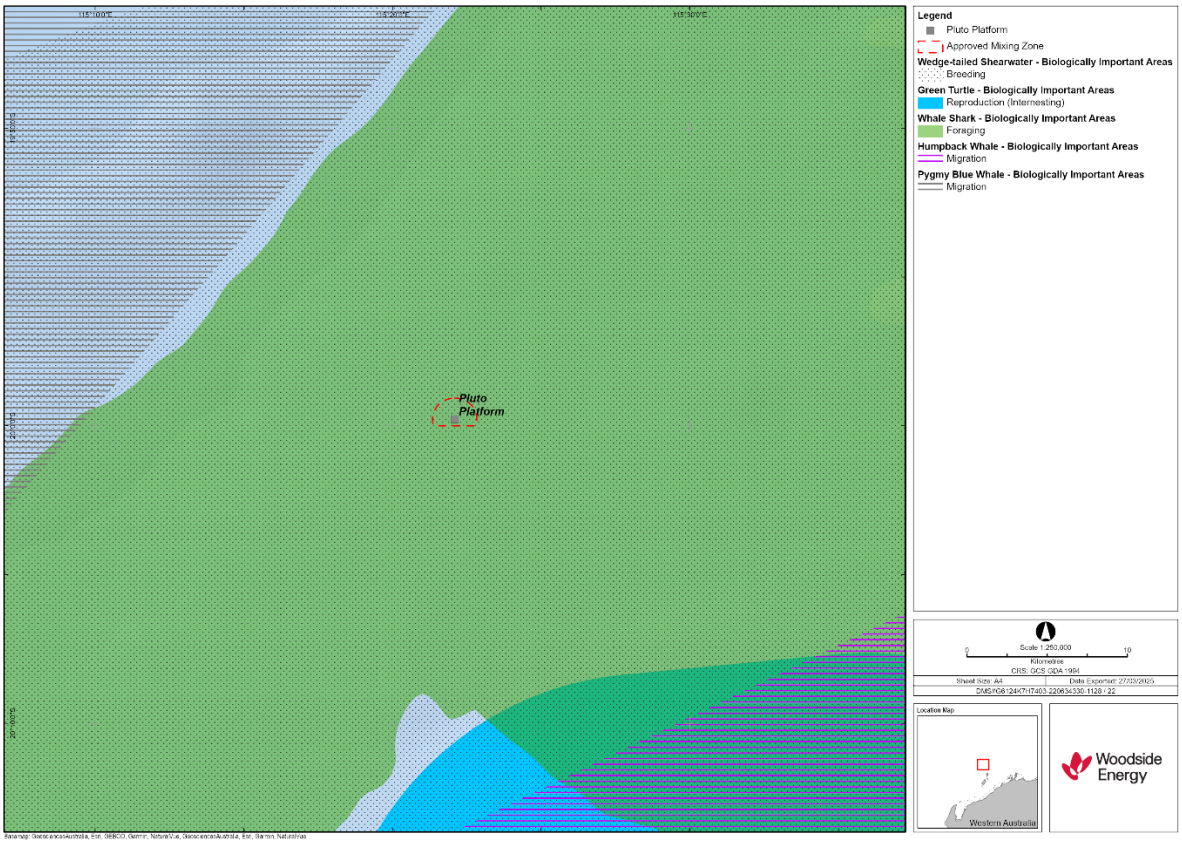


Figure 6-5: Biologically Important Areas

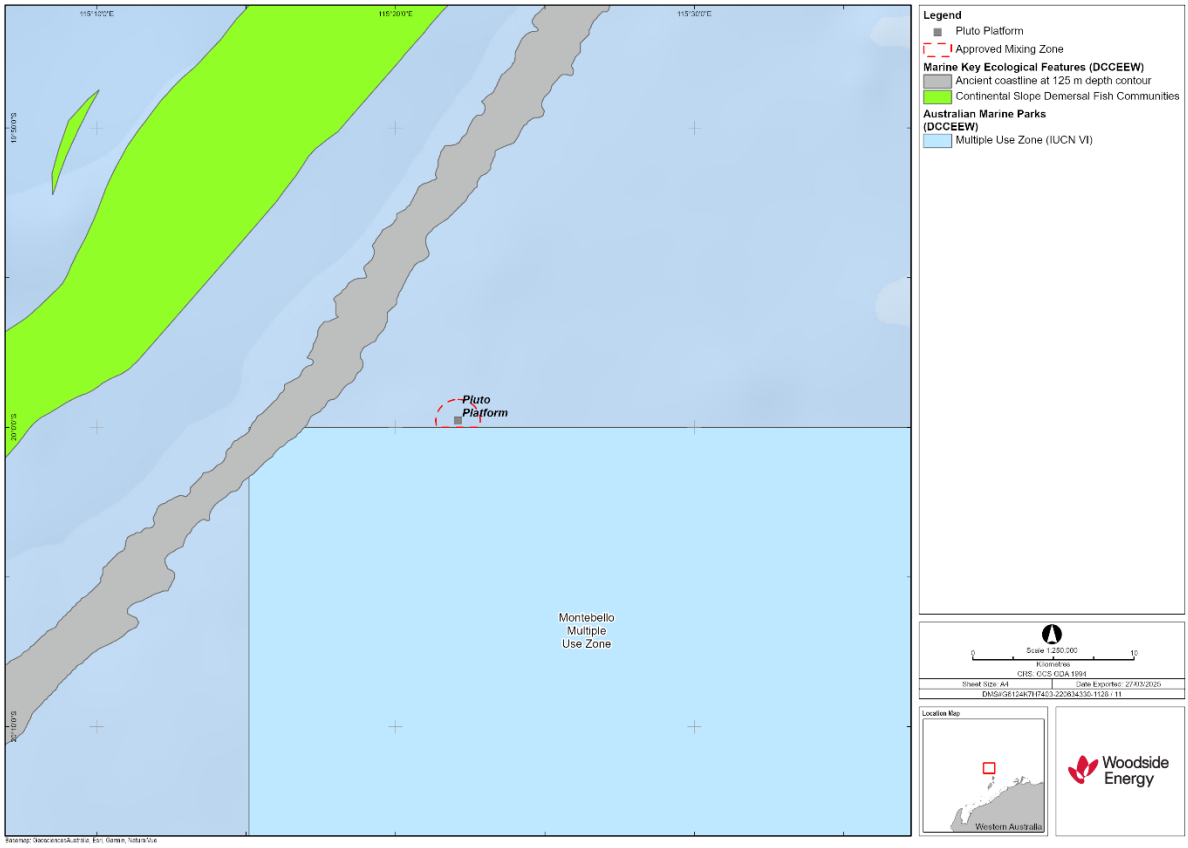


Figure 6-6: Key ecological features

Potential Impacts to Sediment Quality

Potential impacts to sediment quality were assessed through sediment surveys and supported by the results of sedimentation and flocculation studies and potential impacts to water quality through annual produced water chemical characterisation assessments.

Toxicants in Sediments

Accumulation of PW contaminants in sediments depends primarily on the volume and concentration of particulates in PW discharges or constituents that sorb onto seawater particulates the area over which those particulates could settle onto the seabed (dominated by current speeds and water depths) and re-suspension, bioturbation and microbial decay of those particulates in the water column and on the seabed.

Baseline sediment surveys were completed to prior to the discharge of PW from the riser platform. Sediments within the 1300 m mixing zone and adjacent reference areas (5000 m) had no toxicants which exceeded the ANZG 2018 DGV (BMT 2022). In 2021, a survey of the benthic habitats around the facility was completed and results showed habitats predominantly comprised of unconsolidated (soft) sand and mud of possible biogenic origins containing shell fragments and a low cover (<20%) of biota that mostly consisted of a mixed community of poriferans (erect, crust, cup-like and massive forms) and cnidarians (sea whips, sea pens, sea fans, soft corals and hydroids) (BMT 2022), which is broadly represented throughout the NWS Province (Section 4.2). Benthic communities of soft sediment are characterised by burrowing infauna such as polychaetes, with biota such as sessile filter feeders occurring on areas of hard substrate (such as subsea infrastructure). Benthic grab sampling in the vicinity of the continental slope region of the Operational Area revealed a sparse abundance, high variability and high diversity of infauna dominated by polychaetes with other fauna including nemerteans and sipunculids and crustaceans (mainly amphipods) (SKM, 2007). Higher, albeit still low, infauna density was reported at the shelf break (200 m) compared to deeper areas on the continental slope.

Within the approved mixing zone potential impacts to sediment quality are considered to be very low risk. If they occurred, it would be limited to localised impacts to benthic communities. The potential extent of such impacts is extremely small in relation to the extent of the soft sediment habitats that are broadly represented within the Operational Area and the wider NWS Province. As such, impacts to benthic communities are expected to be localised with no lasting effect. There is no history of drilling with oil-based muds at the riser platform.

The PW plume is predicted to be buoyant, due to lower salinity and/or higher temperature than surrounding seawater. Therefore, potential contaminants in the PW discharge may be introduced into sediments around the riser platform through precipitation of soluble contaminants and flocculation and sedimentation of the particles in the PW plume. Studies into potential sediment accumulation from PW discharge have been undertaken by Woodside (Jacobs, 2016). The study found that the PW at all facilities had very small amounts of solid material, with very little potential of settling or flocculation due to the very small particle sizes.

The initial chemical characterisation and sedimentation monitoring in August 2024 included particle size distribution analysis to confirm potential for sedimentation. The analysis showed that 48% of particles from PW discharge are <5 µm and 95% <40 µm. Based on these characteristics sedimentation from PW is not expected to occur at the facility. Dr Graeme Hubbert categorised particulate behaviour based on oceanographic experience and mathematical calculations using settling rates and resuspension velocities for various particle sizes. He determined that particles of a size 1 to 5 µm would never permanently settle out of the water column, and that particles of a size 5 to 40 µm would not permanently settle out of the water column, unless they were in very deep water (>5,000 m) or in areas where hydrodynamic conditions were very weak and did not continuously resuspend the particles.

It is anticipated PW will not impact sediment quality to an unacceptable level; however, this will be verified via initial chemical characterisation monitoring and results considered and managed by the OMDAMP. Should initial routine monitoring indicate the potential for impact to sediment quality, it will be necessary to undertake further investigations. This may include additional chemical characterisation, sedimentation studies, non-routine sediment sampling and/or bioavailability testing.

Non-Routine PW Discharges Impact Assessment

Non-routine PW discharge operations are required during intermittent activities such as production restarts and water cut well restarts. Operations requires flexibility to allow for OIW elevation while the wells are started up and flow rates vary while the system is optimised. It is expected that within 7 days of sequentially managing the system, the process will allow for effective OIW separation with OIW concentrations reflective of steady-state conditions. During restarts at reduced discharge rates, OIW may be elevated for up to 7 days.

The complexities involved in the restart process are hydrate and integrity management requirements, and liquids and pressure management across the integrated production system to prevent potential flaring and onshore LNG plant cascade impacts, as well as managing chemical interactions and effectiveness. In order to provide the required flexibility during production restarts the following OIW levels are applied (whilst maintaining a monthly average consistent with operational criteria):

- <100 mg/L 24-hour rolling average (ra), with flow constrained to less than 800 m^3/d (ra), and.

- <50 mg/L 24-hour rolling average, with flow constrained to less than 1,900 m^3/d (ra).

To assess the short-term non-routine OIW discharges with varied initial OIW concentration assumptions, the OSPAR (2014) dispersed oil concentration of 70 µg/L is used as the PNEC for the non-routine activity dispersion modelling (RPS, 2023). Dispersion modelling developed a series of tables of the dilutions achieved based on the volume of discharge and the distance from the facility that the dilutions are achieved. Using these tables the distance required to achieve PNEC based on the discharge volume can be determined and activities managed to ensure that impacts are managed to ALARP and acceptable levels. Additional modelling was undertaken in 2024 (RPS, 2024a-e) to assess the potential impact of possible lower-rate discharges, including those during non-routine activities such as production system restarts, and water cut well start-ups. These intermittent activities have potential for short term variations in OIW specification which require system flexibility to optimise and stabilise the PW process, and hence may see short periods of elevated OIW concentration, and will be managed to not exceed 50 mg/L and 100 mg/L 24-hour rolling average criteria, corresponding to discharge rates constrained well below the design basis (3,500m^3/day) – limited to 1,900 m^3/day and 795 m^3/d respectively. Non-routine modelling dispersion outcomes at these reduced rates validate that OIW PNEC values are predicted to be achieved for non-routine activities well within the defined mixing zone, and prior to the AMP boundary.

Production Restarts

There is the potential for the facility to experience high OIW during production restarts. Wells that have been shut in are required to be MEG and corrosion inhibitor dosed to maintain pipeline integrity, this may in part cause emulsions to form and OIW management issues. Wells that are either condensed water or have less associated produced water are expected to experience similar high OIW issues.

During production restart events, the modelled discharge rate of ~800 m^3/day with the additional controls, and non-routine discharge criteria of up to 100 mg/L 24-hour rolling average (see Demonstration of ALARP table below) with lower-than-design discharge rates it is expected that OIW predicted-no-effect-concentrations (PNEC) of 70 µg/L (requires 1,429 dilutions) will be readily achieved for the duration of the activity within an approximate 200–425 m radius of discharge (worse-case), and well before the AMP boundary(**Error! Reference source not found.**).

Water Cut Well Restarts

Water cut wells that have been shut in for extended periods of time, may have varied produced water profiles on restart which can impact process stability until stable rates are achieved. It is expected that this can take a number of days for water rates to plateau from each individual water cut well when restarted.

During water cut well restart events and production restarts once sustained water rates occur across the field, a modelled discharge rate of 1,900 m^3/day) with the additional controls, and non-routine discharge criteria of up to 50 mg/L 24-hour rolling average (see Demonstration of ALARP table below) with lower-than-design discharge rates it is expected that OIW PNEC of 70 µg/L (requires 715 dilutions) will be readily achieved for the duration of the activity within an approximate 300 m radius of discharge, and well before the AMP boundary..

Based on modelling and the non-routine short duration of elevated OIW, the non-routine discharge during production restarts and restarts of water cut wells is considered to have a short term, temporary and localised impact to water quality, and not predicted to result in impacts beyond the approved mixing zone, or beyond the AMP boundary.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[67]***	***Benefit in Impact/ Risk Reduction***	***Proportionality***	***Control Adopted***
Legislation, Codes and Standards				
None identified.				
Good Practice				
Implement Woodside's Chemical Selection and Assessment Environment Guideline: • Where Gold, Silver, E or D OCNS rating	F: Yes. Routinely implemented to the chemical selection process for Woodside facilities. CS: Minimal cost. Standard practice.	Environmental assessment of chemicals in discharges is expected to reduce the consequence of impacts resulting from discharges to the marine	Benefits outweigh cost/sacrifice.	**Yes** **C 5.1**

[67] Qualitative measure

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[67]***	***Benefit in Impact/ Risk Reduction***	***Proportionality***	***Control Adopted***
(and no OCNS substitution or product warning), chemicals are selected – no further control required. • If chemicals with a different OCNS rating, sub warning or non-OCNS rated chemicals are required, chemicals will be assessed in accordance with the guideline prior to use.		environment by assessing chemicals for environmental acceptability. Planned discharges are required for the safe execution of activities and therefore no reduction in likelihood can occur.		
Monitoring of OIW concentrations in accordance with PARCOM 1997/16 Annex 3 methodology. Limiting average PW OIW during routine operations to less than 30 mg/L (over a 24-hr rolling average (ra.)). During non-routine production restart and water cut well re-start activities: • limit PW OIW to less than 100 mg/L 24hr rolling average (<800 m3/day ra.), for up to 7 days following re-starts, OR • limit PW OIW to a 50 mg/L 24-hr rolling average (1,900 m3/day ra.), for up to 7 days following restarts. PW OIW is limited to a 30 mg/L monthly rolling average for all activities.	F: Yes. CS: Monitoring and implementation costs. Standard practice. The 30 mg/L 24-hour rolling average limit is a legacy of the former Environment Regulations 29 and 29A repealed in 2014. Reduction of this limit is not considered feasible or practicable. The current limit is effective in managing potential impact of PW discharge. Short-term non-routine criteria support ensuring PW operations achieve environmental outcomes (EPO) with ALARP management of start-up constraints which could otherwise resulting in frequent flaring, system upsets, and/or addition of process chemicals for integrity management (potentially adversely affecting overall outcomes and OIW separation performance).	Limiting OIW concentrations within PW reduces impacts to the environment.	The adoption of a limit ensures that PW OIW is controlled. Short-term, non-routine criterial with volume and duration constraints ensure PNEC values are predicted to be achieved for non-routine activities well within the defined mixing zone, and prior to the Montebello Marine Park multiple use zone boundary, whilst ensuring system stability, safety and integrity and reducing potential flaring emissions and chemical discharges.	**Yes** **C 7.1**

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[67]***	***Benefit in Impact/ Risk Reduction***	***Proportionality***	***Control Adopted***
Implement Monitoring and Management Framework for PW discharges, including: • monitoring of PW discharge volume • chemical characterisation (including BTEX, PAH's, Organic Acids, metals and glycol) • WET testing timing of annual/ triennial sampling to be representative aiming to detect change, considering when the reservoir cuts formation water.	F: Yes. CS: Monitoring costs. Standard practice.	The OMDAMP provides for detection of significant changes to the PW discharge characteristics (i.e., volumes, OIW concentration, chemical characterisation) that may cause an increased impact or risk to the marine environment. Monitoring is designed to detect if 95% or 99% species protection is achieved at the approved mixing zone boundary and AMP boundary. Through the implementation of the OMDAMP, potential risks to the environment are reduced.	Woodside has developed the OMDAMP based on operational experience from relevant offshore assets. The OMDAMP considers risk-based adaptive management measures.	**Yes** **C 7.4**
Online monitoring and/or procedural controls in place to monitor and control PW discharge volume and OIW concentrations and prevent discharge of PW with high OIW concentrations through OIW analyser, or off spec/outage procedures. Process performance monitored by OIW concentration analyser and volume meter(s).	F: Yes. CS: Minimal cost. Standard practice.	The OIW analysers and flow meter provides optimal process control and safeguarding to monitor, control and prevent discharge of PW with high OIW concentration to the environment.	Online monitoring control is WMS requirement – must be adopted.	**Yes.** **C 7.5**
The online analyser is calibrated with a manual sample in accordance with Offshore Laboratory Determination of Oil in Water Standard Operating Procedure.	F: Yes. CS: Monitoring and implementation costs. Standard practice.	Calibration of equipment to maintain quality control.	Calibrations undertaken at appropriate frequency to maintain quality control and in line with procedures.	**Yes.** **C 7.6**

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[67]***	***Benefit in Impact/ Risk Reduction***	***Proportionality***	***Control Adopted***
Professional Judgement – Eliminate				
Reinjecting PW into reservoirs.	F: No. Some technical risk associated with reservoir uncertainty and ultimate reservoir recovery. Economically not feasible. CS: Significant. The reinjection of PW would require significant modification to the PLA facility, including drilling of injection wells. This would require considerable design and construction costs. Previous studies indicate a cost in excess of $400 million CAPEX for a PW reinjection solution on-board the Pluto facility. ***Benefit in Impact Reduction*** The environmental impacts in the approved mixing zone around the facility would be eliminated. Long term biological impacts from PW that are outside of the acceptable limits of change (i.e., impacts to ecosystem integrity from contaminant accumulation in sediment and bioaccumulation effects over time) are prevented by the PW Monitoring and Management Framework. ***Proportionality*** As part of the possible solutions for managing PW from the Pluto operations, Woodside examined the potential for reinjection of PW. Woodside did not identify a suitable reservoir, and such an option would require additional drilling activities to be undertaken. Reinjection is not feasible unless a suitable reservoir is identified. It is not feasible to reinject into a previous Pluto appraisal well, or future shut-in well because this would further accelerate the production of PW from the reservoir and reduce the overall recoverable volume from the reservoir. Given the limited space available on the platform, subsea separation would be required, this is novel technology with limited operational experience. Drilling and Subsea work activities to establish a reliable PW reinjection well and subsea infrastructure also introduce significant complexity, risk and cost. Together the significant technological and operational risks, associated environmental impact (drilling and subsea construction, greenhouse gas emissions associated with 7–15 MW based on known historical requirements for Enfield–Laverda) is considered significantly disproportionate to the potential slight environmental impact improvement. As such, no further engineering design or screening studies reporting is considered reasonably practicable. It is not necessary to conduct a reservoir-by-reservoir analysis to understand these costs. For Type B impacts, it is appropriate to consider case specific drivers to ALARP management. The lack of a suitable reservoir contrasts with Woodside's facilities that historically reinject PW. At Nganhurra, for example, water re-injection was required to maintain reservoir pressure for production and was a key part of the FDP to optimise overall field recovery. As PW alone was not sufficient to maintain reservoir pressure, seawater was used to make up the balance. Therefore, given the significant economic benefits associated with reinjection at NGA, the ALARP outcome is different from NGA to Pluto. The reinjection of PW would also introduce additional sources of environmental risks and impacts, such as those associated with drilling injection wells (e.g., drill cuttings) and maintaining injection capability (e.g., increased greenhouse gas emissions from power generation for pumps, increased chemical usage, etc). Given the localised, slight non-significant impact of PW discharges, and the considerable costs involved in developing a PW reinjection			No

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[67]***	***Benefit in Impact/ Risk Reduction***	***Proportionality***	***Control Adopted***
	capability for the Pluto facility, implementation risks and environmental impacts (greenhouse gas, chemical use), the costs are grossly disproportionate to the potential environmental benefit gained.			
Professional Judgement – Substitute				
None identified.				
Professional Judgement – Engineered Solution				
Chemical injection of water clarifier, demulsifier to reduce OIW concentration, if required.	F: Potentially feasible. CS: Moderate. Initial cost of modifying production system to include chemical dosing point. Ongoing cost of chemical procurement.	Potential minor reduction in OIW concentration; however, does not reduce the overall consequence rating. Further, this results in additional chemical load, and lifecycle environmental footprint associated with packaging, logistics, waste management and potential process upsets.	Benefits outweigh cost/sacrifice.	**Yes** **C 7.7**
Secondary treatment stage (HIGF) to reduce OIW concentration.	F: Yes. Process design adopts an HIGF unit. CS: Moderate. Integrated in to process design. Ongoing cost of maintenance.	Installation of a secondary treatment stage (HIGF) has been provided on the NNC facility to ensure OIW remains below 30 mg/L (24-hr rolling average) during routine operations.	As part of the possible solutions for managing PW from the Pluto operations, Woodside examined the potential for installation of various secondary treatment technologies. The HIGF was identified as the optimal secondary treatment stage in order to maximise OIW separation prior to discharge overboard during routine operations.	**Yes** **C 7.2**
Permanently installed tertiary treatment stage for contingent use to reduce OIW concentration. Filters are used during non-routine activities and to support elevated OIW response procedures.	F: Yes. Coalescing filters are provided in the PWH design as a contingency tertiary treatment stage for use during process upsets and non-routine activities to maintain acceptable OIW concentrations. CS: Moderate cost. Integrated in to the process design. Use is a high cost activity associated with	Installation of a tertiary treatment stage has been provided on the NNC facility to ensure OIW can be managed to below criteria during process upsets or non-routine activities, and to minimise the requirement for unplanned	As part of the facility design - possible solutions for managing PW from the Pluto operations, Woodside examined the potential for installation of various treatment technologies Coalescing filters have been installed as a mitigation measure for process upsets and to support non-routine activities only. Long	**Yes** **C 7.3**

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[67]***	***Benefit in Impact/ Risk Reduction***	***Proportionality***	***Control Adopted***
	maintenance change-out and filter costs. Manual change-out frequency has limitation due to NNC facility.	intervention visits to the platform.	term continuous running of the filters results may result in high cost and increase health and safety handling and exposure risks. The filters have been designed such that a variable flow can be slipstreamed through them from 0 – 100%, providing maximum operator flexibility for remote troubleshooting to prevent the need for a react visit to the platform, therefore these filters provide an ALARP solution to managing non-routine and process upset OIW discharge requirements, while minimising the safety risk on the NNC platform.	
Facility modification to adopt alternate secondary treatment stage technologies to further reduce OIW concentration. For example: • Macroporous Polymer Extraction (MPPE) • Centrifuges / Hydrocyclones • Membrane/ adsorption media filtration	F: No, MPPE, centrifuges/ hydro cyclones and membrane/media filtration typically require high operator intervention, operations and maintenance requirements not conducive to the NNC facility philosophy. PLA platform has limited space, and weight constraints, as well as ancillary considerations such as power generation and no heating circuits. These limit the ability for a number of these alternate technologies to be installed or operated considering provision for sufficient sparing and/or filter handling and waste management/ handling.	Alternate secondary and tertiary options have potential to be effective on suitable facilities to reduce OIW with certain hydrocarbon characteristics. In PLA and PWH's context, feasible options are limited – thus there is limited environmental benefit available compared to the in-place systems, with HIGF, and contingent coalescing filtration system installed. Further operational optimisation is expected from the in-place system as water rates stabilise above the current minimum turndown.	Additional systems pose significant space, weight, utility modifications and requirement for extended crewed operations (to execute the modification and ongoing operation) – Hence a large upgrade, new platform, or extended crewed operation and costs are not proportionate to the impact reduction, especially considering likely periods of reduced PW discharge rates within the design basis for the facility.	No

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[67]***	***Benefit in Impact/ Risk Reduction***	***Proportionality***	***Control Adopted***
	CS: Modification of the PWH and PLA facility would require extended periods of crewed offshore operations, and significant design and execution costs. A number of options would require significant facility layout modification and operational crewed operations and maintenance support.			
Professional Judgement – Procedures and Administration				
Routine in situ monitoring beyond the requirements of Woodside's OMDAMP.	F: Yes. CS: Increasing the frequency of field-based monitoring would result in additional offshore demand on resources, safety hazards and costs associated with an offshore environmental monitoring program, such as vessel activities, logistics, manual labour, analytical laboratory and service provider costs.	In situ monitoring following release is not an effective control to manage the nature of PW discharges and results no impact reduction. Increases to in situ monitoring beyond the adaptive management approach outlined in the OMDAMP does not follow good application of the hierarchy of controls and results in disproportionate sacrifice with regard to execution risks and costs for limited gain.	Long-term monitoring of water and sediment characteristics at the Woodside facilities indicate the PW discharge is not detectable beyond the approved mixing zone. No sediment contamination has been detected. PW separation process design, optimisation, monitoring and surveillance offer the primary controls, with discharge OIW analysis in place to detect performance variations. Further, Woodside maintains a routine OIW monitoring program for the PW stream (including adaptive management via the OMDAMP, which assesses the need for in situ monitoring). The work undertaken to date provides Woodside with a sound understanding of the nature and scale of the environmental impacts from PW discharge, which would not be further improved by	No

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[67]***	***Benefit in Impact/ Risk Reduction***	***Proportionality***	***Control Adopted***
			increasing the frequency of in situ monitoring. The execution risks and cost of implementing this control is grossly disproportionate to the environmental benefit.	
Annual review of routine monitoring results and determine requirement for non-routine sediment quality monitoring as per OMDAMP.	F: Yes. CS: Monitoring and implementation costs. Standard practice.	Review of monitoring results to determine if additional monitoring is required does not reduce environmental impact but provide necessary assurance that impact continues to be appropriately defined.	Additional risk-based monitoring is proportional to the additional cost of implementation and part of the OMDAMP.	**Yes** **C 7.8**
Review of continuous improvement measures to determine if 30 mg/ L OIW limit can be reduced further.	F: Yes. CS: Minimal cost.	Following commissioning and start-up and operating in steady state data will be available to support whether a reduction in the OIW limit is feasible. Reducing the OIW may result in a small reduction in environmental impact to water quality in the immediate vicinity of the facility.	Although the reduction in environmental impact may be small a review of the limit once operating does not incur any large cost and demonstrates continual improvement and ALARP. It should be noted that regardless of the limit the system will be operated to the lowest practicable OIW concentration that can be achieved based on system design and functionality.	**Yes** **C 7.9**
In-situ plume measurement and analysis of plume dilution and mixing characteristics (including monitoring at approved mixing boundary).	F: Yes, once sufficient PW discharge rates are achieved. CS: Monitoring and implementation costs. Incrementally increases vessel activities within the 500 m PSZ adjacent to the facility with applicable SIMOPS management requirements.	In-situ plume studies confirm the validity of the predicted mixing zone and dilutions from the model. This provides confidence in the ongoing application of the model outputs to understand dilutions of the PW. By using the measured WET testing and chemical	Additional cost is proportionate to the environmental benefit to validate model conservatism used to bound impact assessment. The initiation of this control at Pluto is precautionarily applied from 800 m^3/d rate (23% design capacity) to ensure validation of potential uncertainty of up to 100% of predicted dilutions (in	**Yes** **C 7.10**

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[67]***	***Benefit in Impact/ Risk Reduction***	***Proportionality***	***Control Adopted***
		characterisation results and applying the verified model dilutions as well as water quality monitoring at the approved mixing zone boundary confirms that the EPO has been met.	the absolute worst case) model results predicted at the Montebello Marine Park Multiple Use Zone boundary (416 m). i.e. 3719 worst case dilutions are predicted (averaging >20,000), which is significantly higher than observed WET testing PNEC 1112, 1429 non-routine, or conservative assumption of 2000 dilutions required.	

Risk Based Analysis

Application of Woodside's Risk Management Procedures and implementation of the OMDAMP ensures the routine assessment of PW impacts, identification of changes to discharges, systematic assessment of risks and ongoing assessment/monitoring of discharge streams to reduce risk to ALARP, that includes:

- ongoing hazard identification, risk assessment and the identification of control measures
- ongoing PW discharge monitoring.

Company Values

Corporate values require all personnel at Woodside to comply with appropriate policies, standards, procedures and processes while being accountable for their actions and holding others to account in line with the Woodside Values. As detailed above, the PAP will be undertaken in line with these policies, standards and procedures that include suitable controls to manage PW discharge.

Societal Values

Due to the Petroleum Activities Program's proximity to sensitive receptors and potential uncertainty around PW discharges, the PW discharge consequence rating presents a Decision Type B in accordance with the decision support framework described in Section 2.6.1. Consultation was undertaken for this program to identify the views and concerns of relevant stakeholders, as described in Section 5.

Woodside has sent an Activity Factsheet to all identified relevant stakeholders regarding the PAP (Section 5 and Appendix F), no specific concerns around PW discharge were identified through this process.

ALARP Statement

Based on the environmental risk assessment outcomes and use of the relevant tools appropriate to the decision type, Woodside considers the adopted controls appropriate to manage the impacts of PW discharge. Woodside has undertaken extensive PW process studies, trials (emulsions) and risk-based analysis (PW discharge modelling) to inform the evaluation and assessment of environmental impacts and risks. Woodside also implements a risk-based adaptive OMDAMP. The outcomes of the modelling studies and process engineering have been considered in determining the ALARP position.

As no reasonable additional/alternative controls are currently identified that would further reduce the impacts and risks without grossly disproportionate sacrifice, the impacts are considered ALARP.

Demonstration of Acceptability

To assess and determine the acceptable limits of impacts from PW discharges, Woodside has considered the following criteria, appropriate guidelines, principles of Ecologically Sustainable Development, Company Values and Societal Values.

Other Requirements (includes Laws, Polices, Standards and Conventions)

The adopted controls and acceptability assessment has considered regulatory guidance, in particular WA EPA (2016) Technical Guidance: Protecting the Quality of Western Australia's Marine Environment and the ANZG (2018)

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[67]***	***Benefit in Impact/ Risk Reduction***	***Proportionality***	***Control Adopted***

guidelines. Both sources of Regulatory Guidance provide that environmental values should be identified, and levels of ecological protection should then be set. To ensure ecosystem health is maintained overall, the cumulative size of the areas where lower levels of ecological protection apply should be proportionally small compared to the areas designated high and maximum. The ANZG (2018) guidelines similarly provide guidance that levels of protection should be identified, based on the environmental values to be protected. The Monitoring and Management Framework aligns to the levels of protection described by both WA EPA (2016) Technical Guidance and the ANZG 2018 guidelines through the acceptable limits of change.

The level of ecological protection provided to sensitive receptors is consistent with the North-west Network Management Plan (2018). By monitoring and managing to the 99% species protection safe dilutions, there can be high confidence that any potential for impacts will be detected and managed via the OMDAMP.

The Minamata Convention 2013 (ratified by Australia in 2021) requires measures to be in place to control releases containing mercury or mercury compounds. Each of these measures, with information on how each measure is met for discharges of PW from the facility is provided below:

- *Release limit values to control, and where feasible, reduce releases*. DGV related to mercury are in place and described above.
- *The use of best available techniques and best environmental practices to control releases*. Monitoring via the annual chemical characterisation and OMDAMP provides adaptive management to ensure best environmental practices.
- *A multi pollutant control strategy for mercury releases*. The monitoring framework implemented includes full chemical characterisation and WET testing of discharge stream, which allows understanding of holistic toxicity of the effluent considering all contaminants and potential additive effects.

Principles of Ecologically Sustainable Development

Woodside has established several research projects to understand the marine environments in which we operate, notably in the Exmouth Region and the Kimberley Region, including Rankin Bank, Glomar Shoals, Enfield Canyon and Scott Reef. Woodside's corporate values require that we consider the environment and communities in which we operate when making decisions.

These principles of ESD were considered for this aspect:

- Integration Principle
  - the existing environment (Section 4) has been described consistent with the definition within Regulation 5 of the Environment Regulations (i.e. includes ecological, socioeconomic, and cultural features), and any relevant values and sensitivities have been included within this impact analysis; therefore, the impact assessment process inherently includes economic, environmental and social considerations.
  - Feedback, objections and claims from Relevant Persons were considered, see Appendix F.
- Precautionary Principle
  - the impact consequence rating for this aspect is slight, therefore, potential for serious or irreversible environmental damage is not expected.
  - although serious or irreversible environmental damage is not predicted to occur, there is some scientific uncertainty associated with the produced water composition however it is not expected to change the consequence level and PW will be monitored and managed as per the adopted control measures.
- Intergenerational Principle
  - the acceptable levels were developed consistent with the principles of ESD, including that the environmental impacts and risks of the offshore project will not forego the health, diversity, or productivity of the environment for future generations.
  - as described above, the predicted environmental impact spatially limited to an area around the facility, which is not considered as having the potential to affect ecological integrity. By maintaining ecological integrity the discharge of PW is not considered to have the potential affect intergenerational equity.
- Biodiversity Principle
  - the existing environment identifies and describes relevant MNES, as defined in Regulation 7(3) of the Environment Regulations; any relevant values and sensitivities are included within this impact analysis.
  - as described above, the predicted environmental impact are spatially limited to an area around the facility, which is not considered as having the potential to affect ecological integrity. By maintaining ecological integrity the discharge of PW is not considered to have the potential affect biological diversity.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[67]***	***Benefit in Impact/ Risk Reduction***	***Proportionality***	***Control Adopted***
Woodside looks after the communities and environments where we operate. Risks are inherent in petroleum activities; however, through sound management, systematic application of policies, standards, procedures and processes, Woodside considers that despite this potential impact, the extremely low impact of PW is acceptable. The proposed activity has been assessed and considered in accordance with Australian IUCN Reserve Management Principles, conditions of the class approval (Section 1.9), objectives of the IUCN category VI zone (Section 1.9), the North West Marine Park Management Plan and the values of the Montebello Marine Park. Discharge of PW is acceptable providing that 99% species protection safe dilutions are met at the Montebello Marine Park Multiple User Zone boundary. This removes potential to adversely impact on biodiversity, ecological integrity, social amenity or human health. Activities will not be conducted in a manner inconsistent with the objectives of the respective zones of the Australian Marine Park (AMPs), the principles of the IUCN Area categories or the values of the AMPs. ***Internal Context*** The PAP is consistent with Woodside corporate policies, standards, procedures, and processes as outlined in the Demonstration of ALARP and Environmental Performance Outcomes, including: • Woodside Environment and Biodiversity Policy (Appendix A) • Woodside Risk Management Policy • Woodside Environmental Performance Procedure (which specifies maximum mixing zones and minimum sampling requirements). Woodside corporate values include working sustainably, with respect to the environment and communities in which we operate, listening to internal and external stakeholders (below) and considering HSE when making decisions. ***External Context*** Woodside recognises that its licence to operate from a regulator and societal perspective is based on historical performance, complying with appropriate policies, standards and procedures, and understanding the expectations of external stakeholders. External stakeholder consultation was undertaken with relevant stakeholders (Section 5), prior to the PAP and feedback was incorporated into this EP where appropriate. In particular, the Director of National Parks (DNP) was consulted as part of the five-yearly update for this document. In addition, Woodside undertook additional consultation (2022) specific to PW discharge monitoring and management and other activities including baseline data collection on sediment quality during the engagement process. By providing PW monitoring and control measures that are commensurate with the risk rating, location and sensitivity of the receiving environment (including social and aesthetic values), Woodside believes this addresses broad societal concerns to an acceptable level. ***Acceptability Statement:*** Routine and non-routine discharges of PW have been evaluated as representing potential slight, localised, short-term impacts to water quality, marine sediment, marine fauna and habitat. As per Section 2.6.1, Woodside considers 'high order impacts' (Decision Type B impacts such as PW discharge) as acceptable if ALARP is demonstrated using good industry practice, consideration of company and societal values and RBA, if legislative requirements are met and societal concerns are accounted for, and the alternative control measures are grossly disproportionate to the benefit gained. In addition, acceptability is assessed against the above criteria. The adopted controls are considered good oil-field practice/industry best practice, are consistent with WA EPA (2016), ANZG (2018) and Woodside's internal requirements. Further opportunities to reduce the impacts have been investigated (refer ALARP demonstration) and considered to be grossly disproportionate to the benefit gained. Woodside considers the adopted controls appropriate to manage the impacts of PW discharge to an acceptable level.				

EPOs, EPSs and MCs For Pluto Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 7 No impact to the environment outside of the Approved Mixing Zone from planned discharge of produced water.	**C 5.1** Implement Woodside's Chemical Selection and Assessment Environment Guideline: • Where Gold, Silver, E or D OCNS rating (and no OCNS substitution or product warning), chemicals are selected – no further control required. • If chemicals with a different OCNS rating, sub warning or non-OCNS rated chemicals are required, chemicals will be assessed in accordance with the guideline prior to use.	**PS 5.1** All chemicals intended or likely to be discharged to the marine environment will be assessed and approved prior to use in accordance with the Chemical Selection and Assessment Environment Guideline (described in Section 3.9) to ensure the impacts associated with use are ALARP and acceptable.	**MC 5.1.1** Chemical assessment register demonstrates the chemical selection, assessment and approval process for selected chemicals is followed.
	C 7.1 Monitoring of OIW concentrations in accordance with PARCOM 1997/16 Annex 3 methodology. **C 7.2** Continuous reservoir management during routine operations; i.e., changing the relative contribution to facility production of each well, including choking back high OIW wells, to maintain OIW concentrations below Performance Standard. **C 7.3** Adopting a tertiary and secondary treatment stage to reduce OIW concentration.	**PS 7.1** Limiting average PW OIW during routine operations to less than 30 mg/L (over a 24 hr rolling average. During non-routine production restart and water cut well re-start activities: • limit PW OIW to less than 100 mg/L 24 hr rolling average (<800 m3/day ra.), for the first 7 days following re-starts, OR • limit PW OIW to a 50 mg/L 24 hr rolling average (<1,900 m3/day ra.), for up to 7 days. PW OIW is limited to a 30 mg/L monthly rolling average for all activities. Tertiary coalescing filter separation will be used for all non-routine activities where this aligns with achieving beneficial OIW concentration objectives.	**MC 7.1.1** Records demonstrate OIW rolling average limits are not exceeded during routine and non-routine (production restart and water cut well restarts) activities.

	C 7.4 Implementation of the OMDAMP including: • monitoring of PW discharge volume • chemical characterisation (including mercury) • WET testing triennial sampling to be representative aiming to detect change.	**PS 7.4.1** No impact to the environment from PW discharge outside of the approved mixing zone based on multiple lines of evidence.	**MC 7.4.1** Records show routine monitoring has been conducted. Settling velocity and particle size distribution analysis is proposed as part of the initial monitoring of representative discharge to confirm potential for sediment impacts. Results of these studies will inform if non-routine sediment sampling is required prior to the next routine monitoring event. Further investigations have identified no potential to impact environment from PW outside of acceptable limit.
	C 7.5 Online monitoring and/or procedural controls in place to monitor and control PW discharge volume and OIW concentrations and prevent discharge of PW with high OIW concentrations through OIW analyser, operating procedures, and off-spec/outage procedures.	**PS 7.5.1** Instrumentation integrity will be managed in accordance with SCE Management Procedures (Section 7.4) and SCE Technical Performance Standard(s) to prevent environmental risk related to Damage to SCEs for: • P31 – Environmental Emissions Monitoring and Controls, to: • provide means of detecting environmental releases, emissions and discharges to prevent MEEs from manifesting over time, and/or assure compliance monitoring and reporting equipment • ensure monitoring data is available to control PW discharge volume and OIW concentrations; to prevent discharge of PW with high OIW concentrations.	**MC 1.16.1** Records demonstrate implementation of SCE Technical Performance Standard(s) and Management of Hardware Controls in the Operate Phase Procedure (Section 7.4.2), in order to achieve the functional objective of the control. Records may include implementation and maintain/assure and manage-change information summarised in Section 7.4.2

		PS 7.5.2 Online monitoring and/or procedural controls in place to monitor and control PW discharge volume and OIW concentrations, and prevent discharge of PW with high OIW concentrations by implementing; procedures that includes response measures in the event of: • increasing or off-spec PW OIW readings • loss of signal for two OIW analysers.	**MC 7.5.1** Records demonstrate online and/or manual OIW monitoring, operating procedures in place, and implemented.
	C 7.6 The online analyser is calibrated with a manual sample in accordance with Offshore Laboratory Determination of Oil in Water Standard Operating Procedure.	**PS 7.6** Complete calibrations of online analyser and manual OIW sampling equipment in accordance with Offshore Laboratory Determination of Oil in Water Standard Operating Procedure.	**MC 7.4.1** Records demonstrate manual sampling and calibration undertaken during commissioning activities as appropriate.
	C 7.7 Chemical injection of water clarifier, demulsifier to reduce OIW concentration.	**PS 7.7** PW is chemically treated as required so that OIW is limited to a 30 mg/L 24-hour rolling average.	**MC 7.7.1** Records demonstrate OIW rolling average limits are not exceeded during routine activities.
	C 7.8 Annual review of routine monitoring results and determine requirement for non-routine sediment quality monitoring as per OMDAMP.	**PS 7.8** Complete review of routine monitoring results and determine if contaminants with the potential to impact sediments have increased and whether non routine sediment quality monitoring should be undertaken to determine extent of impacts	**MC 7.8** Records show annual review has been conducted as described.
	C 7.9 Review of continuous improvement measures to determine if 30 mg/ L OIW limit can be reduced further.	**PS 7.9** Complete review to determine whether OIW limit can be reduced in the next five-year revision of the EP.	**MC 7.9** Records show review has been conducted as described.

	C 7.10 In-situ plume measurement and analysis of plume dilution and mixing characteristics (including monitoring at approved mixing boundary) to verify dilutions are achieved.	**PS 7.10** Complete plume verification (once flow is greater than 800 m^3/day average discharge rate for at least eight consecutive weeks) including: • obtain background measurements of surface and sub surface temperature and salinity levels surrounding facility • tracking the plume (using a dye or similar) to quantify the horizontal and vertical plume dilutions achieved under different current conditions. • water quality sampling at approved mixing zone boundary to measure potential contaminant concentrations.	**MC 7.10** Technical report confirms predicted model outputs or mixing zone boundary updated (if required).

6.7.8 Routine and Non-routine Discharges: Drill Cuttings, Drilling Fluids and Well Removal Fluids

Context		
Drilling Activities – Section 3.11.1 Contingent Activities – Section 3.11.5	Physical Environment – Section 4.4 Habitats and Biological Communities – Section 4.5	Consultation – Section 5

Impact Evaluation Summary

Source of Impact	***Environmental Value Potentially Impacted***							***Evaluation***						
	Soil and Groundwater	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/Habitat	Species	Socio-economic	Decision Type	Consequence/Impact	Likelihood	Risk Rating	ALARP Tools	Acceptability	Outcome
Routine discharge of WBM drill cuttings to the seabed and the marine environment		x	x		x			A	E	-	-	GP PJ	Broadly Acceptable	**EPO 8**
Routine discharge of drilling muds (WBM) to the seabed and the marine environment		x	x		x				E					
Non-routine discharge of treated NWBM drill cuttings to the marine environment		x	x		x				D					
Non-routine discharge of wash water from mud pits and vessel tank wash fluids		x	x		x				E					
Routine discharge of well clean-out fluids		x	x		x				E					
Non-routine discharge of well annular fluids		x	x		x				F					

Description of Source of Impact

Drilling Operations

The PAP will involve the drilling of the Xena-03 well, drilled over a period of approximately 60 days (including mobilisation, demobilisation and contingency). Drilling activities generate drill cuttings, require cementing of the casing, and require the use of a range of fluids. Throughout the drilling program several different fluids are to be run through the closed circulation system, including, but not limited to, drilling fluids (water-based muds and non-water-based muds), sea water, and kill-weight brine.

Routine drilling discharges will include:

- drill cuttings
- drilling fluids direct to seabed (WBMs only), retained on cuttings and bulk discharge of mud pits (WBMs only)
- Non-routine drilling discharges may include:
- drill cuttings and fluids generated due to respud or side tracking
- WBM, swarf and cement cuttings
- well abandonment and use of fluids (subsea control, completions and well annular fluids).

Drilling activities are described in Section 3.11.1. The well will be drilled as a series of sections, as detailed in Section 3.11.1. The top hole section of the well will be drilled without a riser in place (i.e., riserless drilling). Drill cuttings and unrecoverable WBMs are discharged at the seabed for the top-hole sections, which are drilled riserless

(i.e., no closed loop with the MODU). This results in a localised area of sediment deposition (known as a cuttings pile) around and in proximity to the well site influenced by prevailing seabed currents.

Upon drilling of the top hole section, a casing will be cemented in place, a BOP installed and a riser put in place between the BOP and the MODU. The riser remains in place during drilling of the bottom hole sections and facilitates the circulation of drilling fluids and cuttings between the well bore and the MODU. This enables cuttings and drilling fluids to be circulated back to the MODU, where the cuttings are separated from the drilling fluids by the solids control equipment (SCEt) and typically re-used in the closed loop system between the well bore and the MODU. The cuttings (with adhered residual fluids) are, in typical circumstances, discharged below the water line, with their fate and dispersion determined by cuttings particle size and the density of the unrecoverable fluids. In contrast the fluids are recirculated into the fluid system where there are a number of mud pits (tanks) on the MODU that provide a capacity to mix, maintain and store fluids required for drilling activities. The mud pits form part of the drilling fluid circulating system and may be discharged at the end of specific well sections, where there is a requirement to change the drilling fluid system or the drilling fluid cannot be re-used (due to deterioration/contamination). Bulk discharge of this type is only permitted for WBMs.

Base oil may be used for inflow testing prior to abandonment of the well, to verify barrier integrity. Base oil would be pumped down the drill string and reverse circulated back to the rig, with fluids collected for disposal onshore. If stored in a mud pit, the base oil and other fluids associated with the test may result in pit wash water contaminated with hydrocarbons. If this is the case, mud pit wash water would be discharged in accordance with requirements in this EP, with a hydrocarbon content <1% by volume. Well abandonment activities are conducted in accordance with Woodside's internal standards.

Drill Cuttings and Fluids

As described above, the primary discharges used as the basis of the impact assessment for this PAP are as follows:

- Drill cuttings: drilling generates drill cuttings due to the breakup of solid material from within the borehole. The resultant drill cuttings are basically rock particles of various shapes, with sizes typically ranging from very fine to very coarse.
- Drilling fluids: serve many purposes including maintaining borehole stability and hydrostatic pressure, reducing friction and cleaning/ cooling of the drill bit, in addition to acting as a medium to carry cuttings from the well bore and return them to the surface at seabed or on the MODU. There are two main types of drilling fluids as follows:
  - WBMs consists mainly of fresh water or seawater with the addition of chemical and mineral additives to aid in its function. Drilling additives typically used may include chlorides (e.g., sodium, potassium), bentonite (clay), cellulose polymers, guar gum, barite or calcium carbonate. These additives are either completely inert in the marine environment, naturally occurring benign materials, or readily biodegradable organic polymers with a very fast rate of biodegradation in the marine environment. Bentonite and guar gum are listed as 'E' category fluids under the OCNS and is included on the Oslo Paris (OSPAR) Commission PLONOR (chemicals that 'pose little or no risk to the environment') list (OSPAR Commission, 2021). WBMs can be discharged to sea as fluids retained on cuttings and as bulk discharge from mud pits.

For the purposes of this impact assessment, the indicative dimensions, discharge locations and approximate drill cuttings and drilling fluid volumes provided in Table 6-20 represent the estimated discharges for the Xena-03 Tie-back activities.

Table 6-20: Estimated discharge of cuttings and volumes of drilling fluids used for Xena-03 Tie-back activities

Well Section Width (Inches)	Cuttings ~volume (m^3)	Drilling Fluid Type	Drilling Fluid ~ volume (m^3)	Hole Section	Discharge Point
42	72	Seawater1 with pre-hydrated bentonite (PHB) sweeps/XC polymer	157	Top hole	Seabed
26	569	Seawater1 with pre-hydrated bentonite (PHB) sweeps/XC polymer	752		
17.5	304	WBM	920	Production hole #1	Surface

	13.5 or 12.25	163	WBM	327	Production hole #2	
	9.875	15	WBM	2640	Reservoir section	
Total planned activities		***591 m³***		***5573 m³***		
Indicative Contingent Activities – NWBM. If NWBM required, these volumes will replace WBM volumes for production hole #2	13.5 or 12.25	163	NWBM	670 (retained fluid on cuttings)	Production hole #2	Surface
Indicative Contingent Activities – one top-hole respud	42" + 26" + 17.5" sections	534	Seawater1 with PHB sweeps/XC polymer for 42"/26" sections. WBM for 17.5" sections.	3030	Top hole + production hole #1	As above for each section
Indicative Contingent Activities – sidetrack one section (WBM or NWBM, not both)	~12.5 - 13.5" section	163	WBM	1590	Production hole #2	Surface
	~12.25 - 13.5" section	163	NWBM	670	Production hole #2	Surface

[1] Seawater volume is not included in the estimated 'drilling fluid volume'.

Subsea – Displacement, Completion and Well-bore Cleanout Fluids

Reservoir drilling and completion fluids are usually brines (i.e. a mixture of seawater or formation water) with additives that can include:

- chlorides (often sodium, potassium or calcium)
- bromides
- hydrate inhibitor (monoethylene glycol (MEG))
- biocide
- oxygen scavenger.

They are designed to have the proper density and flow characteristics to be compatible with the reservoir formation. Completion fluids are used to run well completions, and during wellbore clean up and flowback during drilling.

Wellbore and casing clean-up are required at various stages of the drilling operations so that the contents of the well are free of contaminants before the next stage of drilling. A chemical wellbore cleanout fluid train may be used to remove residual fluids from the wellbore. The wellbore cleanout fluid is usually brine (similar to completion fluid) that can include several chemicals, such as biocide and surfactant. During the clean-up process, fluids are circulated back to the MODU.

Cleanout fluids and completion brine will be captured and stored on the MODU and discharged if oil concentration is less than 1% by volume or returned to shore if discharge requirements cannot be met. Discharge volume would be ~400 m³.

Contingent Drilling Activities

Non-water-based Muds

NWBM are not planned to be used but may be required as a contingency during drilling should the offset history, geohazards assessment and borehole stability studies indicate that NWBM is required to manage well stability to safe levels. Where NWBM is needed to drill a well section, the cuttings from the NWBM drilling fluid system will also pass through a cuttings dryer to reduce the average residual oil on cuttings (OOC) for the well (only sections using NWBM) to ALARP, prior to discharge. In the event of SCE failures, cuttings may be discharged without having passed through the dryer; however, this will only occur for a short duration while the drill string is being moved to a safe location in the

well and existing cuttings are circulated out of hole. A decision will then be made on the case for drilling ahead without the failed SCE, while still meeting residual OOC discharge limits. Drilling ahead while SCE breakdown assessment and repairs occur is a contingent activity subject to additional controls; however, the standard mode of operation for the management of cuttings to ALARP is to treat cuttings through a dryer. An OOC discharge limit of <6.9% on wet cuttings will be averaged over well sections drilled with NWBM for the well.

Should NWBM be used, mud pit residue may be discharged to the sea where the residue contains <1% oil volume. Where the mud pit residue exceeds 1% by volume, the residue will be retained and disposed of onshore.

Base oil and chemicals used in NWBM are assessed in accordance with the Chemical Selection and Assessment Environment Guideline.

Respud

It is unlikely the well would be required to respud. If required, the most likely scenario is that the decision to respud is made during drilling of the top hole section of the well; therefore, the incremental increase in cuttings and fluids discharges is associated with the repeat drilling of the same top hole sections for the respudded well with the same associated discharges. A respud once drilling of the bottom hole sections has commenced is far less likely, given the time and effort already committed to the well. However, if this was to occur, the associated discharges would also be a repeat of the discharges required to re-drill the same sections of the respudded well.

Permanent Plugging Program and Removal of Well Infrastructure

If required as a contingency activity, the base case for permanently plugging the well includes the use of WBM and wet cement and will produce well annulus fluids (residual hydrocarbons and residual produced formation water). These fluids/cuttings will be generated during the well bore clean-out, drilling of existing cement barriers, installation of permanent abandonment barriers, circulation of the annulus and washing out of the mud pit.

Potential additional activities that may be required as part of the PAP includes milling, which will produce metal swarf, drilled cement and formation rock. All of the downhole plugging for permanent abandonment activities are conducted through the marine riser. This is a closed system, meaning there are no planned discharges directly to sea during these activities. Planned discharges of the above fluids are only planned to occur after they have been received on the MODU.

The following describes the source of impact with respect to discharge of clean-up fluids, well kill fluids, grit and flocculent only. See Section 6.7.9 for cement, cementing fluids and subsea control fluids. For the purposes of this impact assessment, the indicative dimensions, discharge locations and approximate volumes are provided in Table 6-21.

Table 6-21: Estimated discharges of solids and volumes of drilling fluids used for contingency plugging and well infrastructure removal

Description	Discharge Point	Discharge	Approximate Solids Discharged (m^3)	Approximate Fluid Discharged (m^3)	Potential Additional Solids (m^3)	Potential Additional Fluid Discharge (m^3)
Drill out cement plug	Below sea level	WBM and cement cuttings	2	1	0	0
Kill well	Below sea level	Well kill fluid	0	0	0	Discharged if oil concentration is less than 1% by volume or returned to shore if discharge requirements cannot be met
End of well discharge	Below sea level	WBM, brine, mud pit and vessel tank was fluids	0	600	0	0

Milling (potential activity using WBM)	Below sea level	WBM, swarf, cement and formation rock	0	0	2 (swarf) 3 (cement) 3.5 (formation rock)	1600
Milling (potential activity using NWBM)	Below sea level	NWBM, swarf, cement and formation rock	0	0	2 (swarf) 3 (cement) 3.5 (formation rock)	5
Mechanical cutting	Within the well, below the mudline	Metal and cement cuttings from well infrastructure and lubrication for the cutting tool	0	0	Negligible volumes may be released to surface sediments if cut is made at or close to the mudline	
ABWJ cutting	Within the well, below the mudline	Flocculant and grit	4 tonnes (planned to be released within the well, above the top permanent plug with small volumes entering sediments at cutting depth)	250 L (planned to be released within the well, above the top permanent plug with small volumes entering sediments at cutting depth)	Small volumes may be released to surface sediments if cut is made at or close to the mudline	

Drilled Cement

Indicative volumes of drilled cement for the well are outlined in Table 6-21. The shallow cement plug will preferentially be drilled out with WBM. The drilling fluids will pass through shakers to remove the cement cuttings from the drilling fluid before discharging the cement cuttings.

Well Annular Fluids

Well annular fluids refer to the fluids that remain in the wellbore, or annular spaces between the casing. They may consist of weighted drilling fluid and cement-contaminated mud, seawater, barite, cement polymer, and may include small amounts of hydrocarbon. Upon wellhead removal small volumes (~1.5 m^3) of fluid exchange between the annular spaces and the ocean may occur. The exchange will not be instantaneous as the annular spaces are small and the fluids are typically heavier than seawater. In the unlikely event routine wellhead removal techniques are unsuccessful, this fluid exchange is expected to occur over time following sufficient corrosion of the wellhead.

The small volumes and non-instantaneous nature of the release of the well annular fluids is expected to result in rapid dilution to a no-effect concentration within metres of the release location.

Well Bore Clean-out and Well Kill Fluids

If permanent plugging activities are required, the well will generally be displaced from well kill brine to viscosified brine, or cleaned, which may include residual annulus fluid. A chemical clean-out pill or fluids train will be circulated between the two fluids. This will result in a discharge of fluids in accordance with Woodside's internal guidelines to ensure the potential impacts of the chemicals selected are acceptable.

Should there be clean-up brine contaminated with base oil or NWBM, it will be captured and stored on the MODU for discharge if oil concentration is less than 1% by volume, or returned to shore if discharge requirements cannot be met.

If well kill fluid fails to be bullhead pumped into the well, reservoir fluids may need to be bled off at the MODU through well control equipment (dedicated bleed off/well test spread). In this event, well control equipment will be used to separate the well kill fluids from the hydrocarbons and direct the hydrocarbons to be flared, vented or incinerated, depending on a number of factors including the volume, weather conditions, and safety requirements as documented in relevant procedures for this activity. The well kill fluids will be captured and stored on the MODU and discharged overboard if oil concentration is less than 1% by volume or returned to shore if discharge requirements cannot be met.

Milling

If permanent plugging activities are required, there is a potential additional activity where the well casing needs to be milled out (up to 100 m). This will produce milled swarf (2 m³), drilled cement cuttings (~3 m³) and formation rock (~3.5 m³) and will preferentially be completed using WBM. There may be instances where NWBM is required for operational purposes to manage well stability to safe levels. The solids from the WBM or NWBM drilling fluid system (including the swarf, drilled cement cuttings and formation rock) will also pass through the shakers, to separate these solids before discharging them. Given the small volumes of solids and only limited drilling into formation rock, no oil on cuttings (OOC) discharge limits have been applied, as would be the case for a drilling activity. The estimated volume of solids discharged with residual NWBM on them is expected to be about 5 m³ (per 100 m milled interval).

Removal (Cutting) of Well Infrastructure (Contingency)

The planned cutting depth for removal of the wellhead is approximately 3–5 m below the mudline. Discharges from cutting of well infrastructure using either an abrasive water jet cutting method of a mechanical cutting tool are therefore expected to be confined predominately within the well and settle on the top of the permanent plug. During final cut through the conductor pipe, small amounts of flocculant and grit will be released below the mudline to sediments immediately surrounding the well.

Should cutting at a shallower depth be required, these discharges may be released to the seabed surface. For the mechanical cutting tool, discharges will be limited to small quantities of metal and cement cuttings from the infrastructure itself as well as small quantities of lubricant. For the abrasive water jet cutting method, discharges include a small amount of grit and flocculant. Depending on the cutting depth, pressure from the jet cutting could push some of the material up to the seabed surface causing localised smothering of benthic communities as well as create localised and temporary increases in turbidity around the well.

Impact Assessment

Potential impacts to environmental values

Routine and non-routine drilling-related discharges may result in the impacts of:

- change in water quality
- change in seabed sediment quality
- change in seabed habitat
- injury/mortality to marine fauna (benthic communities).

Some fluids are discharged at the sea surface (or just below); and some are discharged at the seabed. Due to water depth at the drilling location (177 m), this will determine the exposure pathway, and hence potential impacts and receptors.

Drill Cuttings and Retained Fluids

Water Quality and Planktonic Communities

Drill cuttings and retained drilling fluid discharges are expected to increase turbidity and TSS levels above ambient concentrations above the seabed (top-hole well section) or in the upper surface layers (bottom-hole well sections with discharge below the water line from the MODU). Drill cuttings discharge will be generally intermittent and of short duration (over a total period of about 15 days) during drilling of the well.

Top-hole well section drill cuttings and drilling fluids (WBM) will be discharged at the seabed. The coarser material (drill cuttings) will deposit on the seabed and the finer sediment material (the WBM) will cause localised elevated TSS in the water column above the seabed surrounding the well. This reduction in water quality will be temporary (limited to the operational discharges during drilling) and subject to rapid dispersion and dilution by prevailing seabed currents.

During bottom-hole well sections, when drill cuttings with retained drilling fluids (WBM) are discharged below the water line (from the MODU), the larger particles, representing about 90% of the mass of the solids, form a plume that drops out of suspension in the water column rapidly and, deposits on the seabed. About 10% of the mass of the solids (the fines predominately composed of drilling fluid) form a plume in the upper surface layer (depending on the depth of discharge from the MODU) that will be transported by prevailing currents away from the MODU and is diluted rapidly in the receiving waters (Neff, 2005, 2010). There is a large body of knowledge indicating a discharge of cuttings with adhered fluids diluting rapidly, finding that within 100 m of the discharge point, a drilling cuttings and fluid plume released at the surface will have diluted by a factor of at least 10,000. Further to that, Neff (2005) states that in well-mixed oceans waters, the plume is diluted by more than 100-fold within 10 m of the discharge site.

Dispersion of the cuttings plume is influenced by a number of factors: particle sized distribution of the cuttings and fluids, operational discharge events and rates and metocean conditions such as ocean current speed. The case studies described in Neff (2005) used WBMs and surface current speeds of 0.15–0.3 m/s. As currents in the PAA are expected to be within this range, and WBMs (bulk discharge) will contribute the largest input to elevated TSS/turbidity during drilling discharges, the dispersion extent as determined by Neff (2005) is considered representative for Xena-03 tie-back activities.

Using the widely accepted dilution factor of 10,000 (Neff, 2005), cuttings (and adhered fluids) are expected to reach 100 mg/L TSS within 100 m of the MODU. Using a conservative ocean current speed of 0.1 m/s, these discharges are expected to disperse to 100 mg/L within ~16 minutes.

Given the generally low concentration of TSS outside the immediate vicinity of the discharge point, due to rapid dispersion of sediment and the short period of intermittent discharge, the plume is not expected to have more than a very highly localised reduction in water quality and area of potential ecological impact. It is not predicted to impact productivity of the water column.

The combination of low toxicity and rapid dilution of unrecoverable NWBMs discharged in association with drill cuttings are of little risk of direct toxicity to water-column biota (Neff et al., 2000).

Injury/mortality to planktonic species may occur due to a change in water quality following discharges of drill cuttings and fluids. Impacts to these organisms can be as a product of both physical and chemical alterations of water quality, predominantly in the water column.

As outlined above, using the widely accepted dilution factor of 10,000 (Neff, 2005), cuttings (and adhered fluids) are expected to reach 100 mg/L TSS within 100 m of the MODU over a period of ~16 minutes. Minimal impact to plankton (phytoplankton, zooplankton and meroplankton (larvae of invertebrates and fish) is therefore expected from the discharge of drill cuttings. Neff (2010) explains that the lack of toxicity and low bioaccumulation potential of the drilling muds means that the effects of the discharges are highly localised and are not expected to spread through the food web (of which planktonic species are the basis).

Impacts to zooplankton from turbidity are associated with variations in predator prey dynamics, which favours planktonic feeders over visual feeders (Gophen, 2015), while impacts to phytoplankton occur due to decreases in available light, therefore reducing productivity (Dokulil, 1994).

Jenkins and McKinnon (2006) reported that levels of suspended sediments greater than 500 mg/L are likely to produce a measurable impact upon larvae of most fish species, and that levels of 100 mg/L will affect the larvae of some species if exposed for periods greater than 96 hours. Jenkins and McKinnon (2006) also indicated that levels of 100 mg/L may affect the larvae of several marine invertebrate species, and that fish eggs and larvae are more vulnerable to suspended sediments than older life stages. However, dilution estimates (e.g., Hinwood et al., 1994; Neff, 2005) suggest suspended sediment concentrations caused by the discharge of drill cuttings will be well below the levels required to cause an effect on fish or invertebrate larvae (i.e., predicted levels are well below a 96-hour exposure at 100 mg/L, or instantaneous 500 mg/L exposure), beyond the immediate vicinity of the discharge.

Due to the low levels of planktonic productivity in the offshore area, plankton populations on a regional scale are not expected to be affected by drilling or well abandonment activities. In addition, due to the open nature of the marine environment of the PAA and associated environmental conditions (i.e., windy, strong currents, etc), the content and dispersive nature of drilling muds within the marine environment and the high population replenishment of these organisms, it is expected that impacts to plankton species will be limited to within tens of metres of the discharge point and return to previous conditions within a relatively short period of time. On this basis, the impacts to plankton from routine and non-routine discharges during drilling activities is slight.

Sediment Quality and Benthic Communities

Accumulation of drill cuttings, grit and flocculent on the seabed causes changes in the physical properties of the seabed sediment such as the particle size distribution (PSD), the introduction of contaminants (metals such as barium) from retained drilling fluids (WBM) and associated ecological effects.

The discharge of drill cuttings and unrecoverable fluids at the seabed during riserless top hole drilling results in a localised area of sediment deposition (known as a cuttings pile) surrounding the well site. The cuttings pile distribution may reflect prevailing seabed currents and spread predominately downstream of the well site but overall extent from the well site is typically tens of metres. The dimensions of the cuttings pile depend on several factors, including volume (approximately 641 m^3 of top hole cuttings) and composition of cuttings, and oceanographic conditions at the discharge location. The top hole well section drill cuttings and retained drilling fluids (WBM) to seabed have the greatest impact to sediment quality and modification of the habitat in proximity to the well, as the solids tend to clump and settle rapidly around the discharge point (Neff, 2010).

Indicative components of the WBM system outlined in Section 3.11.2 have a low toxicity. Bentonite and chemicals from the family of XC polymers (xanthan gum or similar) are listed as ‘E’ category fluids under the OCNS and considered to ‘pose little or no risk to the environment’. Metals such as barium from these additives will be present in the drilling fluid, primarily as insoluble mineralised salts, and consequently are not released in significant amounts to the pore water of marine sediments and have low bioavailability to those benthic fauna which may come into contact with the discharged barite (Crecelius et al., 2007; Neff, 2008). The XC polymer and bentonite sweeps have very low toxicities and are considered by OSPAR to pose little or no risk to the environment.

As described above, the bottom hole sections are drilled after the riser is fitted. Cuttings and unrecoverable fluids are discharged below the water line at the MODU site, resulting in drill cuttings and retained drilling fluids rapidly dispersing through the water column. The larger cuttings particles will drop out of suspension and deposit in proximity to the well site (tens to hundreds of metres distance) with potential for localised spreading downstream, while the finer fluid particles will remain in suspension and will be transported further away from the well site, rapidly diluting and eventually depositing over a larger area (hundreds of metres to several kilometres) downstream of the well site. Drill

cuttings from the bottom-hole sections will be smaller in volume (approximately 482 m³, Table 6-20) and as determined by surface discharge, depth of seabed and time to reach seabed, result in an extended area of deposition, but a much thinner cuttings pile depth (IOGP, 2016). The fines associated with the retained drilling fluids or mud pit bulk discharge of WBM will settle over a greater extended distance as a thin, undetectable veneer on the seabed. Predicted impacts for bottom hole cuttings are generally confined to a maximum of 500 m from the discharge point (IOGP, 2016). The final deposition of drill cuttings and drilling fluids is largely determined by seabed depth and the time to drop out of suspension within the water column and deposit on the seabed. This leads to the coarser cuttings material being deposited at a location offset but closest to the well site in an area downstream and a distance of up to several hundreds of metres, with associated ecological effects within this area and the fines (predominately drilling fluids) dispersed over a greater distance from the discharge site, typically several kilometres but with no associated ecological effects.

Benthic organisms below the cuttings pile will be buried and smothered; however, the cuttings pile is expected to be recolonised over time. Ecological impacts to benthic biota are predicted when sediment deposition is equal to or greater than 6.5 mm in thickness (IOGP, 2016). This amount of sediment deposition from top hole and bottom hole cuttings is expected to be confined to within a few hundred metres around the well location, although this depends on the nature of the cuttings, the water depth and currents of the receiving environment (IOGP, 2016). A conservative radius of 500 m representing a zone of potential ecological impact has been applied to each well location for this impact assessment. Mobile benthic fauna, such as demersal fish, may be temporarily displaced from where cuttings discharges accumulate. Furthermore, ecological impacts are not expected for mobile benthic fauna such as crabs and shrimps or pelagic and demersal fish, given their mobility (IOGP, 2016). Balcom et al. (2012) concluded that impacts associated with discharging cuttings and base fluids are minimal, with impacts highly localised to the area of the discharge deposition on the seabed. Changes to benthic communities are normally not severe. Organic enrichment can occur, leading to anoxic conditions in the surface sediments and a loss of infauna species that have a low tolerance to low oxygen concentrations, and to a lesser extent chemical toxicity near the well location. These impacts are highly localised with short-term recovery that may include changes in community composition with the replacement of infauna species that are hypoxia-tolerant (IOGP, 2016). Recovery of affected benthic infauna, epifauna and demersal communities is expected to occur, given the short duration of sediment deposition and the widely represented benthic and demersal community composition.

It is acknowledged that transport of fines (associated with the drilling fluids) will disperse beyond the zone of potential ecological impact but there are no associated ecological effects expected beyond this zone (500 m distance from each well site). Low levels of sediment deposition away from the immediate area of each well site would represent a thin layer of settled drill cuttings and drilling fluids, which will likely be naturally reworked into surface sediment layers through bioturbation (US Environmental Protection Agency, 2000). Metals such as barium from the drilling fluid additives are used as a tracer of dispersion and are typically detected beyond the zone of ecological impact but as discussed for sediment quality (above), the insoluble mineralised salts (the source of barium) have low bioavailability to benthic biota.

Impacts associated with routine and non-routine drilling discharges will be largely limited to an area surrounding the well. The low sensitivity of the benthic communities/habitats within and in the vicinity of the PAA, combined with the low toxicity of WBMs and residual NWBMs, no bulk discharges of NWBM and the highly localised nature and scale of predicted physical impacts to seabed biota, affirm that any predicted impact is considered likely but of a slight environmental consequence.

Australian Marine Parks and KEFs

The Xena-03 Operational Area overlaps the Continental Slope Demersal Fish Communities KEF (Section 4.7) and is located ~1.75 km from the boundary of the Multiple Use Zone (IUCN Category VI) of the Montebello Marine Park. This zone is managed to allow ecologically sustainable use while conserving ecosystems, habitats and native species (Section 4.8). While drill cuttings will be discharged within the KEF, the highly localised turbidity and sediment deposition effects will not affect demersal fish communities, beyond temporary avoidance behaviour for some individual fish. Within the conservatively applied zone of potential ecological impact (500 m radius) burial or smothering of epifauna and infauna will be largely confined to close proximity to the wellhead. Recovery of affected benthic infauna, epifauna and demersal fish communities is expected to occur, given the short duration of sediment deposition and the widely represented benthic and demersal community composition. The small portion of the overall KEF area that overlaps the Xena-03 Operational Area, in combination with the predicted recovery of the affected benthic communities, affirms that any predicted impact is considered to be a slight, short-term effect. Given that the Xena-03 wellhead location is ~5.8 km from the boundary of the Multiple Use Zone, potential for drilling discharges to impact the values of the Montebello Marine Park is not expected.

Cultural Heritage

The Xena-03 Operational Area is located further offshore than the Ancient Coastline at 125 m depth contour KEF (Section 4.7). The Xena-03 Tie-back activities do not pose a risk to Indigenous Cultural features on the Ancient Landscape between the mainland and the Ancient Coastline KEF.

Drilling Fluids (Bulk Discharge)

WBM may be bulk discharged at the end of specific well sections, as described above, where there is a requirement to change the drilling fluid system, or the drilling fluid cannot be re-used (due to deterioration/contamination). A small

quantity of WBM and NWBM residue (<1%) may also be discharged at the sea surface while cleaning the mud pits, typically at the conclusion of drilling activities or when changing between mud types.

Discharge of WBM will result in a buoyant plume of fine materials that will rapidly dilute and decrease in turbidity levels immediately away from the discharge point. WBM samples collected by Jones et al. (2021) from the mud pits just before discharge during the Greater Western Flank-2 drilling campaign were ~90% silt sized (<62.5 µm) with a mean diameter of 12 µm (gel-polymer) and 33 µm (KCl-polymer). Total suspended solid (TSS) levels in the gel-polymer mud and KCl-polymer mud were 257 g/L and 245 g/L respectively. Jones et al. (2021) used an ROV to observe mud pit discharges and reported the discharge to exit the discharge outlet as a jet of material in a distinctive cloud-like plume descending rapidly to the seabed and growing in diameter with increasing depth.

The subsea plume can be expected to disperse over a wide area (up to several kilometres), with no discernible sediment deposition on the seabed and no physical or biological impacts, particularly given the water depth at the drilling location (176 m). Impacts beyond the 500 m zone of ecological impact for the well as described for drill cuttings and retained fluids discharge is not expected.

Subsea – Displacement, Completion and Well-bore Cleanout Fluids

Discharges such as displacement, completion and wellbore cleanout fluids are typically inert and of low toxicity. These fluids are mostly brine, with a small proportion of chemical additives such as surfactants, biocide, corrosion inhibitor, oxygen scavenger, MEG and guar gum. The volume of one wellbore and subsequent discharge volume would be ~400 m^3. Any change to water quality is expected to be localised and temporary. Rapid dilution due to prevailing ocean currents in the open water environment would lead to any changes in water quality such as low toxicity contaminants being temporary (only for the duration of the discharge) and reducing water quality within a short distance of the discharge location.

Removal (Cutting) of Well Infrastructure (Contingency)

The planned cutting depth is approximately 3–5 m below the mudline, therefore discharges from cutting of well infrastructure using either an abrasive water jet cutting method of a mechanical cutting tool are expected to be confined predominately within the well and settle on the top of the permanent plug. During final cut through the conductor pipe, small amounts of flocculent and grit will be released below the mudline to sediments immediately surrounding the well.

Should cutting at a shallower depth be required, however, these discharges may be released to the seabed surface. For the mechanical cutting tool, discharges will be limited to small quantities of metal and cement cuttings from the infrastructure itself as well as small quantities of lubricant. For the abrasive water jet cutting method, discharges include a small amount of grit and flocculent. Depending on the cutting depth, pressure from the jet cutting could push some of the material up to the seabed surface causing localised smothering of benthic communities as well as create localised and temporary increases in turbidity around the well. All chemicals used for infrastructure removal are assessed in accordance with the Woodside Chemical Selection and Assessment Environment Guideline.

Cumulative Impacts

The seabed around the Xena-03 well is in close proximity to other wells and hence the discharge of drill cuttings and drilling fluids from the well may result in cumulative impacts. The benthic habitats and communities that may be impacted by the discharge of drill cuttings and fluids are widely represented in the region and not of high conservation value. The area within which cumulative impacts may occur is relatively small and would be substantially smaller than the area impacted directly by drill cuttings and fluids discharges. Other aspects of the PAP that may impact upon benthic habitats will be localised around the Xena-03 wellhead and subsea infrastructure; hence the potential area impacts by cumulative impacts from other aspects is very small. Recovery is expected to occur through natural processes. Hence cumulative impacts will be slight and of no lasting effect (i.e., Environment Impact – F).

Summary of Potential Impacts to Environmental Values

Given the adopted controls, it is considered that routine discharges of drill cuttings and drilling fluids described will not result in a potential impact greater than slight, short-term impact (less than one year) on species, habitat (but not affecting ecosystems function), physical or biological attributes (i.e., Environment Impact – E).

Demonstration of ALARP

Control Considered	*Control Feasibility (F) and Cost/ Sacrifice (CS)*[68]	*Benefit in Impact/Risk Reduction*	*Proportionality*	*Control Adopted*
Legislation, Codes and Standards				
No additional controls identified.				

[68] Qualitative measure

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[68]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Good Practice				
Implement Woodside's Chemical Selection and Assessment Environment Guideline: • Where Gold/Silver/E/D OCNS rating (and no OCNS substitution or product warning), chemicals are selected – no further control required. • If chemicals with a different OCNS rating, sub warning or non-OCNS rated chemicals are required chemicals will be assessed in accordance with the guideline prior to use.	F: Yes. Routinely implemented to the chemical selection process for Woodside facilities. CS: Minimal cost. Standard practice.	Selection and assessment of chemicals in accordance with the Woodside process, reduces environmental impacts associated with planned chemical discharge.	Control is a WMS requirement – must be adopted.	Yes C 5.1
For Xena-03 Tie-back activities fluids, six-monthly chemical reviews are performed during active drilling campaigns.	F: Yes. CS: Minimal cost. Standard practice.	Regular reviews will ensure chemicals selected for drilling fluids remain ALARP.	Benefits outweigh cost/sacrifice.	Yes C 5.5
Written NWBM justification process followed.	F: Yes. CS: Minimal cost. Standard practice.	The written justification takes onboard the technical need for NWBM use, receiving environment, cost and additional controls that may be required. By undertaking formal assessment, the potential impacts are well understood, allowing for development of control measures to reduce the consequence of NWBM use. This provides an overall environmental benefit.	Benefits outweigh cost/sacrifice.	Yes C 8.1
NWBM base oils selected based on expected toxicity.	F: Yes. CS: Minimal cost.	By selecting a base oil with lower toxicity, the consequence of the release on the environment is reduced.	Benefits outweigh cost/sacrifice.	Yes C 8.2
Backload bulk NWBM or maintain on rig for re-use.	F: Yes. CS: Minimal cost. Standard practice.	By restricting the volume of NWBM for overboard discharge, the consequence of	Benefits outweigh cost/sacrifice.	Yes C 8.3

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[68]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
		the release on the environment is reduced. Although no change in likelihood is provided, the decrease in consequence results in an environmental benefit.		
Bulk operational discharges conducted under MODU's Permit to Work (PTW) system (to operate discharge valves/pumps).	F: Yes. CS: Minimal cost. Standard practice.	The MODU's PTW may slightly reduce the volumes of bulk discharges occurring, but it is unlikely to be significant given that bulk discharges are often operationally required and cannot be eliminated.	Benefits outweigh cost/sacrifice.	Yes C 8.4
Displacement, brine, workover or intervention fluids contaminated with hydrocarbons will be treated prior to discharge or containment. If discharge specification not met, the fluid will be returned to shore.	F: Yes. CS: Minimal cost. Standard practice.	Ensuring <1% oil content will provide a small reduction in consequence when fluids are discharged to the environment.	Benefits outweigh cost/sacrifice.	Yes C 8.5
SCEt used to treat NWBM cuttings prior to discharge.	F: Yes. CS: Minimal – more frequent cuttings sampling and testing.	Achieving average oil on cuttings (sections using NWBM only) discharge limit of 6.9% or less oil on wet cuttings will have a small reduction in consequence.	Benefits outweigh cost/sacrifice.	Yes C 8.6
In event of SCE failure (including auger) while drilling with NWBM, the initial action will be to cease drilling and determine whether to repair SCE or drill ahead until next practicable opportunity to trip out of the hole. If cuttings are discharged during dryer or auger failure, measurement of OOC to occur more frequently from shakers.	F: Yes. CS: Cost and schedule implications due to cessation of drilling.	Ceasing of drilling in the event of equipment failure will allow for time to assess feasibility of drilling ahead while still meeting residual OOC discharge requirements.	Benefits outweigh cost/sacrifice.	Yes C 8.7
Professional Judgement – Eliminate				
No additional controls identified.				
Professional Judgement – Substitute				

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[68]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
No additional controls identified.				
Professional Judgement – Engineered Solution				
Mud pit wash residue will be measured for oil content prior to discharge.	F: Yes. CS: Minimal cost. Standard practice.	Ensuring <1% oil content will provide a small reduction in consequence when residue is discharged to the environment.	Benefits outweigh cost/sacrifice.	Yes C 8.8
WBM drill cuttings returned to the MODU will be processed using SCEt equipment.	F: Yes. CS: Minimal cost. Standard practice.	Limiting the discharge of WBMs through reuse will reduce the consequence of the using WBM.	Benefits outweigh cost/sacrifice.	Yes C 8.9
Drill cuttings returned to the MODU will be discharged below the water line.	F: Yes. CS: Minimal cost. Standard practice.	Discharge of drill cuttings below the water line will reduce carriage and dispersion of cuttings thereby reducing the consequence of cuttings discharges during the Petroleum Activities Programme.	Benefits outweigh cost/sacrifice.	Yes C 8.10
Cuttings reinjection into formation. Cuttings are crushed, slurrified and pumped to a desired geological structure with a suitable seal, below the seabed through an annulus or tubing.	F: No. No concurrent drilling or direct sequential drilling planned which would require cuttings to be stored prior to re-injection. CS: Not considered, control not feasible.	Not considered, control not feasible.	Not considered, control not feasible.	No
Riserless mud recovery (RMR) system to return top hole cuttings/mud from the riserless section of the well to the MODU prior to treatment onboard and discharge from the MODU (below the water line).	F: Not technically feasible due to water depth. CS: Not considered, control not feasible.	Not considered, control not feasible.	Not considered, control not feasible.	No
Riserless Mud Recovery (RMR) system to return top hole cuttings from the riserless section of the well to the MODU prior to transport to an alternative discharge location or back to shore for disposal.	F: Not technically feasible due to water depth. CS: Not considered, control not feasible.	Not considered, control not feasible.	Not considered, control not feasible.	No
Return riser-in-place cuttings for disposal at another marine location or onshore for processing and land disposal (skip and	F: Yes. CS: Primary cost/ sacrifice of this option is the additional handling required in	Compared to adopted control, return riser in place cuttings would achieve a reduction in cuttings/mud	Disproportionate. Given the adopted controls and low current risk rating, the	No

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[68]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
ship) for whole well to reduce risk of benthic disturbance. or Return riser-in-place cuttings for all sections drilled with NWBM for disposal onshore (to reduce potential residual oil on cuttings to environment).	transporting cuttings to alternative disposal location. Particularly the health and safety risks associated with high frequency of support vessel activity alongside the rig and the amount of crane lifting required if a cuttings skip/drilling waste container system were employed. Other cost/sacrifice elements which are considered include: • further treatment required of cuttings onshore to ensure a standard suitable for landfill; Class II disposed locally (e.g., Karratha), Class III landfill requires transport to Geraldton or Perth • increased risk of unplanned vessel collision or loss of cuttings during transfer activities • environmental impact (suspended sediment/ sedimentation) of discharging cuttings at new location and other regulatory approvals possibly also required (e.g., sea dumping permit) • potential halt to drilling activity if transfer operations are delayed due to weather or operational issues • additional environmental impact incurred	discharged (although discharge would still occur during riserless drilling on the basis this control is not adopted) at the well location; however, given current impact assessment and controls adopted, this would not result in a significant reduction on consequence.	high cost/sacrifice outweighs the benefit gained over the duration of the Petroleum Activities Program. Impact assessment has determined no sensitive benthic receptors in the vicinity and a low level of impact potential from overall cuttings/mud discharge therefore benefit to be gained from cuttings/mud recovery is disproportionate to the risks introduced by cuttings relocation (including if an alternative system which doesn't use transport containers was implemented).	

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[68]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
	(air emissions) from vessel use and onshore trucking for transportation of cuttings. • Disposal via landfill and/or treatment does not eliminate an environmental impact. These options have their own impacts and therefore disadvantages if implemented.			
Reduce total drill cuttings by implementing slim well design.	F: No. Slim well design is not considered feasible because the well design is optimised to minimise the size of hole drilled while still being able to reach the targets and meet development objectives safely. CS: Not considered, control not feasible.	Not considered, control not feasible.	Not considered, control not feasible.	No
Water quality and/or sediment monitoring of drill cuttings or drilling fluids to verify impact during activity.	F: Yes. CS: For in-water sampling utilising ROV – time and logistics for tool change out from operational tools to specialised scientific sampling tools. Additional POB to operate ROV and coordinate sampling program. Low ROV availability due to operations can limit time to perform environment monitoring. If additional ROV is required on the MODU, deck space and resources to run/store/service ROV. Resources for sample processing (space/	No environmental benefit would be gained by implementation of monitoring during the activity. Monitoring could be used to inform additional control measures in future drilling activities; however, there is a considerable body of existing scientific literature on potential impacts of drill cuttings and impacts are generally well understood. Furthermore, it is not guaranteed that additional controls would be feasible, or if they would provide any environmental benefit.	Disproportionate Cost/sacrifice outweigh benefit to be gained in the context of existing environment (deep water, open ocean communities with no proximity to sensitive benthic communities or receptors). Although adoption of this control could be used to verify EPOs associated with drilling mud and cutting discharge, alternative controls identified achieve an	No

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[68]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
	equipment/ personnel).		appropriate outcome.	
Use SCE with secondary treatment for NWBM: Thermomechanical systems (to achieve <1% average oil on cuttings).	F: Yes – with associated infrastructure including vessels for offline storage and delivery to thermomechanical dryer. CS: The primary cost/sacrifice of this option is the monetary outlay for acquisition and implementation which is estimated at $800,000 to mobilise, install and demobilise, along with a running cost of about $32,000/day. Other factors considered include: • estimation it would take a minimum of seven months to mobilise, install and commission the system on to the MODU • complex and unfamiliar system to integrate with the rig systems • increased health and safety exposure due to: – crew of nine engineers and technicians required to run the plant – multiple crane lifting operations, during installation, operations and demobilisation – rotating machinery – heat illness	A reduction in consequence would be achieved by reducing the average oil on cuttings discharged.	Disproportionate. Cost/sacrifice outweighs benefit to be gained in the context of existing environment and drilling campaign.	No

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[68]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
	– deck congestion due to large footprint of the plant.			
Time restricted discharge of WBM and/or cuttings to align with tide/current or other oceanographic events.	F: Yes. CS: Disruption to drilling operations in having to stop drilling at time when discharge of WBM and/or cuttings might not be permitted. Additional mud storage volume required.	Given the offshore location, oceanographic changes are unlikely to significantly affect the dispersion of cuttings and therefore no environmental benefit would be gained.	Disproportionate. The cost/sacrifice outweighs the benefit gained – no hard coral or other photosensitive benthic communities in the vicinity of the well to rationalise phased/ timed discharge.	No
ALARP Statement: On the basis of the environmental risk assessment outcomes and use of the relevant tools appropriate to the decision type, Woodside considers the adopted controls appropriate to manage the impacts and risks of drill cuttings and fluids discharges to the marine environment. As no reasonable additional/alternative controls were identified that would further reduce the impacts without grossly disproportionate sacrifice, the impacts and risks are considered ALARP.				
Demonstration of Acceptability				
Acceptability Statement: The impact assessment has determined that, given the adopted controls, routine discharges of drilling cuttings and fluids to the marine environment are unlikely to result in a potential impact greater than slight, short-term impact (less than one year) on species, habitat (but not affecting ecosystems function), cultural heritage, physical or biological attributes. Further opportunities to reduce the impacts and risks have been investigated above. The adopted controls are considered good oil-field practice/industry best practice. The potential impacts and risks are considered broadly acceptable if the adopted controls are implemented. Therefore, Woodside considers the adopted controls appropriate to manage the impacts and risks of these discharges to a level that is broadly acceptable and demonstrates the EPO has been met.				

EPOs, EPSs and MC for Xena-03 Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 8 Impacts from routine and non-routine discharges of drill cuttings, drilling fluids and well removal fluids will be limited to planned impacts and activities described as part of the Petroleum Activities Program.	**C 5.1** Implement Woodside's Chemical Selection and Assessment Environment Guideline: • Where Gold, Silver, E or D OCNS rating (and no OCNS substitution or product warning), chemicals are selected – no further control required. • If chemicals with a different OCNS rating, sub warning or non-OCNS rated chemicals are required, chemicals will	**PS 5.1** All chemicals intended or likely to be discharged to the marine environment will be assessed and approved prior to use in accordance with the Chemical Selection and Assessment Environment Guideline (described in Section 3.9) to ensure the impacts associated with use are ALARP and acceptable.	**MC 5.1.1** Chemical assessment register demonstrates the chemical selection, assessment and approval process for selected chemicals is followed.

EPOs, EPSs and MC for Xena-03 Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	be assessed in accordance with the guideline prior to use.		
	C 5.5 For Xena-03 Tie-back activity fluids, six-monthly chemical reviews are performed during active drilling campaigns.	**PS 5.5** Acceptability of chemicals is re-evaluated to ensure ALARP, and alternatives are considered.	**C 5.5** For Xena-03 Tie-back activity fluids, six-monthly chemical reviews are performed during active drilling campaigns.
	C 8.1 Written NWBM justification process followed.	**PS 8.1** NWBMs only used where written justification process has been followed.	**MC 8.1.1** Records show NWBM justification process has been followed and NWBM only used where technically required.
	C 8.2 NWBM base oils selected based on expected toxicity.	**PS 8.2** Group III base oils used in NWBM.	**MC 8.2.1** Fluid reports demonstrate that only Group III base oils used in NWBM.
	C 8.3 Backload bulk NWBM or maintain on rig for re-use.	**PS 8.3** No overboard disposal of bulk NWBM.	**MC 8.3.1** Incident reports of any unplanned discharges of NWBM.
	C 8.4 Bulk operational discharges conducted under MODU's permit to Work (PTW) system (to operate discharge valves/pumps).	**PS 8.4** Increased level of assurance and verification on bulk operational discharges.	**MC 8.4.1** Environmental inspection records demonstrate that bulk discharges are conducted under the MODU PTW system.
	C 8.5 Displacement, brine, workover or intervention fluids contaminated with hydrocarbons will be treated prior to discharge or contained. If discharge specification not met, the fluid will be returned to shore.	**PS 8.5** Achieve less than 1% by volume oil content before discharge.	**MC 8.5.1** Discharge reports demonstrate contaminated fluids were less than 1% by volume oil content before discharge.
	C 8.6 SCEt used to treat NWBM cuttings prior to discharge.	**PS 8.6** Average OOC (sections using NWBM only) discharge limit of 6.9% or less oil on wet cuttings is achieved.	**MC 8.6.1** Discharge reports confirm the average OOC for the entire well (sections using NWBM only) do not exceed limit.
	C 8.7 In event of SCEt failure (including auger) while drilling with NWBM, the initial action will be to cease drilling and determine whether to repair SCEt or drill ahead until next	**PS 8.7** The decision whether to repair SCEt or drill ahead has considered the estimated time for repairs and the amount of drilling until next planned trip	**MC 8.7.1** Records demonstrate that in the event of auger or cuttings dryer failure (where no redundancy is available), active drilling is initially stopped as

EPOs, EPSs and MC for Xena-03 Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	practicable opportunity to trip out of the hole. If cuttings are discharged during dryer or auger failure, measurement of OOC to occur more frequently from shakers.	out of hole, to ensure the OOC limit is not exceeded.	soon as safe to do so. Evidence of assessment to drill ahead with failed SCEt can be produced. Discharge report confirms the average OOC for the entire well (sections using NWBM only) do not exceed limit.
	C 8.8 Mud pit wash residue will be measured for oil content prior to discharge.	**PS 8.8** Achieve less than 1% by volume oil content before discharge.	**MC 8.8.1** Discharge report demonstrates after pit clean out (for pits potentially contaminated with base oil) that mud pit wash residue was less than 1% by volume oil content before discharge.
	C 8.9 WBM drill cuttings that are returned to the MODU will be processed using SCEt equipment.	**PS 8.9** WBM drill cuttings that are returned to the MODU processed using SCEt equipment allowing reuse of mud prior to discharge.	**MC 8.9.1** Daily drilling reports demonstrate that operational SCEt is in use.
	C 8.10 Drill cuttings returned to the MODU will be discharged below the water line.	**PS 8.10** Cuttings discharged below the water line.	**MC 8.10.1** Inspection records confirm cuttings discharge chute/line below the water line.

6.7.9 Routine and Non-routine Discharges: Cement, Cementing Fluids, Subsea Well Fluids, Unused Bulk Product and Subsea Chemicals from Xena-03 Tie-back Activities

Context		
Xena-03 Drilling and Tie-back Activities – Section 3.11	Physical Environment – Section 4.4 Habitats and Biological Communities – Section 4.5	Consultation – Section 5

Impact Evaluation Summary

Source of Impact	***Environmental Value Potentially Impacted***							***Evaluation***						
	Soil and Groundwater	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/Habitat	Species	Socio-economic	Decision Type	Consequence/Impact	Likelihood	Risk Rating	ALARP Tools	Acceptability	Outcome
Routine discharge of cement and cementing fluids, to the seabed and the marine environment		x	x		x			A	F	-	-	GP PJ	Broadly Acceptable	EPO 9
Routine discharge of subsea well fluids (including BOP and well construction activity control fluids)		x	x		x			A	F	-	-			
Produced/reservoir water disposal		x	x		x			A	F	-	-			
Non-routine discharge of unused bulk products at end of drilling campaign		x	x		x			A	F	-	-			

Description of Source of Impact

Cement, Cementing Fluids, Grout, Subsea Well Fluids and Unused Bulk Products at End of Drilling Campaign

Cementing Fluids, Cement and Grout

Cementing fluids, including cementing mix water, may require discharge to the marine environment under various scenarios during drilling and tie-back activities for the Xena-03 well.

At the commencement of the drilling campaign there may be a requirement to run a cement unit test to ensure the functionality of the cement unit and the cement bulk delivery system prior to performing an actual cement job. This test would result in a small volume of approximately 10 m^3 of cement slurry being discharged at the sea surface. The slurry is usually a mix of cement and water however may contain stabilisers or chemical additives.

When cementing the conductor and surface casings after top hole sections of a well have been drilled, cement must be circulated to the seabed to ensure structural integrity of the well. Excess cement is pumped so that structural integrity is achieved. If the hole is completely in-gauge and there are no downhole losses while pumping the cement, a maximum volume of 80 m^3 is estimated to be circulated to the seabed at the well location, which forms a thin concrete film on the seabed in close proximity to the well.

Wherever possible, the cement line flush volumes are included in the planned cement jobs. After each cement job, leftover cement slurry in the cement pump unit and the surface lines is flushed and discharged to the sea to prevent clogging of the lines and equipment. This is estimated at about 10 m^3 discharged. In the unlikely event a respud event is required it would result in additional cement jobs. Also, in the rare event that the cement products become contaminated, the entire volume (~180 m^3) may need to be discharged to sea.

Cement spacers can be used as part of the cementing process, within the well casing, to assist with cleaning of the casing sections prior to cement flow through. The spacers may consist of either seawater or a mixture of seawater and dye. The dye is used to provide a pre-indicator of cement overflow to the seabed surface, to ensure adequate cement height.

If grout bags are used, after grouting activities at each span site, the downline and pump will need to be purged using seawater. This will result approximately 5 m^3 (downline volume) of grout discharged to the ocean. This flushing is required once per grout site.

Subsea Fluids – Blow Out Preventors (BOP) and Well Construction Activity Control Fluids

Subsea fluids are likely to be released during drilling, including the release of BOP control fluids. Subsea control fluids are water-based hydraulic control fluids used in control systems on the subsea trees and BOPs. The BOP is required, by legislation, to be regularly function tested when subsea.

Subsea control fluids will be discharged during function testing of the BOP on installation and pressure testing.

The BOP is function-tested during assembly and maintenance and during operation on the seabed, as described in Section 3.11. As part of this testing, small volumes of BOP control fluid (generally consisting of water mixed with a glycol based detergent or equivalent water-based anti-corrosive additive) are released to the marine environment.

Each time a pressure and function test is undertaken approximately 3620 L of water-based fluid is released to the marine environment, of this approximately 4% is control fluid additive. BOP operation includes function and pressure testing approximately every 21 days, and a function test (approx. 2665 L) approximately every seven days, excluding the week a pressure test is conducted.

Subsea Fluids – Displacement Fluids

As required throughout activities with the riser connected, the well will be displaced from one drilling fluid system to another. A chemical clean-out pill or fluids train will be circulated between the different fluids. This will result in a discharge of operational fluids in accordance with the Woodside internal guidelines.

Produced/Reservoir Water

If well unloading activities were to occur, a temporary production system water filtration treatment package will be used to treat produced/reservoir water before discharge. Prior to discharging, the fluids are cycled through an oilbond filtration system and gauge tank. Water filtration is standard practice for well unloading operations and the produced water will be treated to meet 30 ppm OIW. Fluids that cannot be treated or flared will be sent onshore in tanks for disposal.

Non-Routine Discharge of Unused Dry Bulk Products at the End of the Drilling Campaign:

Adequate stocks of dry bulk product are required to be stored on the MODU for the duration of the drilling activity for safe operations and well control purposes, as defined in the Woodside Well Control Bridging Document. Approximate quantities typically required are:

- cement: approximately 100 tonnes
- barite: approximately 120 tonnes
- bentonite: approximately 120 tonnes.

At the end of the drilling activity and prior to demobilisation, Woodside is contractually obliged to remove the dry bulk product from the MODU. A number of options for removing excess product from the MODU exist, with the last option being to discharge to the marine environment. Woodside has developed a process to assess all safe and technically feasible options for the excess product before a decision is made to discharge overboard. This includes considering the following options, as described below and illustrated in Figure 6-7:

- Retain products on the MODU to be used for subsequent Woodside drilling activities where the activity is not the last in the Woodside MODU sequence.
- Retain products on the MODU to be used by the next titleholder who has the MODU on hire.
- Transfer to another Woodside contracted MODU operating in the region.
- Transfer to another titleholder-contracted MODU operating in the region.
- Return to shore for onshore storage and/or disposal if a facility is available that is both safe and technically feasible to transfer dry bulk products to.
- Discharge to the marine environment as a slurry as a last resort, if it is concluded that no other options outlined in Figure 6-7 are feasible and that concentrations of mercury and cadmium in barite are <1 mg/kg and <3 mg/kg, respectively.

Woodside's base plan is to retain dry bulk products on board the MODU at the end of the campaign, either for reuse by Woodside (if a subsequent Woodside drilling activity is contracted after the petroleum activity), or transfer the dry bulks to the next titleholder who has the MODU on hire. At the time this EP was written it was not yet confirmed whether Woodside would be contracting the MODU for subsequent petroleum activities or if there was another titleholder who planned to contract it.

If there are no available options to leave the dry bulk products on the MODU, Woodside would look to transfer excess dry bulk product to another MODU operating in the region, either for Woodside use or for another titleholder. MODU schedules and regional activities are closely monitored to identify these transfer opportunities early, allowing sufficient time to coordinate transfer arrangements. At the time this EP was written, it was not yet confirmed if there was another MODU to transfer dry bulk product to, and this opportunity typically presents towards the end of a drilling activity. Woodside has a proven record of transferring dry bulk materials for reuse between operators and offshore facilities within these timeframes.

The backload of dry bulks to shore at the end of the campaign has been explored with Woodside's fluids providers. However, current onshore infrastructure does not support the safe transfer of bulk product at high pressure. When the MODU receives bulk product from a shore base, it involves the pneumatic transfer of product from a lower pressure container/tank to the higher pressure MODU or supply vessel container/tank. However, transfer of bulk product from the MODU to shore would involve the transfer of that material, which is powder, from a high pressure to low pressure mobile tank. These high to low pressure transfers of dry powder carry safety risk as the pressure differential between the two systems can result in an uncontrolled, or rapid fluid flow causing pressure build up, beyond safe limits. Dry bulk products can be transported from shore when initially processed given the manufacturing locations have necessary infrastructure to package bulks in bags for transportation and sale, including bagging machines. These dry bulk products cannot be returned to shore in this same manner. Once the product is transported offshore, it is stored in tanks under high pressure conditions. To return product to shore in the same manner it is initially transported from manufacturing location, the product would need to be high-pressure transferred from the MODU or support vessel tanks to bags, which is not considered to be feasible.

During the PAP Woodside will continue exploring the feasibility of installing appropriate infrastructure including pressure release valves and other transfer equipment to enable safe transfer of dry bulk product to shore.

If reuse of excess bulks for subsequent activities in the region is not possible and no feasible options for safe transfer of dry bulk product are identified by completion of the campaign, excess dry bulk will be discharged to the marine environment in the form of a slurry. This will only occur if it can be demonstrated that there are no other options identified in Figure 6-7. Use and discharge of all chemicals and products will be conducted in line with Woodside's internal guidelines (Section 3.9).

Dry bulk materials generally pose little or no risk to the environment (PLONOR)[69], though barite may contain traces of heavy metals, such as mercury and cadmium. Woodside requires that concentrations of mercury and cadmium in barite be <1 mg/kg and <3 mg/kg, respectively. This conforms to the American Petroleum Institute (API) specification for drilling barite. Heavy metal analysis is conducted on individual batches of stock barite prior to mobilisation offshore. This sampling confirms that heavy metals of concern (cadmium and mercury) are within limits prescribed by API standards.

[69] Barite (as barium sulphate) is on the OSPAR List of Substances Used and Discharged Offshore which are Considered to Pose Little or No Risk to the Environment (PLONOR). The list is available at: https://www.cefas.co.uk/media/p3sbu3bn/ospar-list-of-substances-used-and-discharged-offshore-which-are-considered-to-pose-little-or-no-risk-to-the-environment-plonor-update-2021.pdf.

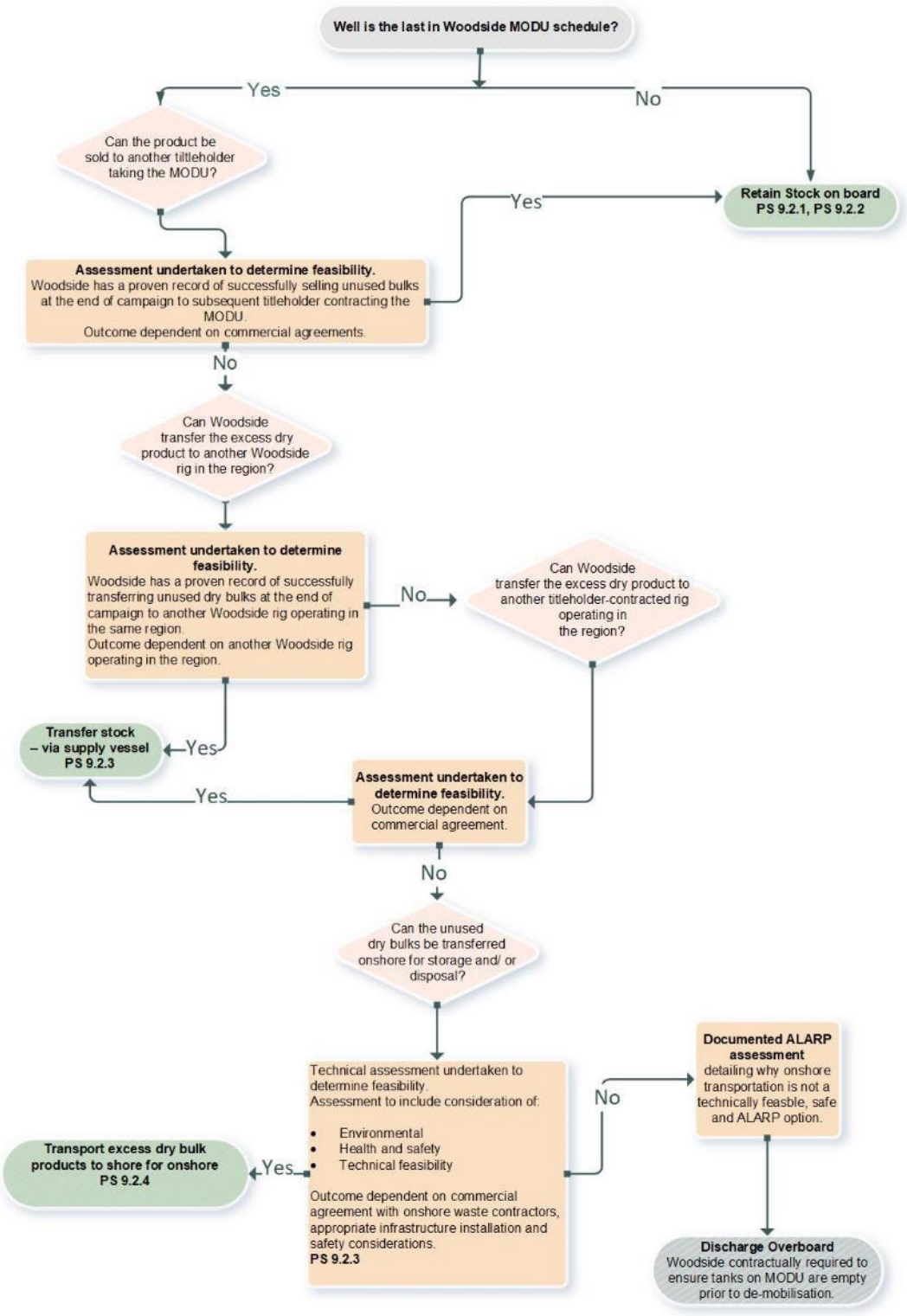


Figure 6-7: Management process for excess bulk product

Impact Assessment

Potential Impacts to Environmental Values

Pelagic and benthic habitats and communities in the Xena-03 Operational Area are considered to be of low sensitivity and reflective of the wider NWMR. No known regionally significant benthic or infauna habitat occur in the area. The

Continental Slope Demersal Fish Communities KEF overlaps the Xena-03 Operational Area (Section 4.7); however, the targeted well location is not located within the KEF. Impacts to values and sensitivities of this KEF are not expected due to the location of the well, small physical footprint of the discharges, coupled with the low toxicity of cementing and subsea fluids used for the Petroleum Activities Program. The likelihood of any significant impact to marine biota is subsequently considered to be low.

Cement and Grout

Sediment Quality and Benthic Communities

Impacts of cement and grout on the marine environment are predominantly associated with localised burial of benthic biota in the direct physical footprint of deposition. Cement operations and grout discharge during drilling involve routine and non-routine discharges that can result in turbidity in the water column. Reduction in water quality will be temporary (limited to the cement operational discharges during drilling) and subject to rapid dispersion and dilution by prevailing currents. Modelling of cement discharges for another offshore project (BP Azerbaijan, 2013) was used because it provides an appropriate, but conservative, comparison of the potential extent of exposure from this activity. In this study, two hours after the start of discharge, plume concentrations were determined to be between 5 and 50 ppm with the horizontal and vertical extents of the plume ~150 m and 10 m, respectively (BP Azerbaijan, 2013). Five hours after ceasing the discharge, modelling indicates that the plume will have dispersed to concentrations <5 ppm.

Cement is the most common material currently used in artificial reefs around the world and is inert. The potential for toxicity is associated with chemical additives that may be added to cement mixtures. Therefore, the toxicity associated with the discharge of cement is limited to the subsurface release of cement (not discharge of slurrified or dry cement). Once the cement has hardened, chemical additives are locked into the cement (Terrens et al., 1998) and not expected to pose any toxicological risk to benthic biota from leaching or direct contact. Most cement discharges that will occur during the drilling activities will be at the seabed during cementing of the casing. Once overspill from cementing activities hardens, the physical sediment properties of the area directly adjacent to the well (10–50 m) will be permanently altered (Terrens et.al., 1998). The potential disturbance area is an estimated 0.007 km^2. Cement discharges at the seabed will overlap with the highest deposition of drill cuttings and drilling fluids. The highly localised physical footprint at the well site is not expected to affect the overall diversity or ecosystem function of the benthic communities of the area.

The potential impacts to benthic communities caused by smothering from a surface release of cement or a seabed release of grout are expected to be significantly less, due to small volumes, intermittent nature of these discharges, and high potential for dispersal by ocean currents. This impact on soft sediment communities is not expected to affect the diversity or ecosystem function in this area and is only considered a short-term impact.

Australian Marine Parks and KEFs

The Xena-03 Operational Area overlaps the Continental Slope Demersal Fish Communities KEF and is located ~1.75 km from the boundary of the Multiple Use Zone (IUCN Category VI) of the Montebello Marine Park. The targeted Xena-03 well location is ~2.5 km from the Continental Slope Demersal Fish Communities KEF and ~5.8 km from the boundary of the Multiple Use Zone. The potential for interaction is limited to a surface release of cement within the overlapping KEF. However, as described above, the surface release of cement or the seabed release of grout will be highly localised around the well location. Recovery of affected demersal fish communities is expected to occur, given the small volume and dispersion, and the widely represented benthic and demersal community composition. The small portion of the overall KEF area that overlaps the Xena-03 Operational Area, in combination with the predicted recovery of the affected benthic communities, affirms that any predicted impact is considered to be a slight, short-term effect. Given that any cement or grout releases to the marine environment will be highly localised to the well location and the distance from the well location to the Multiple Use Zone boundary, potential impact to the values of the Montebello Marine Park is not expected.

Cultural Heritage

The targeted Xena-03 well location (~176 m) and Xena-03 Operational Area is not located within the Ancient Coastline at 125 m depth contour KEF, which extends from the 115–130 m isobath (Section 4.7). The targeted well location is ~4.5 km from the Ancient Coastline at 125 m depth contour KEF, The Xena-03 Tie-back activities do not pose a risk to Indigenous cultural features on the Ancient Landscape between the mainland and the Ancient Coastline KEF.

Cementing Fluids, Subsea Well Fluids (BOP Control Fluids and Well Displacement Fluids) and Other Unused Bulk Products

All chemicals that may be operationally released or discharged to the marine environment by the PAP are evaluated using a defined framework and set of tools to ensure the potential impacts of the chemicals selected are acceptable, ALARP and meet Woodside's expectation for environmental performance. Therefore, any chemicals selected and potentially released are expected to be of low toxicity and biodegradable. Additionally, where cements have been mixed in excess and cannot be reused or returned to shore, these will be turned into a slurry. As chemicals have initially been chosen based on the environmental performance and based on an ALARP assessment, additional dilution prior to discharge further reduces the environment impact to water quality, sediment quality and marine benthic and/or infauna communities. Given the minor quantities of routine and non-routine planned discharges, short

discharge durations and the low toxicity and high dispersion in the open, offshore environment, any impacts on the marine environment are expected to be slight and short-term.

Summary of Potential Impacts to Environmental Values

The overall impact significance level for routine and non-routine discharges of cement, cementing fluids, subsea well fluids and unused bulk product is E based on slight, short-term impact (less than one year) on species, habitat (but not affecting ecosystems function), physical or biological attributes.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost /Sacrifice (CS)[70]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Legislation, Codes and Standards				
No additional controls identified.				
Good Practice				
Implement Woodside's Chemical Selection and Assessment Environment Guideline: • Where Gold/Silver/E/D OCNS rating (and no OCNS substitution or product warning), chemicals are selected – no further control required. • If chemicals with a different OCNS rating, sub warning or non-OCNS rated chemicals are required chemicals will be assessed in accordance with the guideline prior to use.	F: Yes. Routinely implemented to the chemical selection process for Woodside facilities. CS: Minimal cost. Standard practice.	Selection and assessment of chemicals in accordance with the Woodside process, reduces environmental impacts associated with planned chemical discharge.	Control is a WMS requirement – must be adopted.	Yes C 5.1
For Xena-03 Tie-back activity fluids, six-monthly chemical reviews are performed during active drilling campaigns.	F: Yes. CS: Minimal cost. Standard practice.	Regular reviews will ensure chemicals selected for drilling fluids remain ALARP.	Benefits outweigh cost/sacrifice.	Yes C 5.5
Bulk operational discharges conducted under MODU's Permit to Work (PTW) system (to operate discharge valves/pumps).	F: Yes. CS: Minimal cost. Standard practice.	The MODU's PTW may slightly reduce the volumes of bulk discharges occurring, but it is unlikely to be significant given that bulk discharges are	Benefits outweigh cost/sacrifice.	Yes C 8.4

[70] Qualitative measure.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost /Sacrifice (CS)[70]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
		often operationally required and cannot be eliminated.		
Displacement, brine, workover or intervention fluids contaminated with hydrocarbons will be treated prior to discharge or contained. If discharge specification not met the fluid will be returned to shore.	F: Yes. CS: Minimal cost. Standard practice.	Ensuring <1% oil content will provide a small reduction in consequence when fluids are discharged to the environment.	Benefits outweigh cost/sacrifice.	Yes C 8.5
During well unloading and completions activities, if PW is not flared, it will be processed through the well test water treatment package prior to discharge to the environment.	F: Yes. CS: Minimal cost. Standard practice.	Reduced toxicity to the marine environment when discharged.	Benefits outweigh cost/ sacrifice.	Yes C 9.1
Professional Judgement – Eliminate				
Do not use BOP control fluids.	F: No. BOP and xmas tree control fluids are critical to the operation of the BOP and xmas trees. CS: Not considered, control not feasible.	Not considered, control not feasible.	Not considered, control not feasible.	No
Excess dry bulk products will be managed as per Figure 6-7.	F: Yes. However, the cement may not meet the required technical specifications, and hence not be usable. CS: Minor administrative costs associated with coordinating reuse opportunities. Cost savings associated with the re-use or on sell of the dry bulk products. Moderate cost associated with onshore transportation and/ or disposal, if deemed feasible.	Reusing bulk products or identifying an opportunity for it to be returned to shore may eliminate any environmental impacts associated with discharge to the marine environment, where these options are safe and technically feasible. Furthermore, following the process outlined in Figure 6-7 confirms that discharge to the marine environment only occurs when there are no other safe or technically feasible options and therefore when ALARP.	Benefits outweigh cost/sacrifice.	Yes C 9.2

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost /Sacrifice (CS)[70]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Sampling/analysis of stock barite to ensure acceptable levels of heavy metals (i.e., concentrations of mercury and cadmium in barite are <1 mg/kg and <3 mg/kg, respectively).	F: Yes. CS: Minimal cost. Standard practice.	Barite may contain heavy metal such as cadmium and mercury, depending on its geological origin. Limiting the concentrations of cadmium and mercury is consistent with industry good practice. Limiting cadmium and mercury concentrations in barite reduces the environmental risk from discharges of barite to the environment.	Benefits outweigh cost/sacrifice.	Yes C 9.3
Professional Judgement – Substitute				
No additional controls identified.				
Professional Judgement – Engineered Solution				
No additional controls identified.				
ALARP Statement: On the basis of the environmental risk assessment outcomes and use of the relevant tools appropriate to the decision type, Woodside considers the adopted controls appropriate to manage the impacts and risks of cement, cementing fluids, subsea well fluids and unused bulk products. As no reasonable additional/alternative controls were identified that would further reduce the impacts without grossly disproportionate sacrifice, the impacts and risks are considered ALARP.				

Demonstration of Acceptability
Acceptability Statement: The impact assessment has determined that, given the adopted controls, cement, cementing fluids, subsea well fluids and unused bulk products discharges are unlikely to result in an impact greater than slight, short-term impact (less than one year) on species, habitat (but not affecting ecosystems function), physical or biological attributes. Further opportunities to reduce the impacts have been investigated above. The adopted controls are considered good practice. When considering the broader acceptability of the potential impacts consideration has been given to the legislative context, including International Conventions such as the Minamata Convention. Woodside has undertaken an assessment of the PAP and the Minamata Convention (including measures in Article 9(5), and considers that the PAP is not inconsistent with the Minamata Convention. The potential impacts are considered broadly acceptable if the adopted controls are implemented. Therefore, Woodside considers the adopted controls appropriate to manage the impacts of these discharges to a level that is broadly acceptable and demonstrates the EPO will be met.

EPOs, EPSs and MC for Xena-03 Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 9 Impacts from routine and non-routine discharges of cement, cementing fluids,	**C 5.1** Implement Woodside's Chemical Selection and Assessment Environment Guideline:	**PS 5.1** All chemicals intended or likely to be discharged to the marine environment will be assessed and approved prior	**MC 5.1.1** Chemical assessment register demonstrates the chemical selection, assessment and approval

subsea well fluids, unused bulk products and subsea chemicals will be limited to planned impacts and activities described as part of the Petroleum Activities Program.	• Where Gold, Silver, E or D OCNS rating (and no OCNS substitution or product warning), chemicals are selected – no further control required. • If chemicals with a different OCNS rating, sub warning or non-OCNS rated chemicals are required, chemicals will be assessed in accordance with the guideline prior to use.	to use in accordance with the Chemical Selection and Assessment Environment Guideline (described in Section 3.9) to ensure the impacts associated with use are ALARP and acceptable.	process for selected chemicals is followed.
	C 5.5 For Xena-03 Tie-back activity fluids, six-monthly chemical reviews are performed during active drilling campaigns.	**PS 5.5** Acceptability of chemicals is re-evaluated to ensure ALARP, and alternatives are considered.	**C 5.5** For Xena-03 Tie-back activity fluids, six-monthly chemical reviews are performed during active drilling campaigns.
	C 8.4 Bulk operational discharges conducted under MODU's permit to Work (PTW) system (to operate discharge valves/pumps).	**PS 8.4** Increased level of assurance and verification on bulk operational discharges.	**MC 8.4.1** Environmental inspection records demonstrate that bulk discharges are conducted under the MODU PTW system.
	C 8.5 Displacement, brine, workover or intervention fluids contaminated with hydrocarbons will be treated prior to discharge or contained. If discharge specification not met, the fluid will be returned to shore.	**PS 8.5** Achieve less than 1% by volume oil content before discharge.	**MC 8.5.1** Discharge reports demonstrate contaminated fluids were less than 1% by volume oil content before discharge.
	C 9.1 During well unloading and completions activities, if produced water is not flared, it will be processed through the well test water treatment package prior to discharge to the environment.	**PS 9.1.1** Produced water discharged to the marine environment achieves discharge specification of <30 ppm.	**MC 9.1.1** End of Well Discharge Reports demonstrate that formation water met discharge specification.
	C 9.2 Excess dry bulk products will be managed as per Figure 6-7..	**PS 9.2.1** Where the MODU is contracted for a subsequent Woodside drilling activity immediately following the PAP, bulk cement, bentonite and barite is retained on-board for reuse.	**MC 9.2.1** Records demonstrate that if the MODU is contracted for subsequent drilling activity immediately following the PAP, dry bulk cement, bentonite and barite retained on board MODU for reuse at the conclusion of drilling campaign.
		PS 9.2.2 Where activity is last in Woodside MODU schedule, assess feasibility to transfer	**MC 9.2.2** Records demonstrate that where activity is the last in the Woodside MODU

		unused dry bulk cement, bentonite and barite to next titleholder who has the MODU on hire, and/ or transfer to another Woodside or other titleholder-contracted rig operating in the region. If deemed feasible, bulks to be retained on board or transferred for reuse.	schedule, feasibility of transfer of unused dry bulk cement, bentonite and barite to next operator of the MODU, and/ or transfer to another Woodside or other titleholder-contracted rig in the region assessed and implemented if feasible.
		PS 9.2.3 Technical assessment of elimination of dry bulk discharge of barite on completion of drilling campaign undertaken, where options for reuse of bulk products on rig or other rigs in the region (PS 9.2.1, PS 9.2.2) are not feasible. Assessment to consider: • Environmental risk • Health and safety risk • Feasibility and timeframes for onshore disposal.	**MC 9.2.3** Records demonstrate study undertaken where other options for reuse are not applicable.
		PS 9.2.4 No discharge of bulk barite at completion of the drilling campaign, where assessment deems onshore transportation considered technically feasible and ALARP.	**MC 9.2.4** Records demonstrate bulk barite transported onshore where transportation options are feasible and ALARP.
	C 9.3 Sampling/analysis of stock barite to ensure acceptable levels of heavy metals (i.e., concentrations of mercury and cadmium in barite are <1 mg/kg and <3 mg/kg, respectively).	**PS 9.3.1** Sampling/analysis of stock barite to ensure that heavy metals of concern (cadmium and mercury) are within limits prescribed by API standards of: • mercury (Hg): max 1 mg/kg (<1 ppm) dry weight in stock barite • cadmium (cd): max 3 mg/kg (<3p pm) dry weight in stock barite.	**MC 9.3.1** Barite powder test results demonstrate that concentrations of heavy metals within stock barite used during the activity did not exceed: • mercury (Hg): max 1 mg/kg (<1 ppm) dry weight in stock barite • cadmium (cd): max 3 mg/kg (<3 ppm) dry weight in stock barite.

6.7.10 Routine and Non-routine Atmospheric (Direct) and Greenhouse Gas Emissions (Direct and Indirect)

Context		
Utility Systems – Section 3.6 Operational Flaring – Section 3.7.1 Greenhouse Gas Emissions – Section 3.7.4 Vessel-based Xena-03 Drilling and Tie-back Activities – Section 3.11	Physical Environment – Section 4.4	Consultation – Section 5

Impacts and Risks Evaluation Summary

Source of Impact	***Environmental Value Potentially Impacted***								***Evaluation***						
	Soil and Groundwater	Marine Sediment	Water Quality	Air Quality (incl Odour)	Global atmospheric GHG concentration	Ecosystems/Habitat	Species	Socio-economic	Decision Type	Consequence/Impact	Likelihood	Risk Rating	ALARP Tool	Acceptability	Outcome
Operational flaring, exhaust emissions from fuel combustion, fugitive emissions from the Pluto facility				x	x				A	GHG – F Negligible ; Air Quality – F Localised	-	-	LCS GP PJ	Broadly Acceptable	EPO 10
Exhaust emissions from fuel combustion and incinerators on the ASV, MODU, installation and support vessels, and helicopters				x	x										
Contingent MODU flaring (well test non-routine) during well unloading for pressure test and clean up				x	x										
Contingent venting of gas during drilling (e.g., well kick)				x	x										
Consideration of indirect GHG emissions associated with onshore processing, third party transportation, regassification and combustion by end users				x	x				B				LCS GP PJ RBA CV SV	Acceptable if ALARP	

Description of Source of Impact

Air emissions generated during the PAP can be classified into two categories:

- Atmospheric pollutants (non-greenhouse gas emissions) are gases and particulates from an activity, or piece of machinery, which have a recognised adverse effect on human health and/or flora and fauna. The main emissions responsible for these effects include carbon monoxide (CO), oxides of nitrogen (NOx), sulphur

dioxide (SO2), particulate matter less than 10 microns (PM10), non-methane volatile organic compounds (VOCs) including BTEX (benzene, toluene, ethylbenzene and xylenes).

- Greenhouse gas (GHG) emissions. GHG emissions refers to those gases within the atmosphere that absorb long-wave radiation, and thus trap heat reflected from the earth's surface. The main gases associated with this effect include carbon dioxide (CO2), methane (CH4) and nitrous oxide (N2O). Other GHGs include perfluorocarbons (PFCs), hydrofluorocarbons (HFCs) and sulphur hexafluoride (SF6). There are considered to be both direct and indirect GHG emissions.

In this section, atmospheric emissions estimates are developed in line with the National Pollutant Inventory (NPI) emission estimation techniques (EET). GHG emissions are estimated using the National Greenhouse and Energy Reporting (NGER) Measurement Determination 2008 (Cth). The following section has been separated into Direct Emissions (Scope 1 and 2) and Indirect Emissions (Scope 3), aligned with the definitions of the GHG Protocol Corporate Standard (GHG Protocol 2015) and NGERS.

The main sources of GHG emissions associated with the PAP are shown in Table 3-7. GHG emissions sources that are not part of the PAP (e.g. GHG emissions from the onshore processing of Pluto gas) are included for consideration as indirect emissions. In the context of this EP, GHG emissions are classified as direct and indirect emissions, as shown in Table 3-7.

The GHG Protocol 2015 defines indirect GHG emissions as *emissions that are a consequence of the activities of the reporting entity but occur at sources owned or controlled by another entity*. For the purposes of this EP, the "reporting entity" is the Pluto offshore facility and therefore, onshore processing and support vessel/helicopter operations are considered indirect emissions sources.

Climate change is caused by the net global concentration of greenhouse gases in the atmosphere. Human-caused climate change is a consequence of more than a century of net GHG emissions from energy use, land use change, lifestyle patterns of consumption, and production (IPCC 2023). The IPCC has stated that observed increases in GHG concentrations since 1750 leading to climate change are unequivocally caused by human activities and that there is a near linear relationship between cumulative anthropogenic CO_2 emissions and the global warming they cause (IPCC 2023).

Direct Atmospheric and Greenhouse Gas Emissions – Pluto Operations

Direct atmospheric emissions from the Pluto facility during the PAP include emissions from flaring, equipment and generators, fugitives and process vents. Direct emissions and combustion products typically include CO_2, water vapour, NO_x, SO_2, methane, refrigerant gases, particulates and VOCs.

The emissions estimates presented provide a conservative estimate of activities and operations over the next five-year period of the Pluto Facility Operations EP. Direct GHG emissions are estimated to average up to approximately 37,700 t CO_2-e p.a during this period based on facility design values, and consideration for potential maintenance activities and system reliability upsets. Of this, approximately 2,220 t CO_2-e p.a. are predicted to be from methane. This is around 6% of the total.

Variance within the period may occur, due to a number of factors such as reservoir and production system performance outcomes, planned activities including shutdowns and maintenance activities and unplanned reliability events. Emissions estimates below are provided as a reasonable estimate to inform an impact and risk assessment associated with activities requiring emissions to air. Historical emissions are lower than this due to high Pluto-system reliability, limited flaring, and recent installation of the PWH.

Greenhouse gas emissions associated from Xena-03 drilling and tie-back activities is estimated to be approximately 13,300 t CO_2-e.

Atmospheric Emissions – Flaring: Historical Emissions, Prior to Water Handling Module

Prior to the PWH start up, flaring has been the largest source of combustion emissions from the riser platform. The combustion of hydrocarbon gas by flaring is an essential practice, primarily for safety requirements. Operational flaring is comprised of two elements:

- normal operational flaring typically associated with flare system purge and pilot and process flows from produced water separation system
- non-routine flaring that may result from activities such as planned shutdowns, ESD testing and pigging, and unplanned shutdowns and ESDs, production restarts, equipment outage/failures, subsea flowline depressurisation and well remediation activities.

During flaring, the burnt gas generates mainly water vapour and CO2. Gas flaring has the potential to increase the volumes of GHGs emitted to the atmosphere. Flaring also consumes natural gas, a non-renewable resource. The efficiency of the facility flare is estimated to be approximately 98%. Incomplete combustion under certain scenarios may also generate dark smoke.

During normal operations, approximately 540 tonnes of gas are flared per year due to purging and maintenance of a pilot (based on data between 2020 and 2024).

Atmospheric Emissions – Flaring: Water Handling Module Normal Operations

Additional sources have been routed to flare as a result of recent commencement of PWH operations with sources from the produced water degasser and the horizontal induced gas flotation (HIGF) processes. Following full ramp-up of PWH operations, combined continuous low-pressure flows to flare are estimated to result in approximately 3500 tonnes flaring per annum.

Atmospheric Emissions – Intermittent Flaring Required to Operate the Water Handling Module and Integrated Subsea System

It is estimated that intermittent flaring may total approximately 4500 tonnes of gas per year associated with operation of the PWH and integrated subsea system. Flaring will vary as a result of production rates and non-routine activities, outages and shutdowns, and is key to safe operation of the facility and integrity management of the subsea system (particularly pressure management in case of upset to prevent hydrate formation) as outlined in Section 3.7.1.

Atmospheric Emissions – Flaring: Non-routine Flowline Pigging

Flaring to facilitate round-trip pigging of the flowlines is an integral part of operation and maintenance of the facility and occurs as required (approximately once every four years). Non-routine flowline pigging is expected to result in approximately 8300 tonnes of flaring in order to transport flowline pig(s) through the subsea flowline system.

Atmospheric Emissions – Fuel Consumption

Diesel for fuel combustion has been used for the operation of the crane, and survival craft, and main power generation prior to the installation of the water handing module. Diesel usage on the facility (excluding support vessels) between 2016 and 2023 ranged between 202 tonnes and 632 tonnes. The 2016–2017 period (330 tonnes) represented a typical NNC year, while the 2022–2023 period reflects an increased diesel use year as a result of ongoing topside modifications and continuous crewing of the NNC facility associated with the tie-in of the PWH.

Operation of the PWH requires power generation and fuel usage. To accommodate this, installation of the Water Handling Module during 2023 also included installation of a gas engine generator as the main source of power on PLA. Two existing diesel engine generators remain on the platform for backup power generation. When the PWH is operating at design flow rates, the gas engine generator is expected to consume a maximum estimated 147 kg/hr (1286 t/y fuel gas). Diesel use will continue for operation of diesel generators as backup and certain peak demand needs, as well as the crane and survival craft. Since achieving operation of the Water Handling Module gas engine, and completion of crewed offshore project activities, annual emissions from diesel combustion have decreased.

The current arrangement for power generation is:

- gas engine generator
- diesel engine generators.

Grid Stability Module (contingent power supply)

There are several operating conditions that will use various arrangements for power generation as outlined in Table 6-22. Emissions estimates from these different modes and sources are summarised in Table 6-23 and Table 6-24.

Table 6-22: Power generation configuration list

No.	Scenarios	Configuration
1	Uncrewed normal production	Gas Engine Generator priority: • 1 generator online • 2 generators offline standby • 1 grid stability module online
2	Flowline depressurised	Gas Engine Generator priority: • 2 generators online • 1 generator offline standby • 1 grid stability module online
3	Production recovery	
4	Start-up (warm-up) production recovery from ESD	
5	Normal production pumping	
6	Campaign maintenance	
7	Campaign maintenance, UPS discharge test	
8	Shutdown maintenance	

Emissions Estimates

The following sections provide direct emissions estimates associated with annual fuel combustion for power generation, routine and non-routine flaring, and fugitives required in the operation of the Pluto offshore facility.

Table 6-23: Estimated annual atmospheric emissions consumed in operations for power generation

Emission Type	Estimated Annual Emissions from Diesel Combustion	Estimated Total Annual Emissions from Gaseous Fuel Combustion[1]
Source/Fuel	330	1286
CO_2 (t/yr)	1032	3558
CH4 (tCO_2-e/yr)	1	7
N2O (tCO_2-e/yr)	3	2
Total CO_2-e (t/yr)	1036	3567
NO_x (t/yr)	5	120
SO_x (t/yr)	0	0
VOCs (t/yr)	2	3
PM10 (t/yr)	2	0
CO (t/yr)	5	16

[1] Based on combustion of 1286 tonnes of fuel gas required for gas engine generator operation at design capacity.

Table 6-24: Estimated annual atmospheric emissions from routine and non-routine flaring sources

Activity	Routine	Non-routine	
	Routine operations flared gas combustion	Flaring during shutdown, blowdown and start-up events (includes blowdown, warm-up, and infrequent flowline depressurisation)	Estimated emissions from flared gas combustion required for infrequent flowline pigging
Total Gas (t/yr)	3957	4532	8300
CO_2 (t/yr)	10,684	12,236	22,410
CH_4 (tCO_2-e/yr)	526	603	1104
N_2O (tCO_2-e/yr)	103	118	216
Total CO_2-e (t/yr)	11,313	12,957	23,730
NO_x (t/yr)	6	7	12
SO_x (t/yr)	n/a (NPI EETM)		
VOCs (t/yr)	59	68	25
PM10 (t/yr)	n/a (NPI EETM)		
CO (t/yr)	34	39	72

Non-Routine Venting of Process Hydrocarbons via Flare System

During normal operations, hydrocarbon gas is flared via the flare system. The system is maintained to effectively combust hydrocarbons as a critical component for the safe operation of the facility. In the unlikely event that the flare is extinguished or unavailable (such as following a major shutdown prior to system ramp-up or cyclonic wind impact), the hydrocarbon gas discharged via the flare system may initially not be combusted during the period required to maintain safety purge flows to the flare system and intervention to re-establish flare ignition. This may result in the short term (days) low-rate contingent release of hydrocarbon gas to the atmosphere. Intermittent non-routine venting from the riser platform represents only a minor source of atmospheric emissions and is not considered to pose a risk beyond the routine air emissions described in this section.

Fugitive Emissions

Fugitive emissions can occur from pressurised equipment and are inherent in design. Fugitive emissions may occur due to infrequent operational activities or unintentional equipment leaks. Sources can include valves, flanges, pump seals, relief valves, vents, sampling connections, process drains, open-ended lines, casing, tanks, produced water and other potential leak sources from pressurised equipment. Fugitive emissions are quantified and reported as requirements set under the National Greenhouse and Energy Reporting Scheme (NGERS). Fugitive methane

emissions are anticipated to be around 6% of total GHG emissions, which is a very small GHG contributor at Pluto-A as safe operation of the facility relies on the effective containment of hydrocarbons.

This is a conservative estimate based on NGER emissions factors assigned to a shallow water platform, and an upper end estimate of associated methane emissions from PW discharges and conservative flare estimates. The amount of routine and non-routine fugitive methane emissions is considered to be small, and is inherently controlled by design and operations/maintenance practices. The facility has limited topsides processing and relatively few potential leak-points, is well-maintained using good practice operations and maintenance tightness validation. Furthermore, the facility is monitored with safety gas detection systems, and produced water discharges are processed through a degasser to remove associated entrained methane. Facility safety-related controls, produced water operations and implementation strategy measures provide proportional management of potential fugitive emissions for PLA. Potential unplanned hydrocarbon releases to the atmosphere associated with accidents, incidents and emergency situations are described in Sections 6.7 and 6.8). The National Greenhouse and Energy Reporting (Measurement) Determination 2008 estimates fugitive emissions based on typical 'shallow water offshore platforms' to be 1777 t CO_2-e/yr of methane and 7 t CO_2-e/yr of carbon dioxide (with very minor variations depending on facility gas composition). Fugitive emissions associated with produced water production at the PWH maximum design rate is estimated to be up to approximately 1140 t CO_2-e/yr based on accepted NGERs methodologies. Discrete relatively small volumes of packed gases and charged systems, including non-ozone depleting refrigerant gases, are used across the facility and vessels which have potential for small volume leaks (typically less than 100 kg per isolatable inventory). Such gases are used in the HVAC and refrigerant systems on the facility and vessels.

The facility is fitted with several portable fire extinguishing units utilising CO_2. The facility does not have any gaseous fire extinguishing systems containing synthetic GHGs or ozone depleting substances.

Historical Emissions

An historical 5-year emissions summary is provided in Table 6-25 which support the conservative representation of forecast emissions envelope presented above. Historical data illustrates Pluto offshore facility emissions through a period with stable and optimised Pluto-system reliability, includes offshore PWH construction and crewed offshore maintenance campaigns, and commencement of commissioning of the PWH gas engine and produced water handling system. Only a limited duration of wet-flowline operational mode, and very low produced water discharge ramp-up occurred during this period (early 2024).

Table 6-25: 5-year Pluto offshore GHG (NGERS) emissions summary (Direct)

Source	Pluto Offshore GHG Emissions Summary (NGERS)				
Financial year	FY2020	FY2021	FY2022	FY2023	FY2024
Flared Gas (t)	527	1,227	559	710	1,854
CO_2 (t)	1,423	3,314	1,511	1,917	5,006
CH_4 (tCO_2-e)	53	163	74	94	247
N_2O (tCO_2-e)	16	32	15	18	48
Diesel consumed (kL)	239	502	576	762	263
CO_2 (t)	645	1,353	1,553	2,056	708
CH_4 (tCO_2-e)	1	2	2	3	1
N_2O (tCO_2-e)	2	4	4	6	2
Fuel gas (Sm3)	N/A			820	362,791
CO_2 (t)				2	733
CH_4 (tCO_2-e)				0	1
N_2O (tCO_2-e)				0	0
Electricity Generation (MWhr)	1,180	1,246	1,337	1,304	2,293

Offshore Platform Fugitives (tCO_2-e)	N/A		1,776	1,775	1,777
Produced Water Fugitives (tCO_2-e)	N/A				10
Other (tCO_2-e)	4	9	10	10	7
Total (tCO_2-e)	2,144	4,877	4,945	5,882	8,541

Indirect Emissions

Tie-back Activities: MODU, Vessel and Helicopter Operations

Atmospheric emissions during tie-back activities are generated by installation and support vessels from internal combustion engines (including all equipment and generators) and incineration activities (including onboard incinerators) during the PAP for standard operations, excluding drilling waste.

Atmospheric emissions generated during these operations will include SO_x, NO_x, particulates and VOCs. SOx and particulate matter emissions are heavily influenced by the fuel used and its relative sulphur content, MGO usually having a lower sulphite content than marine diesel oil (MDO) or heavy fuel oil (HFO).

NO_2 emissions from routine MODU power generation for an offshore project were modelled previously by another operator (BP Azerbaijan, 2013). NO_2 was the focus of the modelling, on account of the larger predicted emission volumes compared to the other atmospheric emissions, and the potential for NO_2 to impact on human health (as a proxy for environmental receptors). The model demonstrated that atmospheric emissions generated by MODU operations may increase ambient NO_2 concentrations by 1 µg/m³ (0.001 ppm) within 10 km of the source and 0.1 µg/m³ (0.0001 ppm) within 40 km of the source. This represents an increase of 2% over typical background concentrations within 40 km, with air quality remaining well below the WHO air quality guideline for NO_2 of 40 µg/m³ annual mean. As NO_2 is the main emission that poses a threat to receptor health, it is considered conservative to use the above studies to justify potential impacts to receptors. As such, studies into the attenuation of other gasses emitted are not evaluated.

A moored MODU may be used for the drilling campaign resulting in less fuel needed for station keeping, however a hybrid MODU may be used. Other vessels required for the PAP (e.g. installation vessels) may use DP to conduct installation or intervention activities. Based on fuel consumption information from the DPS-1 MODU on previous Woodside drilling campaigns and the expected activity duration plus mobilisation, it is estimated that a hybrid MODU will consume approximately 44 t/d of fuel when compared to similar scenarios. Based on the information available it is expected that up to approximately 2640 tonnes of fuel may be used from MODU activities (60 total days for the drilling and completions of the single well). Other DP vessels associated with the subsea installation and contingent well intervention activities may use up to 315 t (based on 21 days and a rate of 15 t/day). GHG emissions from the MODU, vessel and helicopter operations are expected to be approximately 8042 t CO_2-e.

Support vessels, refuelling vessel and helicopters will support the Petroleum Activities Program, although emissions produced will be substantially less than those produced by the MODU/installation vessels. Total fuel consumption for support vessel activities (based on four general offshore supply vessels on standby at 2.5 t/day) is expected to be up to 1669 tCO_2-e for anchor handling, drilling activities, subsea installation, well start-up and contingent well intervention activities. Helicopter operations during drilling activities may consume up to 84 tCO_2-e, based on ~1.5 t/day. The potential for multiple helicopter runs has been considered in GHG emissions summations.

Well Kick

During drilling of the well and contingent well intervention activities, a kick may occur. A kick is an undesirable influx of formation fluid into the wellbore. The resultant effect would be a release of a small volume of GHGs via the degasser to the atmosphere during well control operations, known as ‘venting’. Venting is required to ensure well integrity is maintained in the event of a kick thereby avoiding an emergency condition. The total estimated, expected volume of GHG emissions from well kicks and venting is estimated to be approximately 378 tCO_2-e.

Well Flowback (Flaring) and Contingency Activities (Venting)

The preferred well unloading method for the tie-back activities is to direct all fluids to the onshore LNP plant via the Pluto facility. However, if this activity is not practicable, contingent well unloading to the MODU may result in gas, condensate, base oil and methanol in the wellbore to be flared and efficiently burned. The flare may be extinguished due to water ingress, lack of pilot (propane), weather impact or equipment failure resulting in cold venting of gas from the flare for several minutes. After the objectives of the well testing and flowback are achieved, the flow is stopped and the well may be cleaned using a brine that can include several chemicals, such as biocide and surfactant. Across approximately 48 hours a volume of ~31 mmscf of gas, 534 bbl condensate may be flared, or 1918 tCO_2-e.

Mud Degassing

Methane emissions may be released during the period of intersection with the reservoir. Small amounts of gases such as methane may dissolve in drilling fluids and be released to the atmosphere as fluids are degassed and recirculated. These emissions have been estimated using American Petroleum Institute factors and are negligible over the activity.

Venting of Residual Gas

During well intervention activities there are several scenarios that may cause small amounts of gas to be vented directly to atmosphere in an intrinsically safe manner via the choke manifold onboard the WIV. Due to the small quantities of gas, it is not viable to flare this gas. These sources of direct gas emissions include:

- Riser disconnect – Riser will be disconnected at the end of well intervention activities. Pressurised gas will be vented to the atmosphere.
- Wireline tool string and tool change – During the well intervention activities, it is estimated that there will be three to five tool changes per well requiring intervention. Tool changes will cause a small quantity of venting to the atmosphere via the wireline lubricator.
- Surface returns – Small volumes of hydrocarbon gas from annular spaces will be cold vented via a choke manifold in a controlled and safe manner from the WIV.

Table 6-26: Greenhouse gas emissions and sources associated with tie-back activities

Source	GHG Emissions (t CO_2-e)
Anchor Handling Activities	
Anchor Handling Operations	273
Support Vessel (Anchor Handling)	136
MODU Activities	
MODU Operations	7140
Support Vessel (MODU Operations)	818
Helicopter Operations	84
Subsea Installation Activities	
Primary Installation Vessel Operations	858
Support Vessel (PIV Operations)	286
Well Start-up and Performance Testing	
Support Vessel	286
Contingent Scenarios – Intervention/IMMR Activities	
Intervention Vessel/IMMR Vessel	858
Support Vessel Operations	143
Contingent Flaring	4
Well Kick and Flowback	1918
Vented Per Well	378
Venting – Riser Disconnect (~1800 PSI)	176
Venting – Tool Change (5 changes)	<1
Venting – Surface Returns	<1
Venting – Removal of Tree Cap	<1

Greenhouse Gas and Atmospheric Emissions associated with Support Vessels and Helicopters

Indirect GHG and atmospheric emissions will be generated by various support vessels, and helicopters supporting Pluto. Vessel emissions include those from internal combustion engines and fugitives. Incinerators may be used onboard vessels to dispose of flammable domestic wastes such as cardboard. Incinerators are typically used infrequently, with wastes generally segregated and transported to shore for disposal.

The figures provided below are estimates of key vessel and helicopter emissions. Atmospheric and GHG emissions from support vessels vary depending on the nature of activities being undertaken; for example, travelling or “steaming”

to a destination at low speed uses less fuel and generates lower atmospheric and GHG emissions than high speed steaming. Emissions generated during safety related vessel standby activities, holding station using DP during loading and unloading of materials to the facility or undertaking subsea IMMR work also vary. PLA is not expected to require routine vessel support except on occasion when an intervention visit is required (planned or reactive maintenance). This is estimated to occur as frequently as eight times per year.

Vessel Masters control day to day operations that determine support vessel emissions. Woodside has the potential to influence fleet level approaches to support vessel emissions through contracting activities. Refrigerant gases are used onboard supply vessels in small quantities.

Expected annual GHG emissions for vessel and helicopter activities have been estimated to be:

- 827 tCO_2-e for support vessels, based on MDO consumption
- 1035 tCO_2-e for IMMR vessels, based on MDO consumption
- 80 tCO_2-e for helicopters, based on Jet A1 fuel consumption.

Indirect emissions from these sources are expected to be relatively constant throughout the EP period.

Greenhouse Gas Emissions associated with Accommodation Support Vessels

Accommodation support vessels generate emissions dependent on several factors, including sea state conditions, size of the vessel, environmental conditions as well as crewing and activity requirements. It is expected that fuel requirements depend on these factors, ranging from ~6 to ~48 tonnes per day. Estimated ASV GHG emissions is approximately 12,760 tCO_2-e for ASVs, based on a 90-day campaign.

GHG Emissions Associated with Processing Onshore and Product End-use Associated with Pluto

Indirect emissions associated with Pluto Operations result from hydrocarbon processing (onshore), third party transport of products, regassification, distribution and combustion by end users. Key influences impacting indirect GHG associated with Pluto production include:

- Total production – indirect emissions are proportional to total production, which varies reservoir, well and production system performance, maintenance and shutdown activities, and well tie-backs and technical and commercial operating requirements.
- Composition of produced gas – such as variability due to technical constraints, inert gas optimisation, and separation of reservoir CO_2.

Downstream feed gas and product demands – the proportion of hydrocarbons attributed to Pluto sold as LNG, condensate, domestic gas and other products varies. Each product requires differing amounts of energy to process to the point of sale and varies based on reservoir composition, field contribution and commercial reasons.

End location, and use of sold products by third parties varies with national and international pathways for valuable energy and resource produces. Wide potential for end use of sold products can result in variable emissions intensities.

For the purposes of framing potential indirect emissions, the total assumed GHG emissions associated with annual production and from transport and customer combustion are estimated in Table 6-27. Estimates are conservatively framed, as they do not include possible abatement or offsets applied voluntarily or through regulatory mechanisms in Australia and across the value chain and product lifecycle, including international. Indirect atmospheric emissions (non-GHG) are discussed in Section **Error! Reference source not found.**.

Table 6-27: Estimated direct and potential indirect GHG emissions associated with Pluto offshore activity production

Source of Emissions	Annual Estimated Emissions (MtCO2-e)	Total Possible Emissions for EP Period (MtCO2-e)
Direct Emissions		
Pluto offshore operations (including fuel, flaring and fugitives)	0.038	0.189
Indirect Emissions		
Project vessels, MODU and helicopters during XNA03 drilling, installation, hook-up and commissioning	0.013	0.013
Vessels and helicopters during operations	0.002	0.01
Onshore hydrocarbon processing[1]	2.36	9.52
Third-party transport of products, regassification, distribution and end use[2]	23.1	91.3

[1] *Estimated onshore processing emissions envelope based on potential positive reservoir and production outcomes, processed through onshore PLP and KGP LNG facilities. Typical of most oil and gas activities, reservoir performance carries a wide uncertainty range, and production varies with market demand and downstream processing performance. The annual estimated emissions presented in Table 6-27 represent the year with highest expected production/GHG emissions in the duration of the five years prior to acceptance of this EP. Total emissions presented do not consider net reduction by way of voluntary and regulatory abatement/offsets.*

[2] *Source: EcoInvent 3.5 database and National Greenhouse and Energy Reporting (Measurement) Determination 2008. EcoInvent v3.5 represents a large collection of inventory data, used as an approximation of third-party lifecycle LNG use for cargos delivered to China. It has been recognised as emission factor source for the European Union Renewable Energy Direction greenhouse gas methodology and is aligned to the principles of the NGERS methodology. Total emissions presented do not consider potential third-party net reduction by way of voluntary and regulatory abatement/offsets.*

The precise shape and pace of the energy transition is uncertain. It is expected to vary across countries because they have different starting points, development requirements, resources and capabilities. However, the scale of the transition is clearer, as it will take many trillions of dollars, invested over decades. Today, Woodside has a portfolio of oil and gas assets. We are also diversifying our portfolio by investing in new energy products and lower carbon services that can avoid or reduce customer emissions. We see an ongoing role for gas from the Pluto facility to support our customers' plans to secure their energy needs, while they reduce their emissions.

Impact/Risk Assessment

Air Quality

Facility, tie-back activities and vessel routine and non-routine emissions, predominantly flaring, have the potential to result in localised, temporary reduction in air quality, generation of dark smoke and contribution to GHG emissions. Potential impacts of emissions depend on the nature of the emissions, as well as the location and nature of the receiving environment.

Facility design (including the rapidly dispersive characteristics of the gas turbine exhausts, flare and other emissions), the estimated level of pollutants in the emissions, and the absence of elevated background ambient levels have been considered in estimating the potential for interaction with human and environmental sensitivities. The PAA is in a remote offshore location, with no expected adverse interaction with populated areas or sensitive environmental receptors associated with air emissions.

The PAA overlaps the breeding BIA for the wedge-tailed shearwater, roseate tern, and fairy tern (see Section **Error! Reference source not found.**); as such, these seabirds may occur near to the facility airshed. Birds (including migratory birds) are also known to opportunistically roost on the riser platform. Given the highly dispersed nature of facility air emissions, no adverse impacts to birds are anticipated due to air emissions.

Potential impacts are expected to be temporary, localised air quality changes, limited to the airshed local to the riser platform. Air emission impacts are not expected to have direct or cumulative impacts on sensitive environmental receptors, or above National Environmental Protection (Ambient Air Quality) measures and are expected to disperse well before reaching the nearest populated area (Dampier).

The flare and potential black smoke resulting from emissions may impact visual amenity. The offshore location of the Platform is not directly visible from the nearest landfall (Montebello Islands, 43 km south). Hence, no impacts to visual amenity for residential communities are expected. Visual amenity impairment to tourism activities is not expected.

Management and Abatement

Woodside's requirements for GHG emissions in the operate phase is applied to continue the identification and evaluation of emission reduction opportunities. These include application of the Emissions and Energy Management Procedure (Section 7.2.11) and the Production Optimisation and Opportunity Management Procedure (POOMP) (Section 7.2.11.1) to enable continued reduction of direct GHG emissions to ALARP. This includes a system of continual review and improvement of key emissions sources from the Pluto facility (which includes the Pluto offshore operations), and ongoing identification, screening and implementation of opportunities to reduce emissions.

During operate phase, Woodside's Flare Management Framework and Woodside's methane Management strategy will also be implemented. This includes setting of annual flare and emissions targets for the asset, and annual execution of asset-specific Methane Action Plans, with discrete activities consistent with the principles of OGMP2.0 and OGCI's Aiming for Zero Methane emissions initiative to reduce emissions to ALARP.

Net-Emissions limits under the Federal Safeguard Mechanism (SGM)[71]

[71] Further information about the SGM and SGM Baselines can be found at the Clean Energy Regulator website: https://cer.gov.au/schemes/safeguard-mechanism and https://cer.gov.au/schemes/safeguard-mechanism/safeguard-baselines

The Federal Safeguard Mechanism (SGM)[72] requires Australia's highest greenhouse gas emitting facilities to reduce or limit their emissions in line with Australia's emission reduction targets of 43% below 2005 levels by 2030 and net zero by 2050. Direct and indirect GHG emissions associated with onshore processing of gas at the Pluto facility, as well as indirect emissions associated with the transportation and end use of gas within Australian safeguard facilities are subject to the SGM, and net emissions from these sources must be kept below a specified limit or baseline.

Safeguard facilities that exceed their baseline must manage their excess emissions, such as by surrendering Australian Carbon Credit Units (ACCUs) or Safeguard Mechanism Credits (SMCs), which are representative of one tonne of CO2-e per credit, so that net emissions are brought in line with the baseline. So that sufficient credits are available and that there is a means to comply, safeguard facilities that exceed their baseline are able to buy Government-held ACCUs from the Clean Energy Regulator via the Cost Containment Measure implemented as part of recent reforms.

Safeguard Mechanism (SGM) obligations for the Pluto facility will be met by emissions abatement via operational controls as first preference. Options to manage residual net emissions in excess of baseline include surrendering ACCUs or SMCs, applying to become a trade-exposed baseline-adjusted facility, applying to borrow baseline from the following year or applying for a multi-year monitoring period. Surrendered carbon credits may be generated from Woodside projects, purchased from the market or purchased from the Government through the Cost-Containment Mechanism.

NGERS requires Woodside to report on GHG emissions and energy use from activities which are under its operational control and includes continued reporting for the Pluto offshore and onshore facility in accordance with its requirements under the NGERS Act.

Carbon Management – Business Context

Woodside established a Carbon Business in 2018 in order to develop a portfolio of carbon credits and skills and expertise in managing carbon credit integrity. Total expenditure to date has been split between approximately one-third on origination of new Woodside projects, and the remainder on purchase of credits. In the future, focus is expected to shift towards project origination.

Woodside recognises that assessing integrity of carbon credits and managing a diverse portfolio of credits is important. In addition to regulatory requirements associated with the SGM, management of carbon credits is informed by current and emerging external frameworks such as the Integrity Council for the Voluntary Carbon Market's Core Carbon Principles, the Investor Group on Climate Change's guidance, and the Oxford Principles for Net Zero Aligned Offsetting. More information on Woodside's approach and management of carbon credits can be found in section 3.4 of the 2023 Climate Transition Action Plan.

Woodside Climate Targets

Woodside is targeting a reduction of net equity Scope 1 and 2 GHG emissions of 15% by 2025 and 30% by 2030, with an aspiration of net zero by 2050 or sooner. The net equity Scope 1 and 2 emissions reduction targets are relative to a starting base of 6.32 MtCO2-e which is representative of the gross annual average equity Scope 1 and 2 GHG emissions over 2016-2020. This starting base may be adjusted (up or down) for potential equity changes in producing or sanctioned assets with a final investment decision prior to 2021. Net equity emissions include the utilisation of carbon credits as offsets.

The targets mean that total portfolio net equity Scope 1 and 2 emissions for the 12 month period ending December 2025 are targeted to be 15% lower than the starting base, and that net equity Scope 1 and 2 emissions for the 12 months period ending 31 December 2030 are targeted to be 30% lower than the starting base.

There is no direct mapping of these corporate level Scope 1 targets to Pluto operations. Abatement of these emissions may come from other facilities with more cost-effective or impactful abatement opportunities, or from offsets. Meeting these targets may mean additional net voluntary abatement beyond that required by the SGM described above.

Data on broader GHG emissions, such as Scope 3 emissions and progress against corporate targets and commitments, will be published as part of Woodside's annual disclosures.

Other regulatory framework for management of Indirect GHG emissions from onshore processing

As described above, indirect GHG emissions will be generated by the onshore processing of gas from the Pluto facility. Onshore processing facilities are also subject to GHG emissions management frameworks and relevant Regulatory approvals.

Ministerial Statement 757 required the development of a Greenhouse Gas Abatement Program for Pluto (Pluto GGAP), prior to the commencement of construction, in order to:

- ensure that the plant is designed and operated in a manner which achieves reductions in GHG emissions as far as practicable

[72] Further information about the SGM and SGM Baselines can be found at the Clean Energy Regulator website: https://cer.gov.au/schemes/safeguard-mechanism and https://cer.gov.au/schemes/safeguard-mechanism/safeguard-baselines

- provide for onshore GHG emissions reductions over time
- ensure that through the use of best practice, the total net GHG emissions and/or GHG emissions per unit of product from the project are minimised.

The Pluto GGAP for the initial Pluto train 1 development was updated to incorporate Pluto train 2 and included interim and long term emission reduction targets approved by the Minister for Environment in August 2021. Ministerial Statement 1208, issued in August 2023, updates the Greenhouse Gas Abatement conditions from Ministerial Statement 757 and includes net GHG emission limits reflected in the approved Pluto GGAP targets in addition to ongoing review and reporting of GHG emissions and updates to the Pluto GGAP. The Pluto GGAP Revision 3A is currently applicable and in-force under MS1208 and is subject to annual compliance reporting provided to the WA EPA and published on the Woodside website – Pluto LNG Environmental Compliance Reporting[73].

On 15 October 2024, the WA State Government released its updated greenhouse gas emissions policy for major projects (State policy) assessed by the EPA. Recognizing reforms that strengthened the Commonwealth SGM in 2023, the State policy describes that conditions to reduce net greenhouse gas emissions will no longer be applied to major proposals assessed under Part IV of the Environmental Protection Act 1986 where the proposals are subjected to alternative regulatory measures such as the current SGM.

In November 2024, the EPA updated its Environmental Factor Guideline: Greenhouse Gas Emissions with consideration of 'rapidly evolving' climate science and policy and the updated State Policy. In its updated guideline, the EPA states that 'emission reductions required under the SGM are now likely to represent an "as far as practicable" reduction of, and in most cases meet its factor expectation for, covered emissions.'

The WA Minister for Environment has recently requested the EPA to inquire into and report on the matter of changing the implementation conditions relating to the management of GHG emissions at Pluto. It is anticipated that Ministerial Statement 1208 will be amended to align with conditions of other major projects, recognizing the SGM declining baseline, and other conditions such as those outlined for Ministerial Statement 1233 (summarised below), to achieve the EPA's objective to minimise the risk of environmental harm associated with climate change by reducing GHG emissions as far as practicable. For Pluto, the trajectory of net GHG emission limits under the SGM is substantially lower than the net GHG limits currently specified in Ministerial Statement 1208.

Following EPA assessment of the North West Shelf Project Extension Proposal, which allows for continued operation of the NWS Project and processing of third party gas at KGP, Ministerial Statement 1233 was issued in December 2024, approving the proposal with conditions relating to the management of GHG emissions (Condition 2-1 to 2-5). The GHG conditions require:

- notifying the relevant state government department if implementation of the proposal will not be or is not expected to be regulated under Safeguard legislation and of the implications of any changes to Federal Safeguard Legislation including obligations to reduce net Scope 1 GHG emissions.
- within 12 months of publication of the Ministerial Statement, and thereafter at five yearly intervals, to carry out a review of best practice design and operational measures that could be implemented to reduce GHG emissions, and provide to the relevant state government department a report which:
  - identifies practicable and reasonable options to reduce GHG emissions from the proposal
  - explains the assessment of both technical and economic feasibility of these options, and identifies which are considered feasible
  - includes an independent peer-review report of this options analysis
  - considers reasonably practicable options for reductions in scope 3 emissions

These measures, which include ongoing compliance with the Federal SGM baseline in accordance with Australia's GHG abatement targets, and an approach which ensures emissions reduction opportunities are periodically reviewed, ensure that portion of indirect GHG emissions associated with processing of Pluto gas at KGP are ALARP and acceptable.

Management and Abatement for Third Party Consumption (inc. Transport, Regasification, Distribution, Combustion) (Indirect)

Woodside continues to pursue a range of management and abatement measures relevant to GHG emissions associated with third party consumption of gas from Pluto. These are appropriate and practicable given that Woodside does not have operational control over third party GHG emissions. Examples of initiatives we are involved with are given below; involvement may change over time.

<u>Reduce</u>

Methane Guiding Principles: Woodside joined the Methane Guiding Principles in 2018. The MGP focuses on priority areas for action to reduce methane emissions across the natural gas supply chain.

Completed activities under the MGP include:

[73] https://www.woodside.com/what-we-do/operations/pluto-lng/pluto-lng-environmental-compliance-reporting

- led the “Global Midstream initiative” which encourages MGP members to engage and collaborate with supply chain and share best practises for methane reduction
- sponsored the first technical workshop of the Australian Energy Producers methane taskforce
- presented and participated in panels at the Global Methane Summit and International Gas Union conference

ASEAN Methane Leadership Programme: Woodside joined in 2023 and initiated an Australian methane programme through the Australian Climate Leaders Coalition. These programmes allow Woodside to share expertise with other companies in the natural gas value chain to help them reduce emissions of methane to near-zero74

IPIECA Scope 3 Emissions Taskforce: Providing members the opportunity to convene and disseminate knowledge and good practice in the area of Scope 3 emissions, including categorisation, value chain emission analysis, Scope 3 measurement and reporting and engagement along the value chain

OGMP 2.0: Woodside joined OGMP 2.0 in 2024. The OGMP 2.0 is the United Nations Environment Programme’s flagship oil and gas reporting and abatement programme. OGMP 2.0 is the only comprehensive, measurement-based reporting framework for the oil and gas industry that improves the accuracy and transparency of methane emissions reporting. This is key to prioritising methane abatement actions in the sector.

Woodside shares examples of emissions reduction initiatives being implemented on its assets with the Operator of non-operated assets at governance forums and joint venture technical committee meetings. Examples have included sharing knowledge about methane measurement (such as drone observation surveys), reduction opportunities such as thermal oxidisers at the Wheatstone asset, and approach to workforce engagement on decarbonisation and identification of opportunities.

Woodside also supports customers[75] to reduce their emissions via the investment in new energy products and lower carbon services, including the progression of corporate Scope 3 targets that apply across Woodside’s portfolio including:

- Scope 3 Investment Target[76]: Woodside has a Scope 3 investment target aiming to invest $5 billion in new energy products and lower carbon services by 2030[77]
- Scope 3 Emissions Abatement Target[76]: Woodside has a Scope 3 emissions abatement target, to indicate the potential abatement impact of these products and services upon customer Scope 1 or 2 emissions. This target it to take final investment decisions on new energy products and lower carbon services by 2030, with total abatement capacity of 5 Mtpa CO2-e[78]

Substitute

Promoting and marketing the role of LNG in displacing higher carbon intensity fuels (IEA, 2019): Woodside continues to advocate LNG as a means for customers to reduce their Scope 1 and 2 emissions, in accordance with the customer nations’ NDCs (see section below). The Pluto joint venture partnerships and investment by Kansai Electric Power and MidOcean demonstrates a long term recognition of the contribution of Pluto gas to meeting global energy demand. Further, evidence of the effectiveness of this strategy is the recent buy into the Scarborough project by Japan LNG (10% – 8 August 2023) and JERA (15.1% – 23 February 2024) with associated potential LNG offtake and collaboration on opportunities in new energy.

Advocate

Advocacy for stable policy frameworks that reduce carbon emissions: Woodside aligns its advocacy to support the goals of the Paris Agreement. A list of speeches and submissions to international and domestic audiences which contain climate related content or positions in 2023 is presented in the Woodside Climate Transition Action Plan, section 6.1.

Monitor and Report

[74] OGMP, 2023. “Implementation Plan Guidance”, p. 2 https://ogmpartnership.com/wp-content/uploads/2023/02/OGMP-2.0-Implementation-Plan-Guidance_2.pdf. OGMP provides the OGCI collective average target for upstream operations as an example of ‘near zero’ emissions intensity

[75] The customers for these products and services may be the same as the customers of our oil and gas business, directly substituting their energy for new products or directly abating the associated emissions. There may also be customers of the new products and services, without also being customers of oil and gas

[76] Scope 3 targets are subject to commercial arrangements, commercial feasibility, regulatory and Joint Venture approvals, and third party activities (which may or may not proceed). Individual investment decisions are subject to Woodside’s investment targets. Not guidance. Potentially includes both organic and inorganic investment. Timing refers to financial investment decision, not start-up/operations.

[77] Includes pre-RFSU spend on new energy products and lower carbon services that can help our customers decarbonise by using these products and services. It is not used to fund reductions of Woodside’s net equity Scope 1 and 2 emissions which are managed separately through asset decarbonisation plans.

[78] Includes binding and non-binding opportunities in the portfolio, subject to commercial arrangements, commercial feasibility, regulatory and Joint Venture approvals, and third party activities (which may or may not proceed). Individual investment decisions are subject to Woodside’s investment targets. Not guidance.

Monitor and report on the global energy outlook: This will be achieved via the release of Woodside's annual disclosures.

Detailed Impact/Risk Assessment

Assessment of Potential Climate Change Impacts

Climate change is caused by the net global concentration of greenhouse gases in the atmosphere. Human-caused climate change is a consequence of more than a century of net GHG emissions from energy use, land use change, lifestyle patterns of consumption, and production (IPCC 2023). The IPCC has stated that observed increases in GHG concentrations since 1750 leading to climate change are unequivocally caused by human activities and that there's a near linear relationship between cumulative anthropogenic CO_2 emissions and the global warming they cause (IPCC 2023). This relationship implies that reaching net zero anthropogenic CO2 emissions is a requirement to stabilize human-induced global temperature increase at any level, but that limiting global temperature increase to a specific level would imply limiting cumulative CO2 emissions to within a carbon budget (IPCC 2023)

As stated by the IPCC, "it is unequivocal that human influence has warmed the atmosphere, ocean and land. Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred". These impacts are summarised in the below section *Climate Change – Global and Australian Context.*

The Paris Agreement

The Paris Agreement is an international treaty on climate change, signed in 2016. It includes the goal to hold "the increase in the global average temperature to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C."

Carbon budgets "refer to the total net amount of carbon dioxide that can still be emitted by human activities while limiting global warming to a specified level" (IPCC 2023). A number of factors influence the calculation of remaining carbon budgets, such as the level of global warming chosen, probability, contribution of other greenhouse gases, how much global warming has already occurred due to historical emissions. The remaining carbon budget to limit global warming to 1.5°C and 2°C was 500 GtCO2 and 1350 GtCO2 respectively, as calculated from 2020 (IPCC 2023).

Since 2020, a portion of this global carbon budget has been consumed by ongoing global CO2 emissions. The Global Carbon Budget, an initiative of the Global Carbon Project of the University of Exeter "tracks the trends in global carbon emissions and sinks and is a key measure of progress towards the goals of the Paris Agreement." It is recognised by being presented at the UNFCC's Conference of Parties (COP) sessions. The last Global Carbon Budget in 2024 estimated that the remaining carbon budget for cumulative global GHG emissions to limit global warming to 1.5°C, and 2°C were 235 GtCO2, and 1110 GtCO2 respectively at January 2025 (50% likelihood).

Greenhouse gas emissions associated with Pluto are estimated to be up to 180 Mt CO2-e till EOFL, of which approximately 17 Mt CO2-e may originate from extraction and processing in Australia. Peak projected annual extraction and processing GHG of approximately 2.4 Mt CO2-e would represent ~0.5% of national Australian emissions (440.6 Mt CO2-e during FY2024) (DCCEEW, 2024b), and an estimated ~0.5% of annualised average Australian carbon budget (of 437.7 MT CO2-e average over the ten year period between 2021-2030, (DCCEEW, 2024b)) to meet Australia's GHGs emissions reduction commitments. These emissions will not materially or substantially contribute to either Australia's GHG emissions or global GHG emissions and are considered de minimis. Further, net emissions associated with Pluto in Australia are set to be lower than these totals - with ongoing abatement via implementation of the NGERS Safeguard Mechanism which sets out an abatement trajectory consistent with achieving Australia's emission reduction targets of 43% below 2005 levels by 2030 and net zero by 2050 (DCCEEW, 2023e).

Federally, the Australian domestic policy response to its Paris Agreement commitments is contained in multiple pieces of Commonwealth legislation (for example, Australian Registry of Emissions Units Act 2011 (Cth); Carbon Credits (Carbon Farming Initiative) Act 2011 (Cth); Climate Change Act 2022 (Cth); National Greenhouse and Energy Reporting Act 2007 (Cth); National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015 (Cth); Offshore Electricity Infrastructure Act 2011 (Cth); Renewable Energy (Electricity) Act 2000 (Cth)). There are also climate change policies at State level. Policies and mechanisms of this kind will serve as Woodside's primary means of managing GHG. As recent Court decisions have noted, current domestic environmental protection and assessment mechanisms are ill-suited for considering climate change impacts.

The Federal Safeguard Mechanism (SGM) described in the Management and Abatement section above is the key piece of legislation that implements the Australian Government's policy for reducing emissions at Australia's largest industrial facilities. The SGM sets legislated limits. known as baselines, on the net greenhouse gas emissions of these facilities. These emissions limits will decline, predictably and gradually. Through these limits, the Australian Government aims to help achieve Australia's emission reduction targets, as committed in Australia's Nationally Determined Contribution (NDC) to the Paris Agreement of 43% below 2005 levels by 2030 and net zero by 2050.

Climate Related Scenarios

Detailed Impact/Risk Assessment

The use of fossil fuels for energy currently accounts for around three quarters of anthropogenic GHG emissions (IEA 2021). This means that efforts to meet climate change goals must include changes to the way that the world produces and consumes energy. These changes are referred to as the "energy transition".

The precise shape and pace of the energy transition is uncertain. It is expected to vary in different countries because they have different starting points, development requirements, resources and capabilities. However, the scale of the transition is clearer. It will take many trillions of dollars, invested over decades. The International Renewable Energy Agency estimates it will require $115 trillion of cumulative investment by 2050 (IRENA 2022).

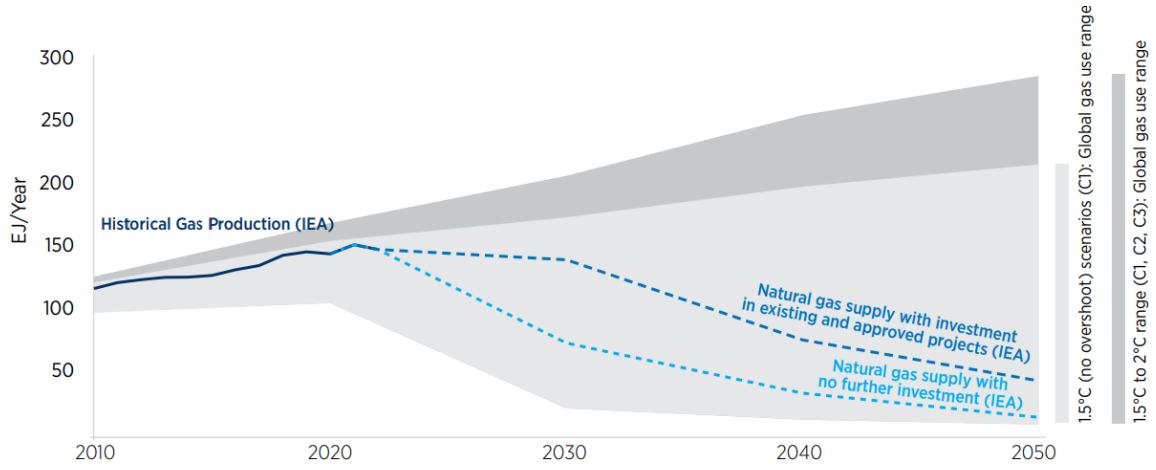
During 2022, the world experienced what the IEA has called the "first truly global energy crisis" (UNFCCC 2022). This crisis has seen higher energy prices and in some cases constraints on access to energy supply, impacting both businesses and households. The energy crisis has led to a renewed focus on energy security and has reconfirmed that the energy transition needs to be carefully managed if it is to be fair, inclusive and ultimately successful.

Gas from Pluto is understood to have an ongoing role in supporting customers' plans to secure their energy needs, while they reduce their emissions. Current uses of gas include power generation[79], heating and chemical feedstock.

In 2021, the IEA published its Net Zero by 2050: A Roadmap for the Global Energy Sector report (the NZE Scenario) (IEA 2021). The report is clear that "the route mapped out here is a path, not necessarily the path", and Woodside recognises that this is one scenario out of many. A range of pathways are considered by the IPCC.

Even in the NZE Scenario, investment in oil and gas development does not cease. The IEA estimates the need for an average $365 billion of upstream oil and gas investment every year until 2030, and $171 billion every year thereafter to 2050 is required in the NZE Scenario. The IEA cautions that "The fact that no new oil and natural gas fields are required in the NZE does not mean that limiting investment in new fields will lead to the energy transition outcomes in the NZE. If demand remains at higher levels, reduced investment would result in a shortfall in supply in the years ahead, and this would lead to higher and more volatile prices.

A range of climate pathways which limit global warming to either 1.5°C or 2°C have been published in addition to the NZE Scenario Figure 6-8 shows the range of potential global gas consumption in these scenarios, along with forecast supply with and without new investment.



[79] Electricity generation fueled with natural gas typically releases about half the lifecycle amount of greenhouse gases compared to electricity generation fueled with coal (IEA 2019). Additionally, natural gas fired electricity generation offers a flexible means of providing support to batteries and help stabilize the power grid during periods of reduced renewable energy production (e.g. at night, and when the wind is calm)

Detailed Impact/Risk Assessment

Figure 6-8: Forecast global gas use in climate pathways that limit warming to 1.5°C and 2ºC, with expected supply[808182]

Woodside notes that the IEA has published two special reports, Emissions from Oil and Gas Operations in Net Zero Transitions and The Oil and Gas Industry in Net Zero Transitions (IEA 2023). Combined, these reports note that oil and gas operations currently account for around 15% of total energy related emissions globally, identify and advocate for opportunities for oil and gas producers to abate these emissions, and analyse broader implications for the sector through the energy transition which includes the need for increased investment in clean energy. This EP demonstrates that management and abatement measures applied reduce GHG emissions associated with the project to acceptable and ALARP levels. Through meeting requirements of the Federal SGM, direct GHG emissions and those created by onshore processing at Pluto are aligned with Australia's emission reduction targets under the Paris Agreement. Further, Woodside's Scope 3 targets demonstrate how Woodside's products and services can help our customers avoid or reduce their Scope 1 or 2 emissions and therefore reduce life cycle (Scopes 1, 2 and 3) emissions intensity of Woodside's portfolio.

Woodside notes that the IEA makes the following statements in their World Energy Outlook 2024 on LNG demand in their Stated Policies Scenario (STEPS), Announced Pledges Scenario (APS) and Net Zero Emissions by 2050 Scenario (NZE):

- In the STEPS, LNG demand increases by more than 2.5% per year over the 2023-2035 period, which is faster than overall natural gas demand but far less rapid than the average 6% per year LNG growth rate between 2013 and 2022. Around 270 bcm of new LNG supply is currently under construction, and this will lead to a near-doubling of capacity in the United States and Qatar, which are set to dominate supply in 2035, together accounting for around 50% of global LNG trade in the STEPS by this date. This increased supply concentration is likely to put a spotlight on possible security of supply risks that might arise from extreme weather in the Gulf of Mexico and from disruption in the Middle East.
- Due to an upward adjustment to projected natural gas demand growth to 2030, LNG demand growth in the STEPS is higher than in the WEO-2023, reaching more than 700 bcm by 2035. However, this pace of growth does not keep pace with export capacity additions. As a result, a 130 bcm surplus emerges by 2030, bringing prices down in key importing regions like the European Union, China and Japan to a range between USD 6.5- 8.5 per million British thermal units (MBtu). This makes it difficult for some exporters to fully recover their long-run marginal cost of supply during this period.
- This LNG surplus narrows in subsequent years as LNG demand growth continues in the 2030s, and a supply gap emerges in 2040. By 2050, around 175 bcm of additional LNG export capacity is required in the STEPS to cover both demand growth and retiring capacity. This additional supply mainly comes from the Middle East, East Africa and North America. In the APS, projects currently under construction are sufficient to meet LNG demand: this peaks at 650 bcm in 2030, and no supply gap emerges. In the NZE Scenario, demand can be met in aggregate from projects existing today, without any need for additional LNG from projects currently under construction: this has a profound effect on gas prices in importing regions, which fall to around USD 5/MBtu by 2030.

Japan and Korea have significant energy- and carbon-intensive industry sectors which account for approximately 30% of GDP for each. Most energy used in industry is imported, which creates a priority for energy security during energy transitions. In the APS, energy supplies in Japan and Korea are underpinned by a variety of sources over the next decade as they pivot to increased use of clean energy sources – including renewables, nuclear and low emissions fuels – to reduce emissions and secure supply. Although the share of fossil fuels in power generation decreases through to 2035 and beyond, natural gas continues to provide stable and flexible power for both countries in light of

[80] Charts utilise IPCC ranges for oil and gas usage in scenarios that have a 50% or greater probability of limiting warming to 1.5°C with no or limited overshoot (C1), a 50% or greater probability of returning warming to 1.5°C after a high overshoot (C2), a 67% or greater probability of limiting warming to 2°C (C3) from AR6-WG3. IPCC data representing outlooks for Primary Energy Oil and Primary Energy Gas was sourced from AR6 Scenarios Database

[81] Data points sourced from the IPCC includes 2010, 2020, 2030, 2040 and 2050. Historical data from the IEA is provided on an annualised basis. Forward looking data from the IEA includes 2030, 2040, 2050. Woodside has used interpolation of the IEA and IPCC data points in intervening years. This is a work derived by Woodside Energy Ltd from IEA material and Woodside Energy Ltd is solely liable and responsible for this derived work. The derived work is not endorsed by the IEA in any manner. IEA data was converted to exajoules using conversion factors obtained from the IEA report; The Oil and Gas Industry in Net Zero Transitions, IEA 2023. IEA and IPCC scenarios are not predictions or forecasts and are representative of views of the future. Woodside's approach to analysing and assessing future energy market conditions is based on qualitative and quantitative factors and may vary from any one scenario presented by the IEA or IPCC.

[82] IEA, 2023. "The Oil and Gas Industry in Net Zero Transitions", https://www.iea.org/reports/the-oil-and-gas-industry-in-net-zero-transitions, License: CC BY 4.0.

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limited domestic supply options or interconnections with neighbouring countries. Natural gas is projected to remain an important energy source, accounting for nearly 12% of the power mix in 2035 in the APS, though gas-fired power drops to just 3% by 2050.

It is acknowledged that information related to climate related scenarios and the energy transition are subject to change, through mechanisms such as ongoing work by the IPCC and other agencies. Woodside will stay abreast of such changes and apply change management processes as described in Section 7.3.2.

Gas's Role in Energy System

The IEA identifies that there are strong macroeconomic drivers for growth in natural gas consumption in emerging markets and developing economies in Asia over the next decade, at least partially driven by coal to gas switching which "helps countries with net-zero emissions targets accelerate the transition away from coal, even if renewables are the major source of emissions reductions" (IEA 2023).

In the 2019 report The Role of Gas in Today's Energy Transition, the IEA indicates that electricity generation fuelled with natural gas typically releases about half the lifecycle amount of greenhouse gases compared to electricity generation fuelled with coal (IEA 2019). Additionally, natural gas-fired electricity generation offers a flexible means of providing support to batteries and helps stabilise the power grid during periods of decreased renewable energy production (e.g. at night or when the wind is calm).

The same IEA report states that "beating coal on environmental grounds sets a low bar for natural gas, given there are lower emissions and lower cost alternatives to both fuels". However, as shown in **Error! Reference source not found.** there is ongoing demand for gas in Paris aligned scenarios regardless of the presence or trajectory of renewable energy development.

The IPCC has noted Carbon intensity (from fossil fuel combustion and industrial processes) decreased, with large regional variations, over 2010-2019 "mainly due to fuel switching from coal to gas, reduced expansion of coal capacity, and increased use of renewables" (IPCC 2023).

Global energy demand is expected to increase. Since the availability of gas can support the reduction of more carbo-intensive firming fuel sources such as coal, rather than displacing renewable energy, it cannot be assumed that emissions associated with customer consumption of Pluto gas would be entirely additive to global atmospheric emissions.

While the US market is not expected to be customers for Pluto gas, it serves as a relevant example. In an article titled *Natural gas is now stronger than ever in the United States power sector*, the IEA states "the switch from coal to gas and uptake of renewables has lowered emissions in the US power sector… In this period, gas-fired generation more than doubled while coal-fired generation was cut by half" (IEA 2023)

Asia has more than half of the world's people and is growing. Across Asia many countries are still heavily reliant on coal which accounts for approximately 50% of the total energy supply in the Asia Pacific (IEA 2020).

Gas also provides important input to industry, with industrial uses of gas including:

- A feedstock for ammonia and methanol production, which are used for fertiliser and consumer goods manufacturing, among other processes that fuel economic growth and an increasing population
- A source of hydrogen production for the refining and chemical industries
- A source of heat for high-temperature industrial processes, such as producing aluminium, ceramics, cement, glass and steel. Due to its high energy density and controllable combustion characteristics, gas is particularly suitable for generating high temperature heat which may not be achievable through direct electrification (International Gas Union 2023).

Woodside currently expects that natural gas will continue to have a role in the energy transition.

Consideration of likely customer markets and associated energy mixes is important to understand the context of emissions from third party consumption of Pluto gas. Pluto includes joint venture partnerships and is geographically positioned to provide LNG to Asian markets, which also enables lower shipping emissions. The strong demand for Pluto gas, including from customer nations who have publicly stated that they intend to use LNG as part of their approach to meeting their Paris commitments (see the next section below), some of which already receive LNG from the Pluto facility, indicate that it is possible for Pluto gas to have a role in reducing global emissions.

The International Energy Agency (IEA) forecasts suggest that most future gas demand in Asia is China, India, Japan, Korea and other developing regions. These regions are existing or likely customer markets for the purpose of evaluating the role of gas from Pluto in existing energy mixes. This does not preclude the sale of gas from Pluto to other customers.

Customer Markets' Nationally Determined Contributions (NDCs)/commitments

The emissions associated with the consumption of Pluto gas along with other feed sources in customer markets will be considered under domestic and international emissions control frameworks. Anticipated and existing customers of gas from Pluto are in countries that are parties to the Paris Agreement. Under the Paris Agreement and global GHG accounting conventions, each country is responsible for accounting for, reporting and reducing emissions that

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physically occur in its jurisdiction. As described in the *Management and Abatement* section above, Woodside will seek to minimise these emissions as appropriate to our level of control.

The Paris Agreement requires countries to publish Nationally Determined Contributions to the goals of the Agreement. GHG emissions associated with customer use in countries that have ratified the Paris Agreement are considered under relevant national plans, summarised along with other policies below:

- **Japan:** "Japan aims to reduce its greenhouse gas emissions by 46 percent in fiscal year 2030 from its fiscal year 2013 levels, setting an ambitions target which is aligned with the long-term goal of achieving net zero by 2050." Japan also published an "Outline of Strategic Energy Plan" in October 2021. This plan assumes that LNG, while reducing from 37% in 2019, still makes up 20% of Japan's electricity generation mix in 2030.
- **The People's Republic of China:** "China would scale up its NDCs by adopting more vigorous policies and measures, and aims to have CO2 emissions peak before 2030 and achieve carbon neutrality before 2060." It goes on to state that "energy storage and gas-powered electricity will be stepped up rapidly"
- **Republic of Korea**: "The Republic of Korea is seeking to dramatically phase down coal-fired power generation while ramping up renewable power. Aged coal power plants will be shut down or shift their fuels from coal to Liquefied Natural Gas (LNG)."

Woodside's analysis of the NDCs and key policy documents of key customer nations is that LNG has an important role in supporting their decarbonisation plans under the Paris Agreement. If the introduction or continuation of Pluto LNG into the global energy market serves to reduce GHG emissions elsewhere, then in Woodside's view the full volume of GHG emissions associated with the project are not expected to be additive to global GHG concentrations.

Gas' Role in Australia's Energy Market

Domestic users of Pluto gas are expected to be subject to Australia's GHG framework which reflect Australia's NDCs, such as the Federal SGM which applies to Australia's largest industrial facilities.

The primary product from the Pluto facility is LNG. However, Pluto also contributes to the WA domestic gas network through production of pipeline domestic gas, and trucked LNG over road networks.

The emissions intensity of gas-fuelled electricity generation can be compared to other fuels data published by the Clean Energy Regulator (CER 2024). This includes data for designated generation facilities only, which according to the CER are facilities "where the principal activity is electricity production." This data is summarised in Table 6-24.

Table 6-28: Comparative emissions intensity of different energy sources in Western Australia, 2022-2023 financial year

Primary Fuel	Total Generation (million MWh)	Scope 1 and 2 Emissions (MtCO2e)	Emissions Intensity (tCO2e/MWh)
Natural Gas	13.89	7.95	0.57
Coal	6.23	5.33	0.86
Oil, Diesel	0.10	0.06	0.65
Solar, Wind, Hydro	3.79	0.00	0.00
Other	0.10	0.01	0.08
Total	24.10	13.35	0.55

Table 6-28 shows that the GHG emissions intensity of gas-fuelled electricity generation in WA is approximately 30% lower than coal-fuelled electricity generation, and comparable to that of the total aggregated electricity generation. This may continue to change, for example as the portion of electricity generated from zero-carbon sources increases.

As stated by the Australian Energy market Operator,

[the 2023 data shows] strong growth in electricity demand, driven by electrification, electric vehicle uptake, and new energy-intensive industries including green hydrogen production. Several of these trends lead to reduced gas consumption. However, increases in expected electricity consumption, coupled with the phased closure of state-owned coal power stations has a corresponding impact on modelled use of gas-powered generation to support the transition to a majority-renewables power system

and

Pressures associated with future coal supply and the planned retirements of coal-fired generation, are expected to increase the reliance of the South West Integrated System gas powered generation (GPG) fleet, and GPG is expected to play an important role, along with renewables, storage and supporting transmissions infrastructure, in ensuring the reliability in the SWIS as the energy transition continues. (AEMO 2023)

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Continuing operations of Pluto will deliver more gas to the WA market, at a time when WA is predicted to face supply shortages. According to 2022 WA Gas Statement of Opportunities report by Australian Energy Market Operator (AEMO) it is forecast there will be insufficient gas supply to meet WA demand. Pluto will continue to help to address the anticipated forecast supply gap in the WA domestic gas market.

Pluto Contribution to Global Greenhouse Gas Concentrations

Pluto operations creates Scope 1 GHG emissions from the PAP and Scope 3 emissions associated with onshore processing at Pluto LNG. There are also Scope 3 GHG emissions from customer use associated with the XNA03 project and other support services. These are estimated in the *Description of Source* section above.

The remaining carbon budget to limit global warming to 1.5°C and 2°C was 500 GtCO2 and 1350 GtCO2 respectively, as calculated from 2020 (IPCC 2023).

Since 2020, a portion of this global carbon budget has been consumed by ongoing global CO2 emissions. The Global Carbon Budget, an initiative of the Global Carbon Project of the University of Exeter "tracks the trends in global carbon emissions and sinks and is a key measure of progress towards the goals of the Paris Agreement." The University of Exeter presented at the UNFCC's Conference of Parties (COP) sessions. The last Global Carbon Budget in 2024 estimated that the remaining carbon budget for cumulative global GHG emissions to limit global warming to 1.5°C, and 2°C were 235 GtCO2, and 1110 GtCO2 respectively (50% likelihood).

As described above, LNG can have a role in displacing higher carbon intensity fuels and lowering carbon intensity of existing energy mixes, and key customer nations have stated that LNG has an important role in supporting their decarbonisation plans under the Paris Agreement. If the continuation of Pluto LNG into the global energy market serves to reduce GHG emissions elsewhere, then the full volume of GHG emissions associated with the project may not be additive to global GHG concentrations.

To facilitate a comparison against carbon budgets, a hypothetical scenario where GHG emissions associated with the Pluto facility are treated as entirely additive is considered. This scenario is not expected to eventuate due to the reasons described above. The estimated Pluto GHG emissions over the expected remaining life of the development are compared with remaining carbon budgets expected to achieve the goals of the Paris Agreement below. Additionally, no allowance is given for future abatement of GHG emissions associated with the project (such as through future abatement opportunities or future policy requirements), or changes to the carbon budgets which are known to be estimates only. As described above, the carbon budgets are developed based on CO_2 only however the comparison below conservatively considers all GHG emissions from the project normalised as CO_2-e, the vast majority of which are CO_2.

Emissions associated with onshore processing of Pluto gas is also subject to GHG frameworks which are expected to reduce the estimate from the gross figure used, such as the Federal SGM.

Table 6-29: Comparison of potential lifecycle GHG emissions associated with the Pluto offshore operations to global carbon budgets, assuming they are additive

Source	Estimated GHG Emissions over the potential remaining field-life ($MtCO_2$-e)	Proportion of remaining global carbon budget – achieving 1.5°C (235 $GtCO_2$)	Proportion of remaining global carbon budget – achieving 2°C (1110 $GtCO_2$)
Direct + Vessels and Helicopters	0.3	0.00%	0.00%
Onshore hydrocarbon processing	17	0.01%	0.00%
Third party transport of products, regasification, distribution and end use	163	0.07%	0.01%
Total	180	0.08%	0.02%

Assuming the scenario in which all GHG emissions associated with potential remaining Pluto field life are additive to global GHG gas concentrations, which they may not be, Pluto's contribution to the global carbon budget required to meet the goals of the Paris Agreement is de minimis.

Climate Change – Global and Australian Context

Climate change is caused by the net global concentration of greenhouse gases in the atmosphere. Noting that human-caused climate change is a consequence of more than a century of net GHG emissions from energy use, land

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use change, lifestyle patterns of consumption, and production (IPCC 2023), the following contextual evaluation of Climate Change impacts is provided.

Climate science is a rapidly evolving field in which new observations continue to deepen understanding of the current and potential impacts of global warming, and the possible pathways for mitigation and adaptation.

The CSIRO State of the Climate 2024 Report (CSIRO, 2024) draws on the latest national and international climate research, encompassing observations, analyses and future projections to describe year-to-year variability and longer-term changes in Australia's climate. Key points from this report on measured warming trends and forecast trajectories include the following:

- Australia's climate has warmed by an average of 1.51 ± 0.23 °C since national records began in 1910.
- Sea surface temperatures have increased by an average of 1.08 °C since 1900.
- The warming has led to an increase in the frequency of extreme heat events over land and in the oceans.
- Mass coral bleaching is a stress response of corals occurring primarily due to elevated ocean temperature, with five bleaching events associated with marine heatwaves occurring on the Great Barrier Reef over the past 10 years: in 2016, 2017, 2020, 2022 and 2024. In 2016, bleaching was associated with then record high sea surface temperatures, which in turn led to the largest recorded mass bleaching to date on the Great Barrier Reef.
- The 2022 event was the first time that mass bleaching occurred on the Reef during a La Niña year. Accumulated thermal stress during the 2024 event was higher than in 2016, although the full impact in terms of bleaching is still being assessed.
- In 2022 bleaching was also observed on some reefs on Australia's west coast, including Ningaloo Reef. This was due to warm ocean temperatures, driven by the 2021–2022 La Niña. The region's previous severe marine heatwave was driven by the 2010–2011 La Niña, which resulted in bleaching being recorded for the first time on Ningaloo and the closure of several Western Australian fisheries.
- In the south-west of Australia there has been a decrease of around 16% in April to October rainfall since 1970. Across the same region, May to July rainfall has seen the largest reduction, by around 20% since 1970.
- In the south-east of Australia, there has been a decrease of around 9% in April to October rainfall since 1994.
- Heavy short-term rainfall events are becoming more intense.
- There has been a decrease in streamflow at most gauges across Australia since 1970.
- There has been an increase in rainfall and streamflow across parts of northern Australia since the 1970s.
- There has been an increase in extreme fire weather, and a longer fire season, across large parts of the country since the 1950s.
- There has been a decrease in the number of tropical cyclones observed in the Australian region since at least 1982.
- Snow depth, snow cover and number of snow days have decreased in alpine regions since the late 1950s.
- Oceans around Australia are becoming more acidic, with changes happening faster in recent decades.
- Sea levels are rising around Australia, including more frequent extreme high levels that increase the risk of inundation and damage to coastal infrastructure and communities.
- The CSIRO report states that in the coming decades, Australia will experience ongoing changes to its weather and climate which are projected to include:
- Continued increase in air temperatures, with more heat extremes and fewer cold extremes.
- Continued decrease, on average, in cool season rainfall across many regions of southern and eastern Australia, which will likely lead to more time in drought.
- More intense short-duration heavy rainfall events even in regions where the average rainfall decreases or stays the same.
- Continued increase in the number of dangerous fire weather days and a longer fire season for much of southern and eastern Australia.
- Further sea level rise and continued warming and acidification of the oceans around Australia.
- Increased and longer-lasting marine heatwaves that will affect marine environments such as kelp forests and increase the likelihood of more frequent and severe bleaching events in coral reefs around Australia, including the Great Barrier Reef and Ningaloo Reef.
- Fewer tropical cyclones, but with higher intensity on average, and greater impacts when they occur through higher rain rates and higher sea level.

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- Reduced average snow depth in alpine regions, but with variations from year to year.

The IPCC is the United Nations body for assessing the science related to climate change and finalised the Sixth Assessment Report (AR6) in 2023. This consists of three Working Group contributions and a Synthesis Report. A summary of outcomes of the working group's contributions comprises a range of matters, which amongst others include:

- The AR6 Working Group I (AR6-WG1) report stated that it is unequivocal that there is human-induced warming. It also stated that increased atmospheric carbon dioxide (CO2) levels, generated by human activity, are the largest driver of warming over the longer term, and that there are a range of factors, including emissions of methane, which increase warming in the short-term.
- The AR6 Working Group II (AR6-WG2) report stated that human-induced climate change, including more frequent and intense extreme events, has caused widespread adverse impacts and related losses and damages to nature and people, beyond natural climate variability. It stated that global warming, reaching 1.5°C in the near-term, would cause unavoidable increases in multiple climate hazards and present multiple risks to ecosystems and humans. The report noted that societal choices and actions implemented in the next decade will determine the extent to which medium- and long-term pathways will deliver climate resilient development.
- The AR6 Working Group III (AR6-WG3) report provided an updated global assessment of climate change mitigation progress and pledges and examined the sources of global emissions. It explained developments in emissions reduction and mitigation efforts and assessed the impact of national climate pledges in relation to long-term emissions goals. More than 2000 quantitative emissions pathways were submitted to the IPCC, of which 1202 scenarios included sufficient information for assessing the associated warming. The report found that there are many pathways in the literature that likely limit global warming to 2°C with no overshoot, or to 1.5°C with limited overshoot. These variations occur because, while climate science is able to calculate a 'carbon budget' of net emissions before any particular temperature outcome is reached, the allocation of this budget between different human activities requires additional judgements about for example technology, economics, consumer preferences and policy choices.
- The AR6 Working Group I (AR6-WGI) report states "[climate change is a global phenomenon, but manifests differently in different regions" (IPCC 2021b). IPCC projections for climate change in Australia from the AR6 Working Group II (AR6-WGII) report include:
- further climate change is inevitable, with the rate and magnitude largely dependent on the emission pathway (very *high confidence*)[83]
- ongoing warming is projected, with more hot days and fewer cold days (*very high confidence*)
- further sea level rise, ocean warming, and ocean acidification are projected (*very high confidence*)
- less winter and spring rainfall is projected in southern Australia, with more winter rainfall in Tasmania, less autumn rainfall in southwestern Victoria and less summer rainfall in western Tasmania (*medium confidence*), with uncertain rainfall changes in northern Australia
- more extreme fire weather is projected in southern and eastern Australia (*high confidence*)
- increased drought frequency is projected for southern and eastern Australia (*medium confidence*)
- increased heavy rainfall intensity is projected, with fewer tropical cyclones and a greater proportion of severe cyclones (*medium confidence*) (Lawrence et al., 2022).
- The AR6-WGII also contains information about projected impacts to health and well-being for the Australasian region including, amongst others:
- detrimental effects on human health due to heat stress, changing rainfall patterns including floods and drought climate-sensitive air pollution (including that caused by wildfires) (high confidence) and vector-borne diseases (medium confidence)
- vulnerability to detrimental effects of climate change will vary with socioeconomic conditions (high confidence) (Lawrence et al. 2022).

For further information related to Woodside's approach to climate change, please see Section 5.3 'Managing Physical Risk' and Section 6.3 'A Just Transition' of Woodside's Climate Transition Action Plan and 2023 Progress Report.

The AR6-WGII report identified nine key climate risks for the Australasian region:

[83] A level of confidence is expressed using five qualifiers: very low, low, medium, high, and very high. For a given evidence and agreement statement, different confidence levels can be assigned, but increasing levels of evidence and degrees of agreement are correlated with increasing confidence (Lawrence et al., 2022).

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- loss and degradation of coral reefs and associated biodiversity and ecosystem service values in Australia due to ocean warming and marine heatwaves (very high confidence)
- loss of alpine biodiversity in Australia due to less snow (high confidence)
- transition or collapse of alpine ash, snow gum woodland, pencil pine and northern jarrah forests in southern Australia due to hotter and drier conditions with more fires (high confidence)
- loss of kelp forests in southern Australia due to ocean warming, marine heatwaves, and overgrazing by climate-driven range extensions of herbivore fish and urchins (high confidence)
- loss of natural and human systems in low-lying coastal areas due to sea level rise (high confidence)
- disruption and decline in agricultural production and increased stress in rural communities in south-western, southern and eastern mainland Australia due to hotter and drier conditions (high confidence)
- increase in heat-related mortality and morbidity for people and wildlife in Australia due to heatwaves (high confidence)
- cascading, compounding and aggregate impacts on cities, settlements, infrastructure, supply-chains and services due to wildfires, floods, droughts, heatwaves, storms and sea level rise (high confidence)
- inability of institutions and governance systems to manage climate risks (high confidence) (Lawrence et al., 2022).

An earlier report by Australia's Biodiversity and Climate Change Advisory Group summarised the potential impacts of climate change to marine and terrestrial species, habitats and ecosystems across Australia (Steffen et al., 2009). The 2009 report identified examples of observed changes in Australia's biota that were considered consistent with the emerging climate change 'signal', as genetic constitution, geographic ranges, lifecycles, populations, ecotonal boundaries, ecosystems, and disturbance regimes (Steffen et al., 2009). The report also stated:

"Biodiversity is one of the most vulnerable sectors to climate change".

"Australia's biodiversity is not distributed evenly over the continent but is clustered in a small number of hotspots with exceptionally rich biodiversity", and that these "include the Great Barrier Reef, south-west Western Australia, the Australian Alps, the Queensland Wet Tropics and the Kakadu wetlands".

Further, it was stated that *"many of the most important impacts of climate change on biodiversity will be the indirect ones at the community and ecosystem levels, together with the interactive effects with existing stressors (Steffen et al., 2009).* Future climate change (e.g., increased temperature and decreased, but more variable, rainfall) has the potential to have a range of impacts on ecological factors and threaten biodiversity in the Australian Mediterranean ecosystem (CSIRO, 2017).

Extensive modelling and monitoring studies over the last twenty years provide considerable evidence that global climate change is already affecting and will continue to affect species (Hoegh-Guldberg et al., 2018); however, these impacts are likely to be highly species-dependent and spatially variable. The most frequently observed and cited ecological responses to climate change include species distributions shifting towards the poles, upwards in elevation and shifts in phenology (earlier and later autumn life-history events) (M. Dunlop et al., 2012). Climate change may not only change species distribution patterns but also life-history traits such as migration patterns, reproductive seasonality and sex ratios (Steffen et al., 2009).

Impacts of climate change such as altering temperature, rainfall patterns and fire regimes, are likely to lead to changes in vegetation structure across all terrestrial ecosystems within Australia (M. Dunlop et al., 2012; Steffen et al., 2009). Increases in fire regimes will impact Australian ecosystems altering composition structure, habitat heterogeneity and ecosystem processes. Changes in climate variability, as well as averages, could also be important drivers of altered species interactions, both endemic and invasive species (M. Dunlop et al., 2012). Climate change could result in significant ecosystem shifts, as well as alterations to species ranges and abundances within those ecosystems (Hoegh-Guldberg et al., 2018).

The 'loss of climatic habitat caused by anthropogenic emissions of greenhouse gases' has been listed as a key threatening process under the EPBC Act (DCCEEW, 2021). The threatening process consists of reductions in the bioclimatic range within which a given species or ecological community exists due to emissions induced by human activities of greenhouse gases (DCCEEW, 2021). The process is considered to have a continental distribution, including both terrestrial and marine areas. Ecosystems in which the process occurs include: alpine habitats, coral reefs, wetlands and coastal ecosystems, polar communities, tropical forests, temperate forests, and arid and semi-arid environments (DCCEEW, 2021).

Coral reefs were recognised by both IPCC and the Australian Government as being at risk of climate change (Lawrence et al., 2022; DCCEEW, 2021). Protected coral reef areas in Australia include those within World Heritage listed sites, such as Ningaloo Coast, Shark Bay, or the Great Barrier Reef. Climate change has been identified as a threat for each of these World Heritage areas, with potential risks to coral reef as well as other environmental values (such as marine fauna) within these ecosystems (IUCN, 2020b, 2020c, 2020a).

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Climate variability and change has been identified as a threat to some EPBC Act protected species, including marine turtles, whales, seabirds and migratory shorebirds: • The Recovery Plan for Marine Turtles in Australia (CoA 2017) states that "[climate change is of particular concern to marine turtles because it is likely to have impacts across their entire range and at all life stages. Climate change is expected to cause changes in dispersal patterns, food webs, species range, primary sex ratios, habitat availability, reproductive success and survivorship". • The Conservation Management Plan for the Blue Whale (CoA 2015a) states: [climate change is expected to cause changes in migratory timing and destinations, population range, breeding schedule, reproductive success and survival of baleen whales, including blue whale species and subspecies". • The Wildlife Conservation Plan for Seabirds (CoA 2022) states that "[consequences to seabirds could include negative impacts from an increase in extreme weather events, reduced or changed prey abundance and distribution, and decrease in nesting habitat". • The Wildlife Conservation Plan for Migratory Shorebirds (CoA 2015) states that '[such changes have the potential to affect migratory shorebirds and their habitats by reducing the extent of coastal and inland wetlands or through a poleward shift in the range of many species". The Recovery Plan for the Southern Right Whale (DCCEEW, 2024a) states that 'modelling the links between krill and whale population dynamics with climate change, including changes in ocean temperature, primary productivity, and sea ice, suggests future ocean conditions are likely to have a negative impact on krill populations and in association the baleen whale species that feed on them.' The North-west Marine Parks Network Management Plan 2018 (DNP, 2018) identifies climate change as a pressure that may impact marine park values. The management plan states that "[t]he impacts of climate change on the marine environment are complex and may include changes in sea temperature, sea level, ocean acidification, sea currents, increased storm frequency and intensity, species range extensions or local extinctions, all of which have the potential to impact on marine park values" (DNP, 2018). Within the Marine Bioregional Plan for the NWMR (DSEWPaC, 2012), pressures related to climate change are assessed as 'of potential concern' for species of marine turtle, inshore dolphins, sawfish, sea snakes, whale shark, dugong, and seabird and shorebird, as well as the KEFs and shipwrecks known to occur in the NWMR.
Summary of Assessment Outcomes
Overall Impact Significance Level: Pluto offshore operations (Direct and Indirect) GHG emissions cause a small reduction of global carbon budgets estimated to meet goals of the Paris Agreement – assigned an Impact level of Negligible (F). Climate change impacts cannot be attributed to any one activity as they are instead the result of global GHG emissions, minus global GHG sinks, that have accumulated in the atmosphere since the industrial revolution started. They do not take into account the net impact of each project or activity. Even discounting the role gas can play towards customer commitments and plans to decarbonise through the energy transition, emissions associated with Pluto are expected to have a de minimis impact to global carbon budgets estimated to meet goals of the Paris Agreement. Pluto offshore operations and downstream processing facilities will also comply with the Federal Safeguard Mechanism Baseline, aligning with Australia's carbon management framework and implementation of the Paris Agreement.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[84]***	***Benefit in Impact Reduction***	***Proportionality***	***Control Adopted***
Legislation, Codes and Standards				
Contract vessels complying with Marine Order 97 (Marine pollution prevention – air pollution).	F: Yes. CS: Minimal cost. Standard practice.	Marine Order 97 is required under Australian Regulations; implementation is standard practice for commercial vessels as applicable to vessel size, type and class. Marine Order 97	Control based on legislative requirements – must be adopted.	Yes C 10.1

[84] Qualitative measure.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[84]***	***Benefit in Impact Reduction***	***Proportionality***	***Control Adopted***
		reduces air pollution from vessels.		
Reporting GHG emissions associated with the facility in accordance with National Greenhouse and Energy Reporting Scheme (NGERS), National Pollutant Inventory (NPI) and other legislative requirements	F: Yes. CS: Minimal cost. Standard practice.	Control based on legislative requirements to provide the national reporting framework for the reporting and dissemination of information related to emissions, hazardous wastes, GHG emissions, greenhouse gas projects, energy consumption and energy production to meet the objectives and desired outcomes of the legislation(s) such as: • the maintenance and improvement of air and water quality, minimisation of environmental impacts associated with hazardous wastes; and an improvement in the sustainable use of resources. • act as the single framework to inform policy, meet reporting requirements, avoid duplication, and to ensure that facility net greenhouse gas emissions are managed within applicable baselines.	Control based on legislative requirements – must be adopted.	Yes C 10.2
Apply for and manage net direct and indirect GHG emissions to within the relevant baseline under the National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015.	F: Yes CS: Minimal Cost. Standard Practice.	Control based on legislative requirement utilising the national reporting framework for the reporting of information related to GHG emissions. The Safeguard Mechanism requires Operators to offset carbon emissions in excess of the relevant baseline using appropriate credit units, such as ACCUs or SMCs.	Control based on legislative requirements – must be adopted.	Yes C 10.3
XNA03 Drilling: Offshore Petroleum and Greenhouse Gas Storage (Resource Management and Administration) Regulations 2011: accepted WOMP, which describes the well design and barriers to be used to prevent a loss of	F: Yes. CS: Minimal cost. Standard practice.	Drilling activities undertaken in accordance with an accepted WOMP will manage the risk of well kicks, reducing the likelihood of occurrence. No reduction in consequence will occur.	Control based on legislative requirements – must be adopted	Yes C 10.4

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[84]***	***Benefit in Impact Reduction***	***Proportionality***	***Control Adopted***
well integrity, specifically: • All permeable zones penetrated by the well bore, containing hydrocarbons or over-pressured water, shall be isolated from the surface environment by a minimum of two barriers (primary and secondary) (a single fluid barrier may be implemented during the initial stages of well construction if appropriateness is confirmed by a shallow hazard study). • Discrete hydrocarbon zones shall be isolated from each other (to prevent cross flow) by a minimum of one barrier where deemed required. • All normally pressured permeable water-bearing formations shall be isolated from the surface by a minimum of one barrier. The barriers shall: • be effective over the lifetime of well construction • (fluid barriers) remain monitored and provide sufficient pressure to				

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[84]***	***Benefit in Impact Reduction***	***Proportionality***	***Control Adopted***
counter pore pressure during well construction • (cementing barriers, including conductor, casing and liners) conform to the relevant minimum standards set out in the Woodside Engineering Standard – Well Cementation. Verification: • Effectiveness of primary and secondary barriers shall be verified (physical evidence of the correct placement and performance) during the drilling of the well.				
XNA03 Drilling: As-built checks that shall be completed during well operations to establish a minimum acceptable standard of well integrity is achieved.	F: Yes. CS: Minimal cost. Standard practice.	Reduces the likelihood of occurrence. No reduction in consequence will occur.	Benefits outweigh cost/sacrifice.	Yes C 10.5
XNA03 Drilling: Subsea BOP installed and tested during drilling operations. The BOP shall include: • one annular preventer • two pipe rams (excluding the test rams) • a minimum of two sets of shear rams, one of which must	F: Yes. CS: Standard practice. Required by Woodside standards.	BOP testing reduces the volume of gas vented in the event of a well kick.	Benefits outweigh cost/sacrifice.	Yes C 10.6

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[84]***	***Benefit in Impact Reduction***	***Proportionality***	***Control Adopted***
be capable of sealing • deadman functionality • the capability of ROV intervention • independent power systems.				
XNA03 Drilling: Process conducted to calculate, update and monitor kick tolerance for use in well design and while drilling, including: • The BOP shall be closed upon detecting a positive well influx. • The shut-in procedure shall be according to the rig contractor procedures or as the well conditions dictate. • Kick tolerance calculations will be made for drilling all hole sections based on the weakest known point in the well. Kick detection techniques will be adjusted based on the level of kick tolerance through a management of change (MOC). • The manual also includes requirements for kick tolerance management in the event of down-hole losses.	F: Yes. CS: Standard practice. Required by Woodside standards.	Processes will reduce the volume of gas vented in the event of a well kick.	Benefits outweigh cost/sacrifice.	Yes C 10.7

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[84]***	***Benefit in Impact Reduction***	***Proportionality***	***Control Adopted***
XNA03 Drilling: Well control bridging document (WCBD) for alignment of Woodside and the MODU Contractor in order to manage the equipment and procedures for preventing and handling a well kick.	F: Yes. CS: Standard practice. Required by Woodside standards.	Implementing equipment and procedures in the well control bridging document will reduce the volume of gas vented in the event of a well kick.	Benefits outweigh cost/sacrifice.	Yes C 10.8
Good Practice				
Forecast, measure, monitor and or estimate facility fuel and flare emissions (in accordance with NGERS and WMS procedures named in Section 7.2.11.2) to inform optimisation management practices and minimise environmental impact of emissions.	F: Yes. CS: Minimal cost. Standard practice.	Minimises environmental impact of emissions through planning, ongoing review, governance and optimisation. It combines with good operating practice to maximise production and reduce flaring emissions (Pluto) and fuel emissions at the LNG plant to manage cost, which improves energy intensity (e.g. cleaner production), optimising emissions from the project. Fuel and flared gas are potential product streams, as such, Woodside applies routine short and long term optimisation and opportunity management framework to identify and prioritise enhancement opportunities. On Pluto to date this has been limited to reduced flaring (e.g. flare purge rates); however overall system efficiencies (such as well and composition optimisation) and LNG Plant opportunities are also considered in this process. Annual flare and emissions target setting and monthly review of performance is completed for Pluto. The LNG Plant also applies flare and emissions target setting and tracking for emissions management. Daily production meetings allow for optimisation as an integrated production system, considering impacts of variables such as maintenance activities and temperature influence on production rates.	Control is WMS requirement – must be adopted.	Yes 10.9
Contracting strategy and evaluation for hire of support vessels includes consideration of	F: Yes. CS: Fuel cost over the 5-year contract is considered in the	Minimises costs and emissions through eco-efficiency approach recognising cost of fuel and	Control effectively allocates a cost to emissions to	Yes C 10.10

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[84]***	***Benefit in Impact Reduction***	***Proportionality***	***Control Adopted***
vessel emissions parameters and low carbon/alternate fuels.	evaluation of responses, allowing for competitive consideration of low carbon alternatives.	carbon emissions over the contract term	recognise that higher emitting fuel sources with other lower operating costs do not represent overall best value.	
XNA03 Drilling: Well unloading acceptance criteria that define the well objectives will be established.	F: Yes. CS: Standard practice.	Eliminates unnecessary flared volumes and corresponding emissions (light and GHG).	Benefits outweigh cost/sacrifice.	Yes C 10.11
XNA03 Drilling: Assess opportunities to eliminate well flowback flaring to MODU. The assessment will consider factors such as: • HSE considerations • well performance • proof of completions success • solids and liquids handling • potential eventual other impacts to the topsides.	F: To be decided. The decision on whether to unload to the MODU or Pluto will be based on technical study outcomes. CS: Cost effective but introduces additional risks to the production facility (i.e. risk of equipment and subsea system failures due to solids).	Minimises environmental impact through the reduction of GHG emissions. Well flowback may be avoided entirely. In this case the wells are instead flowed back to the eventual host facility (the Pluto Facility), resulting in a small increase to expected bean-up flaring for the well but resulting in a net overall flaring decrease.	Benefits potentially outweigh cost/sacrifice.	Yes C 10.12
Development and implement a Pluto integrated facility Methane Action Plan which will detail: • Inventorisation and planned measurement activities to align with the principles of OGMP2.0 reporting framework levels and timelines;	F: Yes CS: Cost, and facility modification safety and reliability risks associated with implementation of commitments.	Methane management activities are aligned with environmental, social, and governance expectations, and Woodside's approach to methane emissions management including and consistent with the principles of OGMP 2.0, and Near-Zero, and is consistent with industry-recognised practices, delivering appropriate and proportional identification and reduction efforts for methane emissions, considering the nature and scale of the facility. Pluto integrated facility management Methane Action	Control is committed – will be adopted	Yes C 10.14

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[84]***	***Benefit in Impact Reduction***	***Proportionality***	***Control Adopted***
• Proportional identification and evaluation of methane opportunities as part of GHG optimisation and opportunity management practices • Includes controls and monitoring activities at the Pluto offshore facility for direct methane GHG emissions		Plan (in-place during 2025) will include: • Development and maintenance of a methane inventory (offshore and onshore processing) • Progress measurement projects to align with OGMP2.0 reporting framework levels and timelines – focussing on onshore processing methane emissions as the material OGMP2.0 facility. – Indicative projects for the action plan for Pluto LNG facility monitoring includes direct measurement surveys of combustion system and vent streams, safety and operational gas detection, leak surveys, metering upgrades, and testing of emergent technology for flare gas combustion efficiency. • Identify and evaluate opportunities for methane emissions mitigation based on a methane inventory using appropriate valuation assumptions to identify NPV positive projects (to contribute optimisation practices (Section 7.2.11.1)) These management measures at Pluto align with Woodside's corporate approach to methane emissions management as appropriate including current OGMP 2.0 requirements to progress proportional identification and reduction efforts for methane for the integrated Pluto facility, and considers the design, very low contribution, non-material and not-normally crewed nature of the PLA platform.		
Implement relevant methane management activities at Pluto offshore platform	F: Yes CS: Cost associated with offshore deployment and logistics. Some offshore activities can be accommodated, however	Methane management activities at PLA which supports the integrated Pluto facility methane and GHG optimisation (C 10.14 above) includes:	Process safety-driven gas detection, maintenance and operations is good industry	**C 10.17**

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[84]***	***Benefit in Impact Reduction***	***Proportionality***	***Control Adopted***
	PLA platform is designed to be operated with minimal crewing, thus minimising risk exposure to personnel. The operations and maintenance strategy has a focus on reducing personnel exposure to hazards associated with offshore operations while maintaining the integrity and operability of the facilities. The strategy depends on effective management of all workforce groups and all activities on the PLA platform to maximise efficiency and ensure offshore scopes are selected with the appropriate risk-based lens. Disproportionate utilisation of offshore crewing for very minor or low-probability of material environmental benefit is not ALARP. Given PLA's very low methane emissions, and existing controls in place; potential GHG footprint of incremental offshore work scopes, maintenance hours and associated logistics risk GHG emissions from vessel support and helicopter loads exceeding any low-probability identification and remediation of residual low rate fugitive emissions. Further, due to its small emissions footprint, the Pluto-A offshore facility is classed as a non-material facility under the OGMP 2.0 Framework. LDAR via fixed gas detection is considered industry standard practice, which is expected to detect material methane leaks and maintain platform safety. Operational LDAR for fugitive methane leaks using either handheld equipment or top-down /	• Operational gas detection, fixed and mobile, to identify hydrocarbon leak sources, predominantly methane. Continuous fixed gas detection (as a component of the PLA Safety Case) and operator inspections upon platform arrival, detect and enable repair of material methane emissions. Regular visitation (approx. 10 visits per year) aids in facilitating observation, inspection and maintenance of methane-containing systems. • Safety-driven LDAR - start-up leaks checks following crewed turnarounds with break-of-containment activities can reduce methane emissions. Baseline Pluto PWH module commissioning leak testing and remediation (two small fugitives identified) was completed during 2024. Post-shutdown start-up infrared and portable gas detection identify leaks for evaluation and repair. Benefits likely outweigh minor cost/sacrifice. • CCTV monitoring of the flare ignition from Pluto PROC CCR to reduce incomplete combustion in flaring. Includes thermal imaging for strong flame indication to support timely reignition (Refer flare monitoring and ignition equipment standards). • Pluto produced water system designed and operated with secondary treatment HIGF which includes low-pressure flash gas operations to remove hydrocarbons including entrained methane from offshore discharged produced water. PW discharge metered • Pluto offshore methane inventory developed in 2025 - reviewed annually.	practice with gas detection control based on legislative requirements (e.g. Safety Case) – thus, must be adopted. Flare monitoring and ignition controls (refer engineered solution), and produced water separation HIGF system installed, and metered per Section 6.7.7). Routine leak survey beyond OGMP 2.0 requirements is proposed at PLA to verify scale of methane emissions against the NGER estimate methane assumption in the EP, incrementally increasing short-term offshore crewing to support EP acceptability.	

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[84]***	***Benefit in Impact Reduction***	***Proportionality***	***Control Adopted***
	remote sensing, e.g., via drone is feasible.	• Conduct routine methane leak surveys on Pluto offshore platform, beginning in 2026 and three-yearly[85] thereafter to: – Verify NGERS-based methane estimates • Identify opportunities for mitigation, actioned in accordance with optimisation management practices (Section 7.2.11.1).		
Woodside supports customers[86] to reduce their emissions via the investment in new energy products and lower carbon services, including the progression of corporate Scope 3 targets that apply across Woodside's portfolio including the following: • Scope 3 Investment Target[87]: Woodside has a Scope 3 investment target aiming to invest $5 billion in new energy products and lower carbon services (non LNG) by 2030[88]. • Scope 3 Emissions Abatement Target[8787]:	F: Yes CS: Cost as reflected in target	Supports customers to reduce their scope 1 and 2 emissions	Proportional at a Woodside corporate level	Yes C 10.15

[85] Frequency is deemed appropriate based on facility methane risk, NGER estimate and other controls in place. Appropriateness of frequency will be verified following 2026 survey.
[86] The customers for these products and services may be the same as the customers of our oil and gas business, directly substituting their energy for new products or directly abating the associated emissions. They may also be customers of the new products and services, without also being customers of oil and gas.
[87] Scope 3 targets are subject to commercial arrangements, commercial feasibility, regulatory and Joint Venture approvals, and third party activities (which may or may not proceed). Individual investment decisions are subject to Woodside's investment targets. Not guidance. Potentially includes both organic and inorganic investment. Timing refers to financial investment decision, not start-up/operations.
[88] Includes pre-RFSU spend on new energy products and lower carbon services that can help our customers decarbonise by using these products and services. It is not used to fund reductions of Woodside's net equity Scope 1 and 2 emissions which are managed separately through asset decarbonisation plans.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[84]***	***Benefit in Impact Reduction***	***Proportionality***	***Control Adopted***
• Woodside has a Scope 3 emissions abatement target, to indicate the potential abatement impact of these products and services upon customer Scope 1 or 2 emissions. This target is to take final investment decisions on new energy products and lower carbon services by 2030, with total abatement capacity of 5 Mtpa CO2 -e[89].				
Woodside will work with the natural gas value chain to reduce emissions in third party systems (e.g. regasification and distribution),	F: Yes CS: Minimal cost associated with collaboration and advocacy	Supports customers to reduce their scope 1 and 2 emissions	Proportional at a Woodside corporate level	Yes **C 10.16**
Professional Judgement – Elimination				
Eliminate flaring by venting un-combusted hydrocarbons.	F: No. Routine hydrocarbon venting is not considered good industry practice, as unburnt methane poses potential for greater environment impact compared to combustion emissions. The ability to flare hydrocarbons is a key safety feature on the facility. Removing the ability to flare hydrocarbons may result in unacceptable safety risks on the facility. CS: Not assessed, control not feasible.	Not assessed, control not feasible.	Not assessed, control not feasible.	No

[89] Includes binding and non-binding opportunities in the portfolio, subject to commercial arrangements, commercial feasibility, regulatory and Joint Venture approvals, and third party activities (which may or may not proceed). Individual investment decisions are subject to Woodside's investment targets. Not guidance.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[84]***	***Benefit in Impact Reduction***	***Proportionality***	***Control Adopted***
Eliminate flaring by reinjecting un-combusted hydrocarbons.	F: No. Routine hydrocarbon reinjection, as opposed to transport to onshore facilities, would not be consistent with the approved Pluto Field Development Plan (FDP) which seeks to optimise hydrocarbon recovery while fulfilling gas supply commitments. As such, gas reinjection would not meet concept screening criteria to warrant option evaluation. CS: Not assessed, control not feasible.	Not assessed, control not feasible.	Not assessed, control not feasible.	No
XNA03 Drilling: Do not vent during well kick.	F: No. Venting is a critical safety activity required in the event of a kick to reduce pressure build up. CS: Not considered, control not feasible.	Not considered, control not feasible.	Not considered, control not feasible.	No
Professional Judgement – Substitution				
Fuel for energy generation on the riser platform is selected for lowest indirect emissions generation practicable: Fuel gas used in preference to diesel for power generation.	F: Yes, fuel gas is the primary fuel source, with diesel as back up fuel used during peak power demand periods and when gas production is shut down. CS: Cost effective.	Gas turbines reduce CO_2 emissions for a given unit of power and reduces spill risk associated with diesel bunkering activities.	Cost effective. Minimises fuel bunkering risks.	Yes. Solution permanently implemented. This improvement was made as part of the recent PW-handling module upgrades, with gas engine commissioned in 2023.
Professional Judgement – Engineered Solution				
Maintain flare tip integrity, flame monitoring (CCTV) and ignition system to support efficiency of combustion and minimise venting,	F: Yes. CS: Minimal cost. Standard practice.	Flare tip integrity, flame monitoring (CCTV) and ignition system functionality minimises potential for venting, incomplete combustion waste products and smoke emissions. Managed via	Control is WMS requirement – must be adopted.	Yes C 10.13

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[84]***	***Benefit in Impact Reduction***	***Proportionality***	***Control Adopted***
incomplete combustion waste products and smoke emissions (equipment within scope of P31).		P31 - Emissions Monitoring and Controls. Minimises environmental emissions through reduction of frequency and duration of potential unplanned venting. Monitoring of the flare is conducted via CCTV (including thermal optical detection) from the PROC CCR. In the event that the flare is extinguished the flare can be reignited remotely or locally via the reignition panel. Note PLA historically operates with a stable flare flame and does not experience flameout events during normal operations.		
Installation of flare gas recovery systems to reduce emissions entering the atmosphere from flaring.	F: Yes CS: Significant additional cost associated with the design and installation of flare gas recovery systems, including significant retrofitting of multiple stages of compression systems, coupled with associated ancillaries, valving and piping, platform modification and weight considerations. The safe addition of required rotating equipment also poses significant production sacrifice and potential domestic gas supply impacts due to the initial design layout, space and safety constraints.	Small to negligible environmental benefit from reducing atmospheric emissions from flaring. The environmental benefit gained from the recovery of flaring emissions would be limited to only a portion of flare system flows due to process safety constraints and flare system operation over a wide design envelope (associated with flow and pressure variations and related flowline integrity management). Furthermore, required retrofitting of multiple stages of compressions (e.g. for LP/HP streams) would offset any environmental benefits through increased power generation emissions. The retrofitting interaction with the safety critical flare system and continued operation and maintenance of gas compression would also increase the NNC platform safety risks.	Given the increased safety risk and the very low, if any, environmental benefit provided when increased power generation emissions are taken into consideration, the installation of flare gas recovery systems is considered grossly disproportionate to the environmental benefit it would provide.	No

Discussion of ALARP

Atmospheric Emissions

On the basis of the environmental risk assessment outcomes and the use of the relevant tools appropriate to decision type A, Woodside considers the adopted controls appropriate to manage the impacts of Pluto facility, tie-back activities and vessel atmospheric emissions. As no reasonable additional/alternative controls were identified that would further reduce the impacts without grossly disproportionate sacrifice, the impacts and risks are considered ALARP.

GHG Emissions

Risk Based Analysis

Application of Woodside's Risk Management Procedures, implementation of the GHG Emissions and Energy Management Procedure and Production Optimisation and Opportunity Management Procedure reduces GHG emissions risk to ALARP (Section 7.2). This includes a system of continual review and improvement of key

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[84]***	***Benefit in Impact Reduction***	***Proportionality***	***Control Adopted***

emissions sources from the Pluto assets as an integrated system, including the Pluto-A offshore platform; e.g., installation of a gas engine on PLA which replaces the primary method of power generation from diesel to gas. Further opportunities are implemented at the Pluto LNG Plant to reduce indirect emissions associated with production from Pluto offshore fields.

Societal Values

Consultation was undertaken for this program to identify the views and concerns of relevant persons, as described in Section 5 and Appendix F Consultation Summary Tables. Some stakeholders expressed strong views on GHG emissions associated with Pluto operations, which were responded to accordingly. This included provision of further information on direct and indirect GHG emissions, discussion of controls and Woodside's corporate position, targets and controls via the 2024 Climate Transition Action Plan and 2023 Progress Report (Woodside, 2024).

ALARP Statement:

On the basis of the environmental risk assessment outcomes and use of the relevant tools appropriate to the decision type (i.e., Decision Type A and B for direct and indirect emissions respectively), Woodside considers the adopted controls appropriate to manage GHG emissions from the Pluto facility and indirect emissions sources that Woodside can practicably influence, including support vessels, during the five year term of this EP. The adopted controls meet legislative requirements, including:

- Marine Order 97 for support vessels
- NGERS and NPI reporting for direct emissions attributed to Pluto
- National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015.

Indirect GHG emissions from onshore processing at PLP are managed under the Pluto Greenhouse Gas Abatement Program, and at Karratha Gas Plant (KGP) are managed under MS1233 GHG Conditions. These require comprehensive reporting and independent auditing of emissions and emission intensities to ensure compliance with contemporary greenhouse gas standards and to maintain transparency and accountability. GHG emissions data available to Woodside is used to derive onshore hydrocarbon processing estimates allocated to the processing of Pluto gas - for example data made publicly available under state Ministerial Statements 757 (Pluto) and 1233 (KGP). It is noted that MS 757/1208 may be amended to alter GHG conditions, however precedent exists that contemporised conditions (such as MS1233) retain requirements for the publication of such data.

The Federal Safeguard Mechanism (SGM)[90] requires Australia's highest greenhouse gas emitting facilities to reduce or limit their emissions in line with Australia's emission reduction targets of 43% below 2005 levels by 2030 and net zero by 2050. Direct GHG emissions from the Pluto Offshore Facility, indirect emissions associated with onshore processing of gas from Pluto as well as indirect emissions associated with the transportation and end use of gas within Australian safeguard facilities are subject to the SGM, and net emissions from these sources must be kept below a specified limit or baseline.

Safeguard facilities that exceed their baseline must manage their excess emissions, such as by surrendering acceptable quality offsets suitably classified as Australian Carbon Credit Units (ACCUs) or Safeguard Mechanism Credits (SMCs) which is the other eligible compliance unit. Each are representative of one tonne of CO2-e per credit, so that net emissions under the scheme are brought in line with the baseline. So that sufficient credits are available and that there is a means to comply, safeguard facilities that exceed their baseline are able to buy Government-held ACCUs from the Clean Energy Regulator via the Cost Containment Measure implemented as part of recent reforms.

Safeguard Mechanism (SGM) obligations for the Pluto facility as defined under SGM will be met by emissions abatement via operational controls as first preference (described above). Options to manage residual net emissions in excess of baseline include surrendering ACCUs or SMCs, applying to become a trade-exposed baseline-adjusted facility, applying to borrow baseline from the following year or applying for a multi-year monitoring period. Surrendered carbon credits may be generated from Woodside projects, purchased from the market or purchased from the Government through the Cost-Containment Mechanism. Woodside is implementing programs at a corporate level to manage indirect emissions associated with customer use of gas from Pluto.

As no reasonable additional/alternative controls were identified that would further reduce the impacts without grossly disproportionate sacrifice, GHG emissions from the Pluto facility and indirect emissions sources that Woodside may practicably influence are considered ALARP.

[90] Further information about the SGM and SGM Baselines can be found at the Clean Energy Regulator website: https://cer.gov.au/schemes/safeguard-mechanism and https://cer.gov.au/schemes/safeguard-mechanism/safeguard-baselines.

Demonstration of Acceptability

Atmospheric Emissions

Given the adopted controls, atmospheric emissions represent a negligible impact that is unlikely to result in greater than isolated impacts with close proximity of the Pluto facility, in an unpopulated area approximately 160 km northwest of the nearest community receptor, Dampier. The adopted controls are considered good oil-field practice/industry good practice and meet requirements of Australia Marine Orders and National Pollutant Inventory reporting.

The potential impacts and risks are considered broadly acceptable if the adopted controls are implemented. Therefore, Woodside considers the adopted controls appropriate to manage the impacts and risks of atmospheric emissions to a level that is broadly acceptable.

Greenhouse Gas Emissions

To assess and determine that impacts from GHG emissions will be of an acceptable level, Woodside considered corporate commitments, principles of Ecologically Sustainable Development, Company Values and Societal Values.

Principles of Ecologically Sustainable Development

Giving consideration to economic development that safeguards the welfare of future generations, Pluto offshore operations is considered to align with the following core objectives of ESD by:

- Integration Principle
  - the existing environment (Section 4) has been described consistent with the definition within Regulation 5 of the Environment Regulations (i.e. includes ecological, socioeconomic, and cultural features), and any relevant values and sensitivities have been included within this impact analysis; therefore, the impact assessment process inherently includes economic, environmental and social considerations
  - indirect GHG emissions associated with Pluto will be managed to ALARP and an acceptable level through the implementation of the controls detailed in this section.
  - Feedback, objections and claims from Relevant Persons were considered, see Appendix F
- Precautionary Principle
  - there is some scientific uncertainty associated with the projection of climate change trends, the predicted and observed environmental effects of climate change, and the changing regulatory and social requirements and/or expectations
  - Woodside has committed to management and mitigation measures for GHG emissions to ensure that Pluto continues to manage GHG emissions to an ALARP and acceptable level
- Intergenerational Principle
  - continue to provide LNG as a source of fuel for global markets and pursue the development of new energy products and lower carbon services with reference to the UN Sustainable Development Goal 7, Affordable and Clean Energy
  - gas having the potential to contribute to an incremental reduction in global GHG emissions by displacing more carbon intensive power generation (e.g., coal), firming up renewables, or in hard-to-abate sectors
  - Woodside considers that this development is aligned with its goals for supporting the energy transition and is compatible with the Paris Agreement goal to hold “the increase in the global average temperature to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C.”
- Biodiversity Principle
  - the existing environment (Section 4) identifies and describes relevant MNES, as defined in Regulation 7(3) of the Environment Regulations; any relevant values and sensitivities are included in the contextual evaluation of climate change.
  - As described above the estimated GHG emissions associated with Pluto will have a de minimis contribution the net atmospheric global GHG concentrations and therefore are not expected to affect biodiversity.

Woodside looks after the communities and environments where we operate. Risks are inherent in petroleum activities; however, through sound management, systematic application of policies, standards, procedures and processes

Internal Context

The PAP is consistent with Woodside corporate polices, culture, processes, standards, structure and systems as outlined in the Demonstration of ALARP and Environmental Performance Outcomes, including:

- Woodside Environment and Biodiversity Policy (Appendix A)
- Woodside Risk Management Policy (Appendix A)
- Woodside Climate Policy (Appendix A)

- Woodside Climate Transition Action Plan and Progress Report
- Woodside being a signatory to the Aiming for Zero Methane Emissions Initiative, the Oil and Gas Methane Partnership 2.0 and the World Bank's Zero Routine Flaring by 2030 Initiative for oil projects, which are voluntary, international multi stakeholder partnerships between industry and non-industry organisations.
  - Deployment is applied consistent with OGMP2.0 principles on a risk-based approach for the most effective deployment of resources and effort to identify and reduce streams which make the most proportional difference - with a methane management strategy for the integrated Pluto facilities, including offshore at PLA.
- WMS requirements such as the GHG emissions and Energy Management Procedure, Production Optimisation and Opportunity Management Procedure (Section 7.2). This is achieved by implementing tools to identify, evaluate, implement and review emissions reductions projects.

External Context

GHG emissions are a global concern, and as such Woodside has undertaken an impact assessment of GHG associated with the Pluto facility and identified key measures to manage GHG emissions to an acceptable level.

According to Wood Mackenzie Energy Research Consultancy, LNG from Woodside operated facilities is amongst the lowest carbon intensity in the world delivered into North Asia[91].

The global consensus on climate change led to the implementation of the Paris Agreement. The aim of the Paris Agreement, as stated in the Article 2.1(a) is to hold the increase in global average temperature to well below 2°C above pre-industrial levels. The Agreement also aims to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognising that this would significantly reduce the risks and impacts of climate change.

Paris Agreement text extract[92]:

"Article 2

1. This Agreement, in enhancing the implementation of the Convention, including its objective, aims to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty, including by:

(a) Holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognising this would significantly reduce the risks and impacts of climate change;

This was reaffirmed in December 2023 in the COP28 decision text on the First global stocktake[93]. The text further recognised that the transition away from fossil fuels in energy systems is to be done in a just, orderly and equitable manner accelerating action in this critical decade, so as to achieve net zero by 2050 in keeping with the science[94]. It also recognises transitional fuels can play a role in facilitating the energy transition while ensuring energy security[95].

The Paris Agreement establishes a framework where countries make nationally determined contributions to manage and reduce their own emissions.

Australia has ratified the Paris Agreement and has set a target to reduce emissions by 43% below 2005 levels by 2030 and to reach net-zero emissions by 2050. Australia's emissions projections under a 'with additional measures' scenario is projected to be 42.6% below 2005 levels by 2030, the next waypoint to net zero emissions by 2050 (DCCEEW 2024b)

Pluto offshore (direct GHG) and indirect onshore third-party processing facilities are also subject to complying with the Federal Safeguard Mechanism (SGM) to manage net emissions under the scheme in line with Australia's emission reduction targets of 43% below 2005 levels by 2030 and net zero by 2050.

Australia's Long-Term Emissions Reduction Plan (DISER, 2021) presents Australia's whole-of-economy plan to achieving net zero emissions by 2050 with priority technologies estimated to achieve 85% reduction and yet-to-be identified emerging technologies abating the remainder. The plan identified LNG as a critical transition fuel and expects growth in the sector with higher use in 2030 than it is today but acknowledging that growth will depend on the preferences of customers and the pace of international action (DISER, 2021).

Climate science has drawn a link between cumulative emissions of greenhouse gases and global temperature levels. The link between cumulative emissions and temperature levels allows a carbon budget to be calculated. This is the

[91] Export from Wood Mackenzie LNG Carbon Emissions Tool available from: https://www.woodside.com/docs/default-source/our-business---documents-and-files/pluto---documents-and-files/wood-mackenzie-lng-carbon-e.
[92] Paris Agreement: https://unfccc.int/files/meetings/paris_nov_2015/application/pdf/paris_agreement_english_.pdf.
[93] FCCC/PA/CMA/2023L.17 (Draft decision distributed 13 December 2023) First global stocktake text extracts https://unfccc.int/sites/default/files/resource/cma2023_L17_adv.pdf (Section I, Clause 3).
[94] FCCC/PA/CMA/2023L.17 (Draft decision distributed 13 December 2023) First global stocktake text extracts https://unfccc.int/sites/default/files/resource/cma2023_L17_adv.pdf (Section II, Subsection A, Clause 28 (d)).
[95] FCCC/PA/CMA/2023L.17 (Draft decision distributed 13 December 2023) First global stocktake text extracts https://unfccc.int/sites/default/files/resource/cma2023_L17_adv.pdf (Section II, Subsection A, Clause 29).

remaining amount of net emissions (i.e., all global sources of emissions minus all global sinks of emissions) that can occur before today's concentration of greenhouse gases increases to the concentration associated with potential temperature outcomes.

Assuming the scenario in which all GHG emissions associated with Pluto are additive to global GHG gas concentrations, which they may not be, the activity's contribution to the carbon budget required to meet the goals of the Paris Agreement is de minimis.

However, the distribution of this carbon budget across different human activities requires additional judgements about a wider range of social, economic and technological factors and consumer and policy choices. Strategies to achieve emissions reductions include transitioning from fossil fuels without CCS to very-low- or zero-carbon energy sources, such as renewables or fossil fuels with CCS, demand side measures and improving efficiency, reducing non-CO2 emissions, and deploying carbon dioxide removal (CDR) methods to counterbalance residual greenhouse gas emissions. Pathways to limit warming therefore show different combinations of sectoral mitigation strategies consistent with a given warming level.

As a result, the demand for oil and gas in climate-related scenarios that could limit global warming to 1.5°C or 2°C is uncertain. For example, in the AR6-WG3 report, the IPCC stated that in pathways that limit warming to 1.5°C (with a greater than 50% probability and with no or limited overshoot) the potential global use of gas in 2050 ranges from 30% above 2019 levels to 85% below them with a median 45% decline.

Woodside considers our role in providing energy as core to our contribution to a just energy transition. UNSD Goal 7 is to "ensure access to affordable, reliable, sustainable and modern energy for all". The Pluto Facility will provide an incremental volume of hydrocarbons to Australian and international markets during its estimated remaining field life. Woodside considers that this development is aligned with the goals for supporting the energy transition and is compatible with the Paris Agreement goal.

Woodside is a signatory to several global initiatives which are complementary to our corporate approach to methane emissions management, which include OGMP 2.0 (2024), Oil and Gas Climate Initiative Aiming for Zero Methane Emissions (OGCI Near-Zero) and the Methane Guiding Principles (MGP, 2022), which are voluntary, international multi-stakeholder partnerships between industry and non-industry organisations. The OGMP 2.0 is the United Nations Environment Programme's flagship oil and gas reporting and abatement programme. OGMP 2.0 is a comprehensive, measurement-based reporting framework for the oil and gas industry that improves the accuracy and transparency of methane emissions reporting. This is key to prioritising methane abatement actions in the sector. Woodside is actioning these commitments at Pluto in line with the control measures C.10.14.

External context – stakeholder expectations and feedback

GHG emissions associated with the project, and the impacts of climate change, were noted as a material issue for relevant persons consulted in the course of preparing this EP. All feedback, claims or objections from Relevant Persons has been appropriately responded to and addressed (see Appendix F), and controls proposed have been assessed in the EP.

Other Requirements (Includes Laws, Polices, Standards and Conventions)

Legislation and other requirements considered relevant for this aspect, and a demonstration of how these requirements are met, are described below.

Requirement	Demonstration
Marine Order 97 Gives effect to Annex VI of MARPOL 73/78	The requirements of Marine Order 97 are incorporated into the key control measures.
National Greenhouse and Energy Reporting (NGER) scheme Annual GHG reporting for facilities	The requirements of NGER reporting scheme are incorporated into the key control measures.
National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015	The requirements of NGER Safeguard Mechanism are incorporated into the key control measures.
National Pollutant Inventory (NPI) Reporting Annual air pollutant reporting	The requirements of annual NPI reporting are incorporated into the key control measures.
Conservation Management Plan for the Blue Whale 2015–2025 Management action A3.1: Continue to meet Australia's international commitments to reduce greenhouse gas emissions and regulate the krill fishery in Antarctica Conservation Advice Balaenoptera borealis Sei Whale	As described above, the predicted atmospheric and GHG emissions from the Pluto Facility are considered de minimis, with no link to climate change impacts on Australian or International receptors. Therefore, the Pluto Facility is not considered to be inconsistent with the Conservation Management Plan for the Blue Whale 2015–2025 (CoA, 2015a), Conservation Advice for Sei Whale (TSSC, 2015a),

Conservation action: Continue to meet Australia's international commitments to reduce greenhouse gas emissions and regulate the krill fishery in Antarctica Conservation Advice Balaenoptera physalus Fin Whale Conservation action: Continue to meet Australia's international commitments to reduce greenhouse gas emissions and regulate the krill fishery in Antarctica National Recovery Plan for the Southern Right Whale action area A3.1: Continue to meet Australia's international commitments to address causes of climate change, including greenhouse gas emissions Recovery Plan for Marine Turtles in Australia Management action A2.1: Continue to meet Australia's international commitments to address the causes of climate change	Conservation Advice for Fin Whale (TSSC, 2015b), National Recovery Plan for the Southern Right Whale (DCCEEW, 2024a). Recovery Plan for Marine Turtles in Australia (CoA, 2017).
Conservation Advice *Rhincodon typus* Whale Shark No specific strategies or actions identified Recovery Plan for the White Shark (*Carcharodon carcharias*) No specific strategies or actions identified Wildlife Conservation Plan for Seabirds No specific strategies or actions identified Wildlife Conservation Plan for Migratory Shorebirds No specific strategies or actions identified Marine bioregional plan for the North-west Marine Region No specific strategies or actions identified North-west Marine Parks Network Management Plan No specific zone rules identified	N/A

Acceptability Statement: Greenhouse Gas Emissions

As per Section 2.6.1 Decision Type B, GHG emissions are acceptable if "ALARP" is demonstrated using good industry practice and risk-based analysis, if legislative requirements are met and societal concerns are accounted for and the alternative control measures are grossly disproportionate to the benefit gained. In addition, acceptability is assessed against the above criteria. Further opportunities to reduce the impacts have been investigated (refer ALARP demonstration discussion). The potential impacts are considered acceptable if ALARP is demonstrated.

Indirect GHG emissions associated with the Pluto facility are managed to an acceptable level by meeting (where they exist) legislative requirements, industry codes and standards, applicable company requirements, and industry guidelines, and these have been adopted as key controls.

Even discounting the role gas can play towards customer commitments and plans to decarbonise through the energy transition, emissions associated with the project are negligible in the context of existing and future predicted global GHG emissions. As described above, even in the hypothetical scenario when taken to be wholly additive, the GHG emissions created by and associated with the project represent a de minimis contribution to the carbon budgets estimated to achieve the goals of the Paris Agreement. Further, the Project will comply with the relevant Australian carbon management framework, for example the Federal SGM. The impact on national and international emission reduction targets is therefore acceptable.

EPOs, EPSs and MC for Pluto Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 10a Pluto facility GHG emissions shall achieve GHG reductions under reformed Safeguard	**C 10.1** Contract vessels complying with Marine Order 97 (Marine pollution prevention – air pollution).	**PS 10.1** Support vessels contracted whose practices comply with Marine Order 97 as applicable to vessel size, type and class.	**MC 10.1.1** Marine verification records.

EPOs, EPSs and MC for Pluto Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
Mechanism (inclusive of legislated net zero emissions by 2050). **EPO 10b** Air quality from direct atmospheric emissions will be limited to planned impacts and activities described as part of the PAP **EPO 10c** Minimise GHG emissions from vessels through efficient fuel usage and consideration of fuel types utilised[96].	**C 10.2** Reporting GHG emissions associated with the facility in accordance with National Greenhouse and Energy Reporting Scheme (NGERS), National Pollutant Inventory (NPI) and other legislative requirements	**PS 10.2** Pluto activity emissions reported annually in accordance with NGERS and NPI.	**MC 10.2.1** NGERs and NPI reporting records.
	C 10.3 Apply for and manage net direct and indirect Pluto facility GHG emissions to within the relevant baseline under the National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015.	**PS 10.3** Manage net direct and indirect Pluto GHG emissions from the Pluto facility to within the accepted baseline, under the National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015.	**MC 10.3.1** Records demonstrate implementation.
	C 10.9 Forecast, measure, monitor and or estimate facility fuel and flare emissions (in accordance with NGERS and WMS procedures named in Section 7.2.11.2) to inform optimisation management practices and minimise environmental impact of emissions.	**PS 10.9.1** Integrity will be managed in accordance with SCE Management Procedures (Section 7.4) and SCE Technical Performance Standard(s) to prevent environment risk related damage to SCEs for: • P31 – Environmental Emissions Monitoring and Controls, to provide means of detection of environmental releases, emissions and discharges to prevent MEEs from manifesting over time, and/or as required to assure compliance monitoring and reporting equipment. e.g. Maintaining functionality of flare and fuel flow metering equipment and estimation techniques to meet applicable criterion for reporting under NGER Determination and NPI.	**MC 1.16.1** Records demonstrate implementation of SCE Technical Performance Standard(s) and Management of Hardware Controls in the Operate Phase Procedure (Section 7.4.2), in order to achieve the functional objective of the control. Records may include implementation and maintain/assure and manage-change information summarised in Section 7.4.2
		PS 10.9.2 Flare and emissions targets (includes fuel) tracked, as required by WMS procedures named in Section 7.2.11.2.	**MC 10.9.1** Records demonstrate performance against annual flare and emissions targets.

[96] Other upstream indirect emissions such as those associated with helicopter travel and suppliers are not considered material

EPOs, EPSs and MC for Pluto Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
		PS 10.9.3 Implement Production Optimisation and Opportunity Management Procedure for the Pluto facility.	**MC 10.9.2** Records demonstrate annual process is applied.
	C 10.10 Contracting strategy and evaluation for hire of support vessels includes consideration of vessel emissions parameters and low carbon/alternative fuels.	**PS 10.10** Evaluation of tenders for support vessels considers emissions parameters.	**MC 10.10.1** Records demonstrate that emissions were considered in tender evaluations.
	C 10.13 Maintain flare tip integrity, flame monitoring (CCTV) and ignition system to support efficiency of combustion and minimise venting, incomplete combustion waste products and smoke emissions (equipment within scope of P31).	**PS 10.9.1** Integrity will be managed in accordance with SCE Management Procedures (Section 7.4) and SCE Technical Performance Standard(s) to prevent environment risk related damage to SCEs for: • P31 – Environmental Emissions Monitoring and Controls, to provide means of detection of environmental releases, emissions and discharges to prevent MEEs from manifesting over time, and/or as required to assure compliance monitoring and reporting equipment. e.g. Maintaining functionality of flare tip, ignition and monitoring (CCTV) to ensure no material degradation of the flare (resulting in un-combusted flare gas). Monitoring in place to ensure flare/pilots are lit, and ignition system available to light the flare in timely manner.	**MC 1.16.1** Records demonstrate implementation of SCE Technical Performance Standard(s) and Management of Hardware Controls in the Operate Phase Procedure (Section 7.4.2), in order to achieve the functional objective of the control. Records may include implementation and maintain/assure and manage-change information summarised in Section 7.4.2

EPOs, EPSs and MC for Pluto Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	C 10.14 Development and implement a Pluto integrated facility Methane Action Plan which will detail: • Inventorisation and planned measurement activities to align with OGMP2.0 reporting framework levels and timelines; • Proportional identification and evaluation of methane opportunities as part of GHG optimisation and opportunity management practices • Includes controls and monitoring activities at the Pluto offshore facility for direct methane GHG emissions.	**PS 10.14** Development and implementation of the Pluto integrated facility management Methane Action Plan (in-place during 2025) will include: • Development and maintenance of a methane inventory (offshore and onshore processing) • Progress measurement projects to align with OGMP2.0 reporting framework levels and timelines – focussing on onshore processing methane emissions as the material OGMP2.0 facility. • Identify and evaluate opportunities for methane emissions mitigation based on a methane inventory using appropriate valuation assumptions to identify NPV positive projects (to contribute optimisation practices (Section 7.2.11.1) Supported by; methane management activities at PLA (below).	**MC 10.14.1** Records demonstrate relevant methane management measures are identified, assessed and if relevant implemented.

	C 10.17 Implement relevant methane management activities at Pluto offshore platform	**PS 10.17** Implement relevant methane management activities at PLA which supports the integrated Pluto facility methane and GHG optimisation (above) which includes: • Operational gas detection, fixed and mobile, to identify hydrocarbon leak sources, predominantly methane. • Continuous fixed gas detection (as a component of the PLA Safety Case) and operator inspections upon platform arrival, detect and enable repair of material methane emissions. • Regular visitation (approx. 10 visits per year) aids in facilitating observation, inspection and maintenance of methane-containing systems. • Safety-driven LDAR - start-up leaks checks following crewed turnarounds with break-of-containment activities via infrared and portable gas detection to identify leaks for evaluation and repair. • CCTV monitoring of the flare ignition from Pluto PROC CCR to reduce incomplete combustion in flaring. Includes thermal imaging for strong flame indication to support remote or local reignition (Refer flare monitoring and ignition equipment standards). • Pluto produced water system designed and operated with secondary treatment HIGF which includes low-pressure flash gas operations to remove hydrocarbons including entrained methane from offshore discharged produced water. PW discharge metered per Section 6.7.7. • Conduct routine methane leak surveys on Pluto offshore platform, beginning in 2026 and three-yearly[85] thereafter to: – Verify NGERS-based methane estimates – Identify opportunities for mitigation, actioned in accordance with optimisation	**MC 10.14.1** Records demonstrate relevant methane management measures are identified, assessed and if relevant implemented.

EPOs, EPSs and MC for Pluto Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
		management practices (Section 7.2.11.1).	
EPO 10d Woodside will support customers to reduce their GHG emissions.	**C 10.15** Woodside supports customers[97] to reduce their emissions via the investment in new energy products and lower carbon services, including corporate targets that apply across Woodside's portfolio including the following: • Scope 3 Investment Target[98] Invest $5 billion in new energy products and lower carbon services (non LNG) by 2030[99]. Scope 3 Emissions Abatement Target[98] • Take final investment decisions on new energy products and lower carbon services by 2030, with total abatement capacity of 5 Mtpa CO2 -e[100].	**PS 10.15.1** Woodside will progress its Scope 3 investment and emissions targets, aligned with stated timeframes	**MC 10.15.1** Progress against targets reported in the relevant annual Woodside disclosures to relevant industry standards and/or requirements. This includes an estimate of abated emissions from currently sanctioned projects.

[97] The customers for these products and services may be the same as the customers of our oil and gas business, directly substituting their energy for new products or directly abating the associated emissions. They may also be customers of the new products and services, without also being customers of oil and gas.
[98] Scope 3 targets are subject to commercial arrangements, commercial feasibility, regulatory and Joint Venture approvals, and third party activities (which may or may not proceed). Individual investment decisions are subject to Woodside's investment targets. Not guidance. Potentially includes both organic and inorganic investment. Timing refers to financial investment decision, not start-up/operations.
[99] Includes pre-RFSU spend on new energy products and lower carbon services that can help our customers decarbonise by using these products and services. It is not used to fund reductions of Woodside's net equity Scope 1 and 2 emissions which are managed separately through asset decarbonisation plans.
[100] Includes binding and non-binding opportunities in the portfolio, subject to commercial arrangements, commercial feasibility, regulatory and Joint Venture approvals, and third party activities (which may or may not proceed). Individual investment decisions are subject to Woodside's investment targets. Not guidance.

EPOs, EPSs and MC for Pluto Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	C 10.16 Woodside will work with the natural gas value chain to reduce emissions in third party systems (e.g. regasification and distribution)	**PS 10.16.1** Woodside to implement the following: • sharing knowledge via Australian industry forums and other companies in the natural gas value chain through; • the adoption and promotion of global methane frameworks such as the Methane Guiding Principles and Oil and Gas Decarbonisation Charter • advocacy for stable policy frameworks that reduce carbon emissions. • Annual review of the implementation and outcomes of these measures, this includes consideration of current or new industry forums, initiatives and natural gas value chain participants	**MC 10.16.1** Records demonstrate that listed actions have been undertaken and are effective.

EPOs, EPSs and MC for Xena-03 Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 10e Minimise GHG emissions from drilling activities and project vessels through efficient fuel, usage consideration of fuel types utilised, and drilling controls.	**C 10.1** Contract vessels complying with Marine Order 97 (Marine pollution prevention – air pollution).	**PS 10.1** Contracted support vessels comply with Marine Order 97, as applicable to vessel size, type and class.	**MC 10.1.1** Marine verification records.
	C 10.4 Offshore Petroleum and Greenhouse Gas Storage (Resource Management and Administration) Regulations 2011: accepted WOMP, which describes the well design and barriers to be used to prevent a loss of well integrity, specifically: • All permeable zones penetrated by the well bore, containing hydrocarbons or over-pressured water, shall be isolated from the surface environment by a minimum of two barriers (primary and secondary) (a single fluid barrier may be implemented during the initial stages of	**PS 10.4** Well drilled in compliance with the accepted WOMP, including implementation of barriers to prevent a loss of well integrity.	**MC 10.4.1** Acceptance letter from NOPSEMA demonstrates the WOMP and application to drill were accepted by NOPSEMA prior to the drilling activity commencing.
			MC 10.4.2 Records demonstrate minimum of two verified barriers (a single fluid barrier may be implemented during the initial stages of well construction if appropriateness is confirmed by a shallow

EPOs, EPSs and MC for Xena-03 Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	well construction if appropriateness is confirmed by a shallow hazard study). • Discrete hydrocarbon zones shall be isolated from each other (to prevent cross flow) by a minimum of one barrier where deemed required. • All normally pressured permeable water-bearing formations shall be isolated from the surface by a minimum of one barrier. The barriers shall: • be effective over the lifetime of well construction • (fluid barriers) remain monitored and provide sufficient pressure to counter pore pressure during well construction • (cementing barriers, including conductor, casing and liners) conform to the relevant minimum standards set out in the Woodside Engineering Standard – Well Cementation. Verification: • Effectiveness of primary and secondary barriers shall be verified (physical evidence of the correct placement and performance) during the drilling of the well.		hazard study) were in place for all permeable zones penetrated by the wellbore. **MC 10.4.3** Records demonstrate composition and weight of drilling fluids were applicable to down hole conditions.
	C 10.5 As-built checks shall be completed during well operations to establish a minimum acceptable standard of well integrity is achieved.	**PS 10.5** Achieve a minimum acceptable standard of well integrity.	**MC 10.5.1** Records show Well Acceptance criteria developed for well. **MC 10.5.2** Records demonstrate well acceptance criteria have been met.
	C 10.6 Subsea BOP installed and tested during drilling operations. The BOP shall include: • one annular preventer • two pipe rams (excluding the test rams)	**PS 10.6** Subsea BOP specification, installation and testing compliant with internal Woodside Standards and international requirements (API Standard 53 5th Edition) as agreed by	**MC 10.6.1** Records demonstrate that BOP and BOP control system specifications and testing were in accordance with minimum standards for the expected drilling conditions as agreed by

EPOs, EPSs and MC for Xena-03 Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	• a minimum of two sets of shear rams, one of which must be capable of sealing • deadman functionality • the capability of ROV intervention • independent power systems.	Woodside and MODU contractor.	Woodside and MODU contractor.
	C 10.7 Process conducted to calculate, update and monitor kick tolerance for use in well design and while drilling, including: • The BOP shall be closed upon detecting a positive well influx. • The shut-in procedure shall be according to the rig contractor procedures or as the well conditions dictate. • Kick tolerance calculations will be made for drilling all hole sections based on the weakest known point in the well. Kick detection techniques will be adjusted based on the level of kick tolerance through a management of change (MOC). • The manual also includes requirements for kick tolerance management in the event of down-hole losses.	**PS 10.7** Kick tolerance is calculated, managed, monitored and updated while drilling.	**MC 10.7.1** Records demonstrates well kick tolerance is calculated, managed, monitored and updated while drilling.
	C 10.8 Well control bridging document (WCBD) for alignment of Woodside and the MODU Contractor in order to manage the equipment and procedures for preventing and handling a well kick.	**PS 10.8** Well is drilled in accordance with the contractor WCBD to reduce the likelihood of emissions to air from a well kick during drilling operations.	**MC 10.8.1** Records demonstrate well drilled in accordance with WCBD.
	C 10.11 Well unloading acceptance criteria that define the well objectives will be established.	**PS 10.11** Flaring restricted to a duration necessary to achieve the well objectives.	**MS 10.11.1** Records demonstrate flaring was restricted to a duration necessary to achieve the well objectives.

EPOs, EPSs and MC for Xena-03 Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	C 10.12 Assess opportunity to eliminate well flowback flaring to MODU. The assessment will consider factors such as: • HSE considerations • well performance • proof of completions success • solids and liquids handling • potential eventual other impacts to the topsides.	**PS 10.12.1** Study assessing unloading to MODU vs Pluto undertaken.	**MC 10.12.1** Records demonstrate study on unloading to MODU vs Pluto undertaken.
		PS 10.12.2 No well unloading to the MODU, where considered technically feasible and ALARP.	**MC 10.12.2** Records demonstrate no well unloading to the MODU, where considered feasible and ALARP.

6.7.11 Routine Atmospheric Emissions: Indirect Emissions associated with Gas Processing Onshore

Context		
Pluto Facility Operations Overview – Section 3.1.1 Location – Section 3.2 Process and Production Description – Section 3.5.4	Cultural Features and Heritage Values – Section 4.9	Consultation – Section 5

Impact/Risk Evaluation Summary

Source of Impact	***Environmental Value Potentially Impacted***							***Evaluation***						
	Soil and Groundwater	Marine Sediment	Water Quality	Air Quality (inc. Odour)	Ecosystems/Habitat	Species	Socio-economic	Decision Type	Impact/Consequence	Likelihood	Current Risk Rating	ALARP Tools	Acceptability	Outcome
Consideration of potential indirect impact from atmospheric emissions associated with onshore processing of Pluto gas				x			x	B	Air Quality – Negligible, no lasting effect. Heritage – No attributable impact assigned.	-	-	LCS GP PJ	Acceptable if ALARP	EPO 11

Routine Atmospheric Emissions – Indirect Emissions from Gas Processing Onshore

Description of Source of Impact/Risk

Background

The processing of gas from Pluto at onshore processing facilities will result in the release of atmospheric emissions. These emissions, and their potential indirect effects, have been raised by stakeholders as a concern and as such are evaluated within the Pluto Facility Operations EP.

This section provides contextual evaluation of consideration for potential indirect impacts, particularly the potential for atmospheric emissions associated with the PAA to cause a reduction in ambient air quality impacting human health and the potential to contribute to accelerated weathering of rock art on the Burrup Peninsula and within the Dampier Archipelago (i.e., Murujuga). These potential indirect impacts cannot be considered in isolation as they are the result of cumulative airshed conditions generated from various sources.

Murujuga Rock Art Strategy

The WA State Government (DWER) has established a Murujuga Rock Art Strategy (MRAS) in partnership with MAC as the Traditional Owners and custodians of Murujuga.

DWER has primary responsibility for the day-to-day implementation of the strategy in partnership with MAC. This includes working with MAC to oversee the development and implementation of a world's best practice monitoring and

analysis program that will determine whether the rock art on Murujuga is subject to accelerated change (for further information see Murujuga Rock Art | Western Australian Government (www.wa.gov.au).

The results from studies underway will guide management and protection of Murujuga rock art, with State environmental protection and heritage legislation in place as the applicable regulatory framework.

The MRAS states that:

"The data currently available from previous monitoring projects does not allow for a conclusive answer on whether anthropogenic emissions are impacting Murujuga's rock art. The Murujuga Rock Art Strategy is therefore essential to fill these gaps in knowledge.

Although it is not known whether the rock art is being impacted currently, there are feasible impact pathways by which emissions from industrial activities and other local sources could cause accelerated weathering of the rock art. The strategy is examining these potential pathways and the condition of the rock art to understand whether change is occurring, and whether there is a need to set a future limit on emissions to ensure accelerated weathering does not occur."

As a causal link between industrial air emissions and anthropogenic-induced change to rock art on Murujuga has not been established, nor sources and potential pathways defined, it is not yet practicable to attribute impact and risk level posed by the Pluto Offshore Operations PAA. The scientific uncertainty that persists is addressed by an adaptive and precautionary management framework in place by way of the MRAS and the associated Murujuga Rock Art Monitoring Program (MRAMP), together with the State Environmental Protection Act 1986 (WA) and associated regulatory framework, approvals and licences.

Onshore Processing Emission Context

Gas from Pluto is transported to shore through the trunkline to be processed at the Pluto LNG Facility. A portion of annual gas supply from Pluto offshore may also be processed at the KGP LNG train 4 and 5 via the interconnector pipeline. Products from Pluto gas are then sold as LNG and delivered to customers via ship or road or distributed to customers via pipeline for domestic consumption for purposes such as heating, electricity generation or industrial processes such as the production of LNG, ammonia, urea or hydrogen.

This section relates to atmospheric emissions that are associated with the processing of gas exported from Pluto to onshore facilities. While the operation of these onshore processing facilities is outside the scope of this EP, the atmospheric emissions associated with processing Pluto gas at these facilities is addressed in this section. The processing facilities addressed in this section are considered as the primary recipients of Pluto gas, being the Pluto LNG facility, and a smaller portion of gas supplied to KGP.

Source of Atmospheric Emissions from Onshore Processing

The principal atmospheric emissions from onshore processing in terms of potential for air quality impacts arise from the combustion of gas in fuel turbine generators and compressors as well as gas conditioning process vents at onshore facilities. Gas processing and liquefaction can also result in flaring of some gas and incidental venting of un-combusted gas. The most significant by-products of gas combustion, flaring and venting of gas will include oxides of nitrogen (NOx), carbon monoxide (CO), methane and non-methane volatile organic compounds (VOCs) including BTEX (benzene, toluene, ethylbenzene and xylenes).

Ozone is not typically emitted directly from gas consumption or processing but is formed through anthropogenic sources via chemical reactions between oxides of nitrogen and other emissions such as VOCs and CO in the presence of ultraviolet light. Ventilation readily disperses CO emissions relative to criteria. There may also be traces of particulate matter (PM) and sulphur dioxide (SO_2), but such emissions are generally considered negligible from the onshore processing of Pluto gas, due to the fact it has a very low sulphur content and absence of products that are precursors to the formation of particulate pollution. Emissions of PM from the consumption of gas from Pluto is negligible in comparison to background and other industrial sources.

Sources of Emissions within the Murujuga Airshed

Potential indirect impacts from processing of gas from Pluto could arise via a contribution to the cumulative effect of all emissions in the airshed. The Murujuga airshed encompasses the entire Burrup Peninsula and includes the population centres of Dampier and Karratha and surrounding areas. Industrial facilities that currently release or have approval to emit into the Murujuga airshed include:[101]

- Woodside Operated North West Shelf Venture's Karratha Gas Plant (KGP)
- Woodside Operated Pluto LNG Facility
- Yara Pilbara Fertilisers Pty Ltd Ammonia Plant
- Yara Pilbara Nitrates Pty Ltd Technical Ammonium Nitrate Production Facility (TANPF)
- Perdaman Urea Project

[101] https://www.epa.wa.gov.au/sites/default/files/EPA_Report/EPA%20Report%201727%20-%20North%20West%20Shelf%20Extension%20Project%20-%20assessment%20report.pdf.

- Pilbara Iron Yurralyi Maya Power Station
- Santos Devil Creek Power Station
- ATCO Karratha Power Station
- EDL West Kimberley Power Plant (Maitland LNG Plant).

Atmospheric Emissions into the Murujuga Airshed from Onshore Processing of Gas from Pluto

Emissions associated with onshore processing of gas from Pluto are emitted and combined with similar emissions from natural sources and other industrial activities in proximity of the Murujuga region. Assessment of potential impacts considers cumulative impacts within the airshed rather than estimating emissions influence associated with processing gas from Pluto in isolation. Further, estimating ground level concentrations of atmospheric constituents as related to human health and deposition relies on complex non-linear photochemical modelling, underpinned by biochemical and physical forcing systems such as regional meteorological forcing model.

Therefore, impact assessment is based on a cumulative airshed modelling inclusive of contribution from onshore processing of Pluto gas, and other material sources.

In 2021, DWER commissioned Ramboll Australia Pty Ltd to undertake a *Study of the Cumulative Impacts of Air Emissions in the Murujuga Airshed*[102](Ramboll 2022) which considered a "complete emission inventory" including air emissions from existing and proposed future industries, shipping, and aggregated sources in the Pilbara region. The study used the CAMx atmospheric emission model, which includes atmospheric photochemistry to evaluate concentrations of a range of pollutants including NOx, ozone, SOx, CO, VOCs, and particulates across two modelling domains. The detailed 1.33 km grid encompasses the Dampier Archipelago, as far East as Wickham and as far West as 40 Mile Beach. Predicted ground level concentrations were evaluated at Karratha, Dampier, Hearson Cove and Ngajarli (Deep Gorge) and compared with relevant criteria in the National Environment Protection Measure (NEPM) air quality standards. Deposition rates were also predicted.

Emission estimates in the Ramboll 2022 study were based on a range of sources, including publicly available datasets, engineering design estimates (maximum and averages) and facility level monitoring data which match the selected year's meteorological data. The scenarios investigated as part of this study included:

A baseline scenario reflecting 2014 sources, including all industrial, mobile, domestic and commercial as well as natural sources. This covers onshore gas processing at steady state operational capacity at Pluto Train 1 and KGP Gas Plants. The year 2014 was selected due to typical meteorology (Ramboll 2022). A comparison of modelled data with real-world air quality monitoring data was undertaken, which "indicated reasonable agreement with the measurements at Burrup Road, Dampier, and Karratha"

A future scenario that considered the above scenario as a basis, but included proposed future additional industrial emissions sources in 2030. This scenario included operation of Pluto Train 1, Pluto Train 2, KGP and Perdaman onshore facilities and other future projects producing at capacity.

Assumptions regarding non-industrial emissions considered in these scenarios were based on a range of sources (Ramboll 2022):

- Mobile sources:
  - Commercial shipping and boating, with data sourced from the maritime automatic identification system (AIS) which also identifies vessel type, enabling application of USEPA default specifications for engines. Recreational boating
  - vehicles, which included data from an ABS survey of motor vehicle use scaled down the region, vehicle registration information and traffic and road network data from Main Roads WA
  - aircraft, which applied techniques from NPI to data supplied by airports and public sources such as aircraft operator website and tracking tools
  - railways, based on public data on fuel consumption per tonne of minerals delivered and mine site production rates. All rail lines in the region are operated by mining companies
  - Domestic and commercial sources:
  - estimates of population (with growth for future scenario),
  - other sources such as solvent and aerosol use (per capita data), bitumen road construction (materials usage), service stations (applying population data to service station locations), domestic fuel burning (from previous surveys) and others
- Natural sources such as vegetation, dust, bushfires and oceanic sources which came from other models

Both the baseline and 2030 scenarios included operation of onshore processing facilities at capacity which covers the portion associated with ongoing processing of Pluto gas.

[102] Study of the Cumulative Impacts of Air Emissions in the Murujuga Airshed: https://www.wa.gov.au/system/files/2023-03/Study-of-the-cumulative-impacts-of-air-emissions-in-the-Murujuga-airshed.pdf.

Specific assumptions for individual emission sources were provided by all regional parties in confidence to DWER or were otherwise estimated by Ramboll based on sources such as NPI for operating facilities, and as such are not published in the report. Woodside provided inputs to the Ramboll 2022 study in response to DWER's data request, and these are aligned with scenario descriptions and assumptions described in North West Shelf Project Extension Environmental Review Document (ERD) Appendix E Air Quality Impact Assessment[103] (Jacobs, 2019), Section 4, Scenarios 3 and 4 with existing, approved and referred facilities operating – which included (amongst others):

- Airshed baseline
- NWS Extension Project with NO_x improvement opportunities
- Expansion of Pluto (Train 2fed by Scarborough gas
- Perdaman Urea project
- Methanol facility proposal.

Ramboll used tools such as the EPA's Proposal Search Tool and related assessment documentation (such as Environment Document Review or Works Approvals) to provide data on future proposed developments. The model performance was validated at a number of locations using real-world air quality monitoring data provided by DWER and industrial operators in the region.

This indicated that NOx loads to the airshed from NO2 concentrations predicted by the model were "similar ranges at Karratha, but the model is biased high at Burrup Road and Dampier" which indicates that modelled outcomes at these locations on Murujuga are conservative. It also indicates that assumptions for model inputs are appropriate.

The Jacobs 2019 assumptions were developed with "reasonable and conservative emission estimates" for the purposes of completing a robust risk and impact assessment of industrial sources are, such as inclusive of elevated flare rates (Jacobs 2019 81). This 2030 projection is the "Future Burrup Strategic Industrial Area state (existing, approved and referred) with proposed emission reductions in place" referred to in Table 6-5 of the NWS Project Extension ERD . The Jacobs 2019 report drew on an earlier aggregated air emissions inventory for the Pilbara region developed by SKM (2003) for sources such as biogenic emissions, vegetation sources and other natural sources, and other previous modelling studies. The Jacobs 2019 model outputs were compared with real-world air quality monitoring results from multiple locations, which indicated that the model was "performing well in terms of being able to accurately predict a variety of statistical results for NO2. as measured by Woodside at the Burrup, Dampier and Karratha monitoring stations" In addition to validating model performance, this also demonstrates that the assumptions used for existing emissions sources were appropriate.

Ramboll 2022 estimated that NOx loads to the Murujuga airshed (1.33 km grid encompassing Dampier Archipelago, Murujuga, Karratha and Roebourne) from industrial sources were estimated to be 13,937 tonnes per year and are forecast to reduce to 12,052 tonnes per year by 2030, when calculated over a 1.33 km grid. A significant contribution to this cumulative airshed reduction is associated with commitments by the NWSJV to reduce NO_x emissions from the Karratha Gas Plant by 40% by 2030. Ramboll (2022) did not predict NO_x air concentrations in excess of current air quality standards in any modelled scenario.

The assumptions for Murujuga airshed NO_x emissions underpinning Ramboll (2022) are suitably conservative for reviewing relative contribution of KGP and Pluto for the onshore processing of Pluto gas using information provided by the respective facilities as described below:

Table 6-30: Comparison of modelled NOx emission assumptions with recent reported information

	Pluto		**KGP**	
	NOx emission rate annual avg (g/s)	*Source/comment*	*NOx emission rate annual avg (g/s)*	*Source/comment*
Baseline Scenario (2014)	34.1 g/s (Train 1)	Jacobs 2019	281.1	Jacobs 2019
Current	29.1 g/s (Train 1 - 15% below modelled baseline)	Reported NPI data, 2022/23 period (with consistent multi-year history)	248.7 (12% below modelled baseline)	Reported NPI data, 2022/23 period (with consistent multi-year history)
Future emissions scenario assumptions	35.6 (Train 1) + 33.59 g/s (Train 2)	Pluto Expansion estimates – Jacobs 2019	149.2 g/s (40% reduction commitment)	NWS Extension ERD commitment (Table 6-9, p 106)

[103] NWS Extension Environment Review Document Appendices: https://www.woodside.com/docs/default-source/current-consultation-activities/australian-activties/north-west-shelf-project-extension---appendices.pdf.

The current trajectory of aggregated emissions in the Murujuga airshed indicates that the future emissions scenario assumptions considered by Ramboll 2022 were conservative because:

- Assumptions for Pluto Train 1 and Train 2 include conservatisms as set out in the Jacobs report. Assumptions for Train 2 equipment are based on vendor specified performance, which is a conservative basis for emission estimation. This performance will be measured and validated in accordance with Condition 38 of the Pluto Train 2 Works Approval[104] which will include a summary of the environmental performance of equipment against design specifications and the Pluto AQMP (which is consistent with Jacobs 2019). Validation is also covered in section 5 of the Pluto AQMP
- KGP has commenced the NOx reduction committed in the NWS Extension ERD[105] (see Table 6-29on pg. 106) with one LNG train planned to be taken offline between late 2024 and mid 2025 (Woodside 2024)
- Emissions estimates for the Perdaman urea project in Jacobs 2019 are 8.93 g/s. It is acknowledged that the current Perdaman Urea Project Air Quality Management Plan (2021) references an Air Quality Impact Assessment (Jacobs 2020) which estimates 'based on engineering and other data" total NOx emissions for the plant of 11.7 g/s. This increase is 0.7% of the Ramboll future scenario and therefore negligible in context of the broader airshed
- It is Woodside's understanding that the proposed Methanol plant is no longer proceeding[106], which for context was expected to contribute 28.05 g/s (Jacobs 2019[81]).

Woodside is not aware of any reason why the future emissions scenario assumptions for contribution to the Murujuga airshed from non-Woodside sources are not appropriate. Any potential future development not considered in this scenario would be required to undergo its own assessment process under regulatory frameworks (described below). Further, the MRAS/MRAMP is expected to identify any ongoing or future trends in air quality which could potentially impact rock art.

The Ramboll 2022 study found that "SO_2, NO_2, $PM_{2.5}$, PM_{10}, CO and NH_3 peak ground level concentrations are centered at industrial facilities near or on the Burrup Peninsula, showing that industrial sources and shipping contribute to emissions in the area, but with total air concentrations for these compounds remaining below current air quality standards except for $PM_{2.5}$ and PM_{10}." The report also noted that the governing driver for particulate matter concentrations was dust, rather than industrial emissions. As stated in the report "There are no accepted or commonly applied standards for assessing deposition of acidic air pollutants on land surfaces or on sensitive receptors such as the Burrup Peninsula rock art. While this assessment report provides results for acidic deposition, no assessment, or commentary is provided about the potential impacts on areas of sensitivity such as the rock art."

Some recommendations are provided in the Ramboll 2022 report related to potential improvements in accuracy regarding terrain datasets, modelling approach for dust and treatment of plumes in the model grid, and uncertainty related to emissions estimates including NPI data. However, "significant effort was made to obtain the most accurate information available with particular focus on sources located near or on the Burrup peninsula" and the comparison of modelled emissions with latest data shown in Table 6-30 indicates that conservatism exists in assumptions. The NWS Project Extension ERD Air Quality Impact Assessment compared measured ground level concentrations of NO_2 from 2009-2015 with NEPM criteria and found no exceedances. The report states that there was "no currently accepted or commonly applied standards for assessing deposition of air pollutants on land surfaces, such as Burrup Peninsula rock art" and the report does not provide any assessment or commentary on potential impacts to rock art.

Applying expected NOx emission rates from Table 6-28 and multi-year NPI reporting history; peak NOx emissions associated with processing of Pluto gas at Pluto and a 1/5th proportion supply of Train 4 or Train 5 capacity at KGP are conservatively estimated to be approximately 1,200 t/yr.

Based on the estimated total regional airshed emissions used in Ramboll (2022) and NO_x contribution to the airshed outlined within the Pluto Air Quality Management Plan (approved in accordance with Ministerial Statement 757), it is estimated that NO_x emissions associated with the processing of Pluto gas via the Pluto LNG facility, and an approximate 1/5th proportion supply of Train 4 or Train 5 capacity at KGP accounts for approximately 12% currently, declining to less than 6% of the total estimated 2030 NO_x load in the Murujuga region. Conservatively applying these estimate over the potential remaining field life results in a total NOx emission estimate of approximately 8,000 t.

Where Pluto gas is processed at KGP, it proportionally displaces other sources of gas processed at this facility (as assumed in the Ramboll (2022) model, which did not need to account for the source of gas); Pluto gas therefore does not result in a net increase in KGP or total airshed NO_x, relative to those presented in the Ramboll 2030 projections.

[104] https://www.der.wa.gov.au/our-work/licences-and-works-approvals/lwa-available-for-public-appeal/item/download/12092_8dfe908804d6cc7505eb20a79d09f08f

[105] https://www.woodside.com/docs/default-source/current-consultation-activities/australian-activties/north-west-shelf-project-extension---environmental-review-document.pdf?sfvrsn=a8b10277_4

[106] https://www.parliament.wa.gov.au/pq/qsearch.nsf/5ba5221642b0ed73482569d60026c3a7/504273a549cd5b5148256df2007b9bbc?OpenDocument

Continued processing of gas from Pluto is therefore not anticipated to cause an increase of NO_x within the Murujuga airshed beyond historic maximum levels; which, as described in Section 4.9.6 has resulted in no scientifically conclusive evidence for anthropogenic change to rock art on Murujuga. The reduction in future NO_x load within the Murujuga air-shed presented in the Ramboll 2022 study is reflective of commitments made by third party proponents that are publicly disclosed either in Ministerial Statements or Air Quality Management Plans.

Existing Regulatory Framework

Facilities associated with the onshore processing of LNG are not subject to the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth). Assessment and management of these emissions is required pursuant to various State and Commonwealth legislative frameworks. Impacts associated with atmospheric emissions are subject to an appropriate level of independent assessment by regulatory agencies and management measures are in place which are sufficient to ensure the environment performance outcome of this PAP can be achieved.

A summary of the relevant legislation, approvals and governance measures in place to manage atmospheric emissions from onshore processing facilities such as Pluto LNG facility, NWS Karratha Gas Plant and Perdaman Urea facility are outlined below.

Environmental Protection (EP) Act 1986 (WA)

The EP Act is the principal legislation in WA that provides for "the prevention, control and abatement of pollution and environmental harm" and for "the conservation, preservation, protection, enhancement and management of the environment".

The object of the EP Act is to protect the environment of Western Australia, having regard to a number of principles, including:

- the precautionary principle, which holds that where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, decisions are to be guided by:
  - careful evaluation to avoid, where practicable, serious or irreversible damage to the environment
  - an assessment of the risk-weighted consequences of various options
- the principle of intergenerational equity, which holds that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations
- the principle of waste minimisation, which holds that all reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment
- principles relating to improved valuation, pricing and incentive mechanisms, which include the 'polluter pays principle' whereby those who generate pollution and waste should bear the costs of containment, avoidance or abatement.

Assessment of Proposals under Pt IV of the EP Act

In Western Australia, it is the role of the independent Environment Protection Authority (EPA) to assess proposals against the requirements of the EP Act and EPA objectives.

Section 15 of the Act establishes the objectives of the EPA (Authority): It is the objective of the Authority to use its best endeavours to protect the environment; and to prevent, control and abate pollution and environmental harm. The object and principles guide the overall application of the powers of the Act. The principles are matters to which the EPA is required to have regard as a condition of the valid exercise of its powers to assess and report on proposals and schemes under the Act. The EPA only recommends that the Minister approve a proposal if it can be demonstrated the proposal is aligned with the Act including any relevant objectives.

Under the EPA's Air Quality Environmental Factor Guideline, the EPA has an objective to *maintain air quality and minimise emissions so that environmental values are protected*[107] (Air Quality Objective). The Air Quality Environmental Factor Guideline identifies that this objective recognises the fundamental link between good air quality and the environmental values it supports. It also recognises the principle of waste minimisation as set out in the EP Act. In the context of this factor and objective, the EPA recognises that maintaining good air quality and minimising emissions protects human health and amenity, as well as the broader environment. When considering the significance of potential impacts to air quality, the EPA may have regard to the various matters outlined in Section 5 of the Statement of Environmental Principles, Factors and Objectives[108], including the Air Quality Objective.

Applicable assessments by the EPA and subsequent decisions by the Minister for Environment under Part IV of the EP Act include Ministerial Statement (MS) 757 for the Pluto LNG Facility, and MS 536 for LNG trains 4 and 5 at the Karratha Gas Plant (KGP). MS 1233 was also recently issued for the North West Shelf (NWS) Project Extension, published in December 2024, which allows for continued operation of the NWS Project and processing of third party gas at KGP. Further information regarding conditions of implementation is detailed in sections below.

[107] EFG – Air Quality - 03.04.2020.pdf (epa.wa.gov.au).
[108] Statement of environmental principles, factors, objectives and aims of EIA (epa.wa.gov.au).

Environment Protection and Biodiversity Conservation Act 1999 (Cth)

The EPBC Act is the Australian Government's key piece of environmental legislation providing for the protection of the environment and the conservation of biodiversity. The EPBC Act requires approval for activities with a significant impact on a number of matters of national environmental significance, including, for example, National Heritage places and listed threatened species or endangered communities.

The Pluto LNG Development Draft Public Environment Report (EPBC Referral 2006/2968) included evaluation of air emissions within the context of presence of rock art and monitoring studies being undertaken at the time (e.g. BRAMMC/CSIRO discussed in Section 4.9.6). Commonwealth ministerial approval of EPBC 2006/2968 was granted in October 2007.

The NWS Project Extension (a proposal to extend operation of the NWS Project beyond 2030) has been assessed under the EPBC Act by the WA EPA under an accredited process (Refer EPA Report 1727). The controlling provision for the proposed action is 'National heritage places', and the Project is subject to assessment by accredited assessment under Part IV of the EP Act at the level of Public Environment Review. The Commonwealth Minister for the Environment will make an approval decision once the State process has completed.

Aboriginal Heritage

Aboriginal sites are of cultural heritage importance to both the Aboriginal and wider community. The Aboriginal Heritage Act 1972 (AH Act) is the principal legislation providing for the preservation of Aboriginal sites and objects in WA. All Aboriginal heritage sites or places to which s.5 of the AH Act applies are protected, whether or not they are registered with the Department of Planning, Lands and Heritage (DPLH). It is an offence under the AH Act to excavate, destroy, damage, conceal or in any way alter any Aboriginal site unless the consent of the Registrar or the Minister for Aboriginal Affairs is first obtained.

Approvals under Pt V of the EP Act

DWER regulates certain premises through a works approval and licensing process to prevent, control, abate and mitigate pollution and environmental harm, under Part V of the EP Act.

Woodside currently holds the following licences for facilities operated on the Burrup Peninsula:

- Pluto Liquefied Natural Gas (LNG) Project (L8752/2013/2)[109]
- Woodside Onshore Gas Treatment Plant (KGP) (L5491/1984/18)[110]

The above-mentioned licences specify air emission limits for individual emission points, NOx concentration in Pluto turbine exhausts is limited to 100 mg/m^3 over a stack test average period not less than 30 minutes; and at KGP 350 mg/m^3 for trains 1, 2 and 3 and 100 mg/m^3 for trains 4 and 5. Monitoring of emissions points is required at the facilities annually and quarterly (respectively). Woodside is required under these licences to submit an Annual Audit Compliance Report identifying compliance with the conditions of the licences ensuring emissions remain within acceptable levels. Copies of the Annual Audit Compliance Reports are available on the DWER's website.

Other Regulatory Measures in Place for Management of Atmospheric Emissions

National Environmental Protection (Ambient Air Quality) Measure (Cth)

The National Environment Protection Council (NEPC), comprising Commonwealth, State, and Territory Ministers, finalised the NEPM (Ambient Air Quality), on 26 June 1998. The National Environment Protection Council Act 1994 (Cth) allows the National Environment Protection Council to make National Environment Protection Measures (NEPMs). NEPMs are a special set of national objectives designed to assist in protecting or managing particular aspects of the environment. The NEPM [Ambient Air Quality] outlines ambient air quality monitoring protocol that allows for the adequate protection of human health and well-being.

National Environment Protection (National Pollutant Inventory) Measure 1998 (Cth)

The National Pollutant Inventory (NPI) is a public database that provides information on 93 selected air pollutants and their emissions, produced as a result of industry, transport, commercial premise, and household activities, and emitted to air, land, and water in Australia. The NPI is a Commonwealth Government initiative and each state and territory is responsible for implementing the program. The objective of the NPI is to inform the community about emissions to water, air, and land and acceptable emissions levels. It also provides information for policy and decision making, environmental planning and management, and minimising waste.

The Woodside operated facilities on the Burrup Peninsula have been reporting emission data to the NPI from the NWS Project since the 1998/1999 reporting period and Pluto since the commencement of operations in 2012. Other facilities located on the Burrup Peninsula including Yara Pilbara Fertilisers Pty Ltd have reported since 2005. Emissions data is publicly available on the Australian Government Department of Climate Change, Energy, the Environment and Water (DCCEEW) website: https://www.dcceew.gov.au/environment/protection/npi

Other Relevant Frameworks and Programs

[109] https://www.der.wa.gov.au/component/k2/item/download/4517_d69d5c4f5e6e32e9687a81cd206801d1.
[110] https://www.der.wa.gov.au/component/k2/item/download/6862_f7458bf91f1480d35d8f604ed3b129e0.

Murujuga National Park Management Plan

As outlined in Section 4.9.5, Murujuga National Park management plan objectives are achieved through measures which include Conservation Agreements, funding and support, and Cultural Heritage Management Plans (Section 6.11). It is under the Conservation Agreement that Woodside continues to support research into, and monitoring of the National Heritage values of the Park and conducts its activities in a manner not inconsistent with the Murujuga National Park management plan.

Program: Murujuga Rock Art (Western Australian Government)

The Western Australian Government publish on their Aboriginal heritage conservation website a summary of their Murujuga Rock Art Program, the partnership with Murujuga Aboriginal Corporation, and the Murujuga Rock Art Strategy. The description of the program is provided in the box below, courtesy of Govt of Western Australia Website: https://www.wa.gov.au/service/aboriginal-affairs/aboriginal-heritage-conservation/program-murujuga-rock-art.

Program Murujuga Rock Art

Background

Murujuga (which means 'hip bone sticking out' in the Ngarluma-Yaburara language) comprises the Burrup Peninsula and the Dampier Archipelago 1,300 km north of Perth, Western Australia. The Government of Western Australia (State Government) recognises Murujuga as a unique ecological and archaeological area containing one of the largest collections of Aboriginal engraved rock art in the world.

Murujuga is also home to industry that contributes to the local, state and national economy and employment. Concerns the rock art could be damaged by industrial air emissions have led to several independent scientific studies and rock art monitoring initiatives since the mid 2000s.

Murujuga Rock Art Strategy

The purpose of the Murujuga Rock Art Strategy (MRAS) is to protect the Aboriginal rock art by providing a long-term framework that builds on previous work to deliver an improved approach to monitoring, analysis and management.

The Murujuga Rock Art Strategy will be reviewed at least every five years. This will ensure it remains current, supports appropriate governance arrangements, and that the best scientific knowledge and management practices are used to protect the rock art.

Scope

The department has primary responsibility for the day-to-day implementation of the strategy in partnership with MAC. This includes working with MAC to oversee the development and implementation of a world's best practice monitoring and analysis program that will determine whether the rock art on Murujuga is subject to accelerated change.

The scope of this strategy is to:

- *establish an environmental quality management framework, including the derivation and implementation of environmental quality criteria*
- *develop and implement a robust program of monitoring and analysis to determine whether change is occurring to the rock art on Murujuga*
- *identify and commission scientific studies to support the implementation of the monitoring and analysis program and management*
- *establish governance arrangements to ensure that:*
  - *monitoring, analysis and reporting are undertaken in such a way as to provide confidence to Traditional Owners, the community, industry scientists and other stakeholders about the integrity, robustness, repeatability and reliability of the monitoring data and results*
  - *government is provided with accurate and appropriate recommendations regarding the protection of the rock art, consistent with legislative responsibilities*
- *develop and implement a communication strategy in consultation with stakeholders.*

The consultation summary report summarises the comments received on the draft strategy. The consultation ran from September 2017 to May 2018. There were 27 written submissions received.

Monitoring Program [Murujuga Rock Art Monitoring Program – MRAMP]

A best practice monitoring and analysis program commenced in 2020. It will provide reliable information on changes and trends in the condition of the rock art and whether the rock art is showing signs of accelerated change.

The program includes:

- *installation of air quality monitoring stations across Murujuga*
- *regular field measurements of selected rock art panels using a variety of methods*
- *detailed laboratory investigation of rock samples, including the microorganisms living on the rock surface.*

The results from these studies will guide management and protection of the rock art. Reports produced as part of the monitoring program are regularly published in the Murujuga Rock Art Strategy document collection.

The monitoring program is overseen by the department and MAC, in consultation with national and international subject matter experts, a panel of independent peer reviewers and stakeholders.

MAC has developed the Murujuga Research Protocols as a set of governing principles and guidelines to ensure research is conducted in a respectful and culturally appropriate manner.

[continues over…]

[…continued]

The monitoring program is being implemented by Calibre Group and experts from Curtin University until early 2026. Curtin University has also developed a training program for MAC Rangers to build their skills and knowledge in monitoring and analysis techniques. Once Rangers are qualified, MAC will be well placed to implement the monitoring from 2026 onwards.

Conceptual models of the rock art system were published in 2021 to share the current understanding of the system and interactions that are likely to be occurring. These models inform the development of the monitoring studies plans and the development of an environmental quality management framework.

The monitoring studies data collection and analysis plan, published in April 2022, is crucial to the design of the Murujuga Rock Art Monitoring Program, and the scope and quality of the science to monitor, evaluate and report on changes and trends in the integrity of the rock art on Murujuga.

The first Monitoring Studies Technical Report was published in December 2023, following an independent peer review process. View the Summary Monitoring Studies Report. View all reports from the Murujuga Rock Art Monitoring Program.

Key Milestones and Status:

Year	***Program Key Milestone and Status***
2020-2021	• *Review weathering/alteration/degradation processes that have the potential to cause change in the rock art (**completed**).* • *Deliver a stakeholder workshop (**completed**).* • *Develop conceptual models and a monitoring studies plan (**completed**).* • *Determine optimal monitoring sites (**completed**).* • *Peer-review conceptual model and monitoring studies plan (**completed**).*
2022	• *Gain MAC and the department's approval of the monitoring studies plan (**completed**).* • *Obtain State Government commitment to funding dedicated MAC Ranger positions and to support training and capacity building for MAC (**announced May 2022**).* • *Complete fieldwork and laboratory monitoring studies (**2022 studies completed**).* • *Commence Ranger training needs analysis, Ranger training and capacity building (**completed**).*
2023	• *Continue fieldwork and laboratory monitoring studies (**2023 fieldwork completed**).* • *Procure and install air quality monitoring stations (**completed**).* • *Continue of Ranger training and capacity building (**completed**).* • *Develop report on monitoring studies Mar 2022–Mar 2023 (peer reviewed) (**completed**).* • *Deliver a stakeholder workshop (**completed**).*
2024	• *Continue fieldwork and laboratory monitoring studies.* • *Report on monitoring studies April 2023–April 2024 (peer reviewed).* • *Design ongoing monitoring program.* • *Develop interim Environmental Quality Criteria (EQC) based on field and laboratory (chamber) studies.* • *Implement the ongoing monitoring program.* • *Commence reporting against interim EQC.* • *Continue Ranger training and capacity building (Curtin University micro credentials).* • *Develop Environmental Monitoring Programme Regulations under the Environmental Protection Act 1986.* • *Perform independent review of the Murujuga Rock Art Strategy.*

[continues over…]

[…continued]

Key Milestones and Status:

Year	*Program Key Milestone and Status*
2025	• *Report on monitoring studies April 2024–April 2025 (peer reviewed).* • *Design final monitoring program.* • *Develop final EQC.* • *Report on monitoring program 2024–2025.* • *Commence progressive handover monitoring and reporting program to Murujuga Aboriginal Corporation (with support from the department).* • *Perform independent review of the monitoring program.*
2026 (and beyond)	• *Perform ongoing monitoring program, managed by the Murujuga Aboriginal Corporation and the Department of Water and Environmental Regulation.* • *Perform ongoing monitoring and reporting against final EQC.*

Stakeholder Reference Group:

The Murujuga Rock Art Stakeholder Reference Group is an advisory group that was established by the previous Minister for Environment, Hon. Stephen Dawson MLC, in September 2018. The group facilitates engagement between the Murujuga Aboriginal Corporation (MAC) and key government, industry and community representatives on the development and implementation of the strategy.

Professor Stephen van Leeuwen is the independent chair of the stakeholder reference group, which meets on a quarterly basis. Visit the document collection to read summaries of meetings and community forums.

The Terms of Reference are reviewed regularly in consultation with MAC and the Independent Chair to ensure the group remains effective in achieving its purpose.

[end]

Murujuga Rock Art Monitoring Program

In recognising the high level of stakeholder concern and scientific uncertainty regarding the links between anthropogenic emissions and risks to rock art (see Appendix F), in 2019 the Department of Water and Environmental Regulation (DWER) produced the Murujuga Rock Art Strategy[111] (MRAS), which builds on the research to date, and according to DWER will establish a world's best practice program to monitor, evaluate and report on factors that could affect the condition of Murujuga rock art. This is being undertaken in consultation with the Murujuga Aboriginal Corporation, a team of national and international experts in relevant disciplines and is funded by industry, including Woodside. The MRAS describes a risk-based approach for the management of impacts to the rock art that is consistent with the State Government's responsibilities under the EP Act.

A program being executed as part of the MRAS is the Murujuga Rock Art Monitoring Program (MRAMP) which will monitor, evaluate, and report on changes and trends in the integrity of the rock art, specifically to determine whether anthropogenic emissions are accelerating the natural weathering, alteration, or degradation of the rock art. This will enable timely and appropriate management responses by the Western Australian Government, industry and other stakeholders to emerging issues and risks. The following extract from the WA Government website MRAS website outlines this. (Govt of Western Australia (December 2023) https://www.wa.gov.au/service/aboriginal-affairs/aboriginal-heritage-conservation/program-murujuga-rock-art#frequently-asked-questions).

[111] https://www.wa.gov.au/system/files/2020-07/DWER-Murujuga-rock-art-strategy.pdf.

How Will the Murujuga Rock Art Strategy Provide Protection for the Rock Art?

The initial studies will allow the scientific team to determine the levels of various air emissions that may cause accelerated weathering of the rock art. These levels will not necessarily be identified during the field studies on Murujuga Country, in which case they will be informed by laboratory tests.

The research will inform an environmental quality management framework. Specifically, the levels of air emissions at which accelerated weathering is deemed to occur will be used to inform environmental quality criteria. The ongoing monitoring program, administered by MAC and the department, will gather data and ensure that emissions do not exceed the criteria. Industry will also be regulated to ensure their emissions will not cause the criteria to be exceeded.

There are two types of environmental quality criteria under the framework: environmental quality standards and environmental quality guidelines. Guidelines provide early warning of potential environmental effects, while standards indicate where the level of risk is no longer acceptable, triggering a management response to prevent environmental harm. In the case of the rock art, an exceedance of the standard means there is a high risk of permanent loss or damage to the rock art.

While environmental quality criteria have been used successfully in other contexts, it is important to remember that there are no environmental quality standards or guidelines values currently available anywhere in the world that can be applied to engraved rock art.

[… and…]

What is the Connection with World Heritage Listing?

The World Heritage nomination for Murujuga includes a comprehensive and effective management framework that outlines how the potential 'Outstanding Universal Value' of the area will be protected, conserved and monitored. As part of this framework, the State Government and MAC will demonstrate how they are working closely together to protect the rock art through the Murujuga Rock Art Strategy and the Murujuga Rock Art Monitoring Program.

The DBCA website has more information on the World Heritage nomination.

In recent EPA assessment reports for industrial facilities on the Burrup Peninsula, the EPA has recommended a condition mandating relevant facilities to comply with air quality standards such as those derived from the MRAMP.

In the EPA's North West Shelf Project Extension Assessment Report 1727 (EPA Report 1727), the EPA recommends the 'Air Quality Outcome' for recommended condition 3 be 'to ensure that no air emissions from the proposal have an adverse impact accelerating the weathering of rock art within Murujuga beyond natural rates.'

Recommended condition 3-3 states that if the Minister notifies the proponent in writing of one or more air quality standards to be met (including standards derived from the results of the Murujuga Rock Art Monitoring Program) and the proponent complies with all those standards, and any amendments to the standards the proponent is taken to have achieved the Air Quality Outcome.

EPA Report 1727[112] specifies that the proponent is to achieve compliance with any detailed air quality standards to ensure that there are no adverse impacts accelerating the weathering of rock art within Murujuga beyond natural rates. The EPA expects that this will include environmental quality objectives and environmental quality standards derived from the results of the MRAMP. Ministerial Statement 1233[113] was subsequently issued for the North West Shelf Project Extension, published in December 2024, adopting the above mentioned EPA recommended conditions relating to air quality. The Ministerial Statement for the Perdaman Urea Project (MS 1180) includes the same air quality outcome condition that is proposed in EPA Report 1727 and MS 1233.

The Pluto LNG Facility has a Cultural Heritage Management Plan and Air Quality Management Plan (AQMP) (required under Ministerial Statement 757). Statements and commitments made by Woodside within the North West Shelf Air Quality Management Plan and the Pluto LNG Facility Air Quality Management Plan commit to manage potential impacts to Aboriginal rock art on the Burrup Peninsula in accordance with the MRAS and as a member of the Murujuga Rock Art Stakeholder Reference Group. Woodside actively supports the implementation of the Murujuga Rock Art Strategy through membership of the Murujuga Rock Art Reference Group and provides funding associated with the Murujuga Rock Art Monitoring Program. Woodside also supports the coordinated approach for an atmospheric deposition monitoring program to be established under the Strategy, and currently provides data to the program from the Woodside Atmospheric and Ambient Air Quality Monitoring Programs.

[112] North West Shelf Project Extension Proposal (epa.wa.gov.au).

[113] https://www.epa.wa.gov.au/sites/default/files/1MINSTAT/1727%20Statement%201233%20for%20publishing%20North%20West%20Shelf_0.pdf

Onshore Facility Air Emission Design Mitigations

Under the regulatory Conditions and Part IV Air Quality Management Plans of onshore processing facilities on the Burrup, operators are required to implement a number of controls and risk management practices related to air emissions, including the demonstration of best practice design, and monitoring and abatement programs.

Condition 11-1 of Ministerial Statement 757 required the development of an Assessment of Best Practice for Minimising Emissions to Air from Major Plant (Best Practice Report) for the Pluto LNG Facility and condition 11-2 required the development of the Pluto LNG Facility Air Quality Management Plan to demonstrate that best available practicable and efficient technologies are used to minimise and monitor air emissions from the plant. This demonstration was required to meet the requirements of the Minister for the Environment on advice of the EPA prior to Woodside applying for and obtaining a Works Approval to construct the Pluto LNG facility. In 2019, these reports were updated to include Pluto Train 2 and subject to an independent peer review commissioned by the EPA, before being approved by the Minister for Environment in 2020 on advice of the EPA.

Best practice technologies to minimise air emissions implemented in Pluto LNG design and operation include:

- dry Low NO_x emissions control systems on gas turbines
- specification of activated methyldiethanolamine (aMDEA) in the acid gas removal system to reduce co-absorption of benzene, toluene and xylene (BTX) and other hydrocarbons.
- installation of a regenerative thermal oxidiser on the acid gas removal unit
- flare design integrated smokeless flaring technologies implemented for the storage and loading flare system, cold dry flare, warm wet flare and common spare flare.
- Best practice technologies to minimise air emissions implemented in Pluto LNG Train 2 design and operation are also included associated with facility expansion to process Scarborough gas.

The Pluto Ministerial Statement 757 requires the Pluto Air Quality Management Plan to include:

- targets and standards
- an emissions monitoring programme to cover specified pollutant compounds
- an ambient air monitoring programme and a nitrogen deposition monitoring programme
- provisions for annual reporting

Annual compliance reporting against these requirements is provided to the WA EPA and published on the Woodside website – Pluto LNG Environmental Compliance Reporting114.

Point source emissions monitoring under the Pluto Air Quality Management Plan focusses on validating emissions performance during operations against targets (50 mg/Nm3 and 70 mg/Nm3) which are lower than Licenced emissions limits. Any target excursions are investigated through Woodside's management system investigation practices, and actions taken toward rectification back within the target values, with emissions above target and responses summarised in annual reporting.

The NWS Extension Environment Review Document115 details how the most recent LNG trains (Trains 4 and 5) constructed at the existing North West Shelf Project are already equipped with lower NOx technology for gas turbines. KGP's Ministerial Statement 536116 (February 2000) applicable for the construction and operation of Train 4 and Train 5 included the requirement to install low-NOx burners on new gas equipment.

In addition, EPA Report 1727 includes recommended conditions requiring the minimisation of air emissions from the NWS Project Extension proposal by the adoption of practicable technologies, and, as a minimum, a substantial reduction of both total NO_x and VOC emissions from the proposal baseline by 31 December 2030.

Ministerial Statement 1233[117] (MS 1233) issued for the North West Shelf Project Extension, published in December 2024, requires that:

…no air emissions from the proposal have an adverse impact accelerating the weathering of rock art within Murujuga beyond natural rates.

MS 1233 contains a number of conditions related to air quality and NOx emissions, including but not limited to:

- Within 12 months of issue of MS 1233, the Air Quality Management Plan must be revised in consultation with Murujuga Key Stakeholders

[114] https://www.woodside.com/what-we-do/operations/pluto-lng/pluto-lng-environmental-compliance-reporting
[115] https://www.epa.wa.gov.au/sites/default/files/PER_documentation2/NWS%20Project%20Extension%20-%20Environmental%20Review%20Document.pdf.
[116] https://www.epa.wa.gov.au/sites/default/files/1MINSTAT/Ministerial%20Statement%20536.pdf
[117] https://www.epa.wa.gov.au/sites/default/files/1MINSTAT/1727%20Statement%201233%20for%20publishing%20North%20West%20Shelf_0.pdf

- Compliance with all air quality objectives and standards, including, if applicable, those derived from the results of the MRAMP
- At a minimum, reduce NOx emissions to 3065 tpa by 31 December 2030, corresponding to a 60% reduction
- Include provisions for adoption of continuous or predictive emission monitoring technologies on each stack of LNG processing trains by 30 June 2030
- Identification of best practice design and operational measures and efficient technologies implemented or to be implemented:
  - Specifying when each measure will be implemented
  - Methodology for determination of effectiveness of the measure in minimising air emissions
  - Independent Peer Review Report assessing these measures against international and Australian industry best practice

Monitoring data and compliance reporting is required to be provided to the WA EPA and made public.

The existing NWS Air Quality Management Plan includes the following management actions:

- MA4: Adopt practicable and efficient technologies to reduce air emissions. The AQMP states that Woodside has identified and evaluated credible opportunities to achieve a long term reduction in air emissions and commits to a 40% [updated to 60% in MS1233 Condition] reduction in NOx emissions from a baseline set between 2013 and 2018. Measures which the NWS has or is considering include implementation of technology such as water injection, dry-low NOx, ultra dry-low NOx, selective catalytic reduction (SCR) systems on turbines, or ceasing operation of older non-DLN equipment with proportionally higher NOx emissions.
- MA5: Implement an adaptive management plan addressing the potential impact to rock art from industrial emissions. This is described in the AQMP, stating that since it is difficult to set appropriate management actions given the current lack of scientific understanding of the impacts of air emissions on petroglyphs, actions will be monitored, reviewed, evaluated and updated considering a range of factors including outcomes from MRAS.

Should credible scientific evidence emerge that industrial emissions are causing accelerated weathering of Murujuga rock art as an outcome of MRAMP, the impact profile of onshore atmospheric emissions may change. In this eventuality, sufficient provisions exist in the relevant onshore regulatory frameworks as described above to ensure that onshore atmospheric emissions are limited to acceptable levels, which may require review of controls currently in place at onshore processing facilities to manage potential impacts (for example under section 2 of MS1233 for NWS, or section 10 of the Pluto AQMP). In such a case whereby impact is attributed to the onshore process of Pluto gas, EP change management process would apply (Section 7.3.2) as required by Regulation 39. It is not feasible to pre-emptively lay out a planned response to such an outcome because there is a broad range of potential findings, severity of change, mechanism timeframes, attribution considerations, and outcomes from stakeholder engagement. However, potential options are available to reduce NOx emissions in this context and to achieve the 60% reduction in NOx emissions at NWS required under MS1233, which may include:

- Retrofitting NOx reduction technology such as DLN (or other technologies as noted above under description of NWS AQMP MA4) on, or ceasing operation of older non-DLN equipment at KGP which emits proportionally higher NOx concentration, noting that Pluto gas is not processed into LNG through these older trains in any case
- Implementation of further NOx reduction measures or technologies which may no longer be considered disproportionate in context of a proven impact pathway, such as water injection, dry-low NOx, ultra dry-low NOx.

Both Pluto LNG Facility and NWS Karratha Gas Plant are also subject to cultural heritage management obligations detailed in MS757 and MS1233 respectively – further described in Section 6.11.

Detailed Impact Assessment

Indirect Emissions from Gas Processing Onshore – Assessment of Potential Impacts

Contribution to Accelerated Weathering of Murujuga Rock Art

The Dampier Archipelago, including the Burrup Peninsula and surrounds, traditionally referred to as Murujuga (which means 'Hip Bone Sticking Out' in the Ngarluma-Yaburara language) is located in the Pilbara region of WA. With more than one million images, Murujuga is home to one of the largest, densest and most diverse collections of rock art in the world.[118]

[118] https://www.wa.gov.au/system/files/2020-07/DWER-Murujuga-rock-art-strategy.pdf.

The presence of industry on the Burrup Peninsula has generated concerns from some stakeholders that these emissions may lead to an accelerated weathering of rocks on which rock art is present which may reduce the visibility or destroy the rock art. Research to date on the impacts of emissions on rock art has not been conclusive, and there are currently no set air quality thresholds for the protection of rock art.

As outlined in Section 4.9.6, industrial emissions on the Burrup Peninsula are subject to extensive scientific studies to understand any potential pathway to impact on rock art, including wet and dry deposition which may alter the pH of rocks as well as the supply of nutrients which may promote microbial activity, the metabolic by-products of which may interact with rock surfaces.

The history of research on this subject, set out in more detail in Section 4.9.6, may be broadly divided into four periods. The earliest period, from 2002 to 2009, aligns with the studies conducted by the Burrup Rock Art Monitoring Management Committee (BRAMMC) but also includes work conducted by others, primarily Bednarik who identified potential impact pathways through acid formation and microbial impacts. During this period MacLeod (2005) also took some comparative pH samples between in-situ rocks and museum samples. None of this parallel work established that industrial emissions were impacting rock art, or the levels of emissions at which impacts may be expected to occur. This period concluded with the 2009 BRAMMC report which stated that “there is no scientific evidence to indicate that there is any measurable impact of emissions on the rate of deterioration of the Aboriginal rock art in the Burrup” (BRAMMC, 2009) but recommended the establishment of the Burrup Rock Art Technical Working Group (BRATWG) to conduct ongoing monitoring.

The second period of research aligns with this monitoring from 2010 to 2017. A significant component of this monitoring involved the monitoring of rock art colour. In 2016, Black and Diffey produced an unpublished paper critiquing the statistical methods applied by the CSIRO, which led to a review by Data Analysis Australia (DAA) which also raised “substantial doubts about the reliability of the data”. A final report from the CSIRO adapted its statistical methods to respond where possible to the conclusions from DAA but the results were described as “not fully conclusive”. Also, during this period, the BRATWG also commissioned an extreme condition weathering study which found that the dissolution of chemicals began at lower pH levels than previously estimated, however this work was only preliminary and should not be relied upon in setting thresholds for potential impacts.

The third research period, although overlapping with the conclusion of the BRATWG and initial years of the MRAS and MRAMP, is marked by the absence of any results from a coordinated, well-resourced research program and instead comprises a number of independent studies between 2017 and 2023. As a result, it is difficult to characterise these studies consistently. Some (Black et al., 2017a; Dorn, 2020; Smith, 2022a) critiqued or re-stated conclusions of previous studies. Black et al. 2017b repurposes historic pH data and concludes that “theoretical evaluation using electrochemical equilibrium principles” indicates impacts to rock art will result from a decreased pH since pre-industrial times; CGB Solutions’ 2020 analysis of historic pH and contemporary measurements found that pH was not decreasing and that any correlation between acidity and LNG production sites could not be statistically supported. Both studies suffer from significant issues with the available data.

Other studies (Black et al., 2018; Gleeson et al., 2018) discuss possible impact pathways but stop short of drawing conclusions on whether impacts to rock art are resulting from industrial emissions. Smith et al. (2022b) does hypothesise that industrial emissions may be responsible for some reported impacts but acknowledges that the methodologies applied are subject to considerable errors that prevent a definitive conclusion being drawn. A series of studies by MacLeod (2020, 2021, MacLeod and Fish, 2021) report on the results of monitoring conducted for Yara Pilbara Nitrates. The outcomes of these reports are inconsistent. Solo reports by MacLeod (2020, 2021) both state that “There is unequivocal evidence that the changes in colour contrast are affected by the changes in the mean and in the minimum pH observed on the rock art sites at the reference positions”, though the results include increased acidity correlating in some places with increased contrast and elsewhere with decreased contrast. MacLeod and Fish (2021) then state that “there is presently no adverse impact on the rock engravings from industrial pollution owing to a lower NO_x level than when the studies commenced 14 years ago”. This conclusion is critiqued by Smith et al. (2022a).

As noted in the MRAMP conceptual model, “while many of these studies form useful datasets to include in subsequent analyses, in general these studies have been inconclusive or failed to show any significant impact of anthropogenic impact on the rock art or chemical/biological species composition and abundance (Commonwealth of Australia, 2018). Nor have they produced any definitive relationships to inform a conceptual impact model, which is instead reliant on fundamental scientific studies in other regions to inform the likely processes occurring at Murujuga (e.g., Dorn, 2020[119]).”

In December 2023, the first interim report of MRAMP[120] was published (refer to Section 4.9.6), marking the start of a fourth period of research. The report states that results remain inconclusive with regards to whether industrial air emissions are resulting in anthropogenic change to rock art and recommends that further scientific studies are required. The MRAMP report noted that while some spatial trends in electrochemical parameters (such as pH) and rock surface elemental composition have been found, more work is required to determine causal relationships for these trends (as relationships were not as expected). Spatial trends were also identified as appearing for several

[119] https://www.wa.gov.au/system/files/2023-12/murujuga-rock-art-monitoring-program-conceptual-models.pdf.
[120] https://www.wa.gov.au/system/files/2023-12/murujuga-rock-art-monitoring-program-monitoring-studies-repo2023.pdf.

measured air pollutants such as NO_2 that are generally consistent with earlier air quality modelling by Ramboll (Ramboll 2022).

The MRAMP monitoring report outlined that similar trends exist for the pH measurements taken in March–April 2022 and the measured NO_2 levels generally. This relationship was the reverse of what would be expected to confirm the acid deposition hypothesis in previous literature as MRAMP found pH values in March–April 2022 were highest where NO_2 concentrations are highest; whereas with acid deposition, pH is expected to be lower where NO_2 is higher, as NO_2 is often a precursor to the formation of nitric acid, which has a low pH. Neutral pH is around 7, with low pH indicating potentially acidic conditions. The results in the MRAMP monitoring report have been reinterpreted by Smith (2024) in addition to original research but fails to address this unexpected correlation. Smith (2024) claims that "the damaging impact of acidic emissions on the rock surfaces is not in doubt" but does not provide adequate detail on the original research to allow its reliability to be considered, nor does it provide reason to question the conclusions of the MRAMP report, which stress that the available data is insufficient to draft any meaningful conclusions.

Throughout this ongoing period of research, new information will continue to be considered and responded to. However, the resourcing, scope and expertise available to MRAMP make it by far the most significant source of research on the cultural impacts of industrial emissions on Murujuga. MRAMP is also co-managed by MAC and emphasises Indigenous decision making and management, aligned with international guidance and standards, including the United Nations Declaration on the Rights of Indigenous Peoples and ICOMOS Charter for the Protection and Management of the Archaeological Heritage. For these reasons, the results of the MRAMP are prioritised in understanding the potential for emission to impact Murujuga's rock art.

The contribution of emissions from processing of Pluto gas to the Murujuga airshed is relatively small over the remaining life of Pluto Offshore Operations. Further, there is inconclusive evidence for any causal link between industrial air emissions and anthropogenic change to rock art on Murujuga. Given this, and that downstream facilities are subject to separate regulatory assessment outcomes, the risk of processing of Pluto gas at onshore facilities adversely impacting rock art on Murujuga is considered to be low, and no impact classification is able to be assigned. Woodside will continue to monitor the outcomes of MRAMP (as per C 11.1) and update or change manage the EP accordingly (Section 7.3)

Potential Impacts to Human Health

It is recognised that gaseous emissions causing a reduction in ambient air quality have the potential to impact human health as regulated by the NEPM. Both the Pluto LNG Facility and NWS Project Air Quality Management Plans have modelled and assessed the potential impacts of industrial emissions on human health in accordance with the requirements of Western Australian regulatory requirements and international standards (e.g., World Health Organisation). Ambient air quality monitoring programs are in place which demonstrate that current air pollution levels were well below standards set to protect human health and well-being.[121] The magnitude of emissions from processing Pluto gas are insufficient to lead to the exceedance of any relevant health criteria on the Burrup Peninsula or surrounding region.

Both Pluto LNG facility and the NWS Project have committed to maintaining an ongoing air quality monitoring program that is in place to monitor the ambient ground-level concentrations of relevant gases on the Burrup Peninsula, with comparisons being made against the NEPM standards and reported to DWER.

Ambient air quality monitoring results from Pluto and NWS Project will be summarised in the relevant facilities' Annual Environment Report, including any observed exceedances of ambient air quality standards.

As part of the NWS Extension proposal, the EPA assessed the residual impact to human health and amenity from the proposal's nitrogen dioxide (NO_2), SO_2, NH_3, ozone (O_3), and particulate (as PM_{10} and $PM_{2.5}$) emissions at sensitive receptors both in isolation and in a cumulative context with other existing and future emission sources. Predicted ground level concentrations (GLCs) at Dampier, Karratha, Hearson Cove, and Deep Gorge (Ngajarli) remain below applicable current and future proposed air quality criteria at 'standard operating conditions' and 'worst case' cumulative impact scenarios, with the exception of annual PM_{10} and $PM_{2.5}$ GLCs at Hearson Cove and Deep Gorge (Ngajarli), which slightly exceed the applicable criteria due to high levels of natural background dust. Subject to recommended conditions, the impact of the proposal was considered as being consistent with the EPA's objective for air quality in respect of human health.

Noting the absence of any current impacts to human health from industrial activity on Murujuga and presence of a comprehensive regulatory regime including monitoring program, the risk of processing of Pluto gas to human health is assessed as Negligible (F) based on slight effect to overall cumulative air quality in context of defined air quality criteria.

[121] Pluto Air Quality Management Plan, Rev 2

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/ Sacrifice (CS)**	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
Legislation, Codes and Standards				
MRAS and associated MRAMP in place by DWER and MAC to protect the Aboriginal rock art by providing a long-term framework that builds on previous work to deliver an improved approach to monitoring, analysis and management. The MRAS describes an approach for the management of impacts to the rock art that is consistent with the State Government's responsibilities under the Environmental Protection Act 1986 (WA). Woodside will maintain membership of the Murujuga Rock Art Reference Group Woodside funding contributes to the execution of the MRAS and MRAMP Woodside monitors the outcomes of the MRAMP and assesses relevance to this activity as part of the implementation strategy of this EP.	F: Yes. CS: Aligned with existing practice	Benefit as defined in sections detailed above: • Program: Murujuga Rock Art (Western Australian Government) • Murujuga Rock Art Monitoring Program. Further studies governed by DWER/MAC are required to provide greater scientific certainty and allay stakeholder concerns.	Control based on State Government Process, the outcomes of which are currently, or expected to be, implemented via current Regulatory regimes.	Yes. **C 11.1**
Onshore processing facilities Onshore processing facilities (Pluto LNG, NWS Karratha Gas Plant) are subject to assessment and compliance under the Environmental Protection Act 1986 (WA), including: • Existence of applicable Ministerial Statement(s) • Implementation of potential EQMF if developed as an outcome of MRAS • NOx concentration limits at emission point	F: Yes. CS: Aligned with existing practice.	Implementation of activities and associated controls to ALARP and acceptable levels supports the maintenance of cultural features and heritage values. NWS AQMP MA4 commits to adoption of practicable and efficient technologies to reduce air emissions. MS 1233 requires a reduction of NOx emissions from	Control based on legislative requirements – must be adopted.	Yes. **C 11.2**

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/ Sacrifice (CS)**	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
sources (via. EP Act Part V Licencing) • Implementation of Part IV conditions. • Requirement to assess and implement NOx reduction measures, (e.g. Pluto Best Practice Report, NWS AQMP MA4) This includes implementation of potential EQMF developed as an outcome of MRAS; and measures such as NOx concentration limits at emissions point sources under EP Act Part V licences, and implementation of Part IV conditions. The NWS AQMP also requires MA5 development of an adaptive management plan to address the potential impact to rock art from industrial emissions.		KGP of 60% by 2030, and identification and implementation of best practice (with peer review). Pluto MS 757 required an Assessment of Best Practice for Minimising Emissions to Air from Major Plant. Further information on these requirements is described above, under Onshore Facility Air Emission Design Mitigations		
Implement the PAP in a manner that is not inconsistent with the objectives of the Murujuga National Park Management Plan 78, through execution of the Conservation Agreement and Deep Gorge Joint Statement.	F: Yes CS: Significant potential cost. Legal requirement.	Legal requirement to carry out activities not inconsistent with the Murujuga National Park Management Plan.	Control based on legislative requirements – must be adopted.	**Yes** C11.3
Good Practice				
Forecast, measure, monitor and or estimate facility fuel and flare emissions (in accordance with NGERS and WMS procedures named in Section 7.2.11.2) to inform optimisation management practices and minimise environmental impact of emissions.	F: Yes. CS: Minimal cost. Standard practice.	Minimises environmental impact of emissions through planning, ongoing review, governance and optimisation. It combines with good operating practice to maximise production and reduce flaring emissions (Pluto) and fuel emissions at the LNG plant to manage cost, which improves energy intensity (e.g. cleaner production),	Control is WMS requirement – must be adopted.	Yes **C 10.9**

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/ Sacrifice (CS)**	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
		optimising emissions from the project. Fuel and flared gas are potential product streams, as such, Woodside applies routine short and long term optimisation and opportunity management framework to identify and prioritise enhancement opportunities. On Pluto to date this has been limited to reduced flaring (e.g. flare purge rates); however overall system efficiencies (such as well and composition optimisation) and LNG Plant opportunities are also considered in this process. Annual flare and emissions target setting and monthly review of performance is completed for Pluto. The LNG Plant also applies flare and emissions target setting and tracking for emissions management. Daily production meetings allow for optimisation as an integrated production system, considering impacts of variables such as maintenance activities and temperature influence on production rates.		
Professional Judgement – Eliminate				
No additional controls identified.				
Professional Judgement – Substitute				
No additional controls identified.				
Professional Judgement – Engineered Solutions				
Processing of Pluto gas into LNG trains at Pluto LNG Plant and KGP (T4/T5)	F: Yes	DLN is a turbine combustion control technique based on	Proportional, and specified in design in line with Best	Yes **C 11.**4

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/ Sacrifice (CS)**	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
equipped with Dry Low NOx (DLN) technologies.	CS: Minimal cost, equipment already in place at onshore facilities	pre-mixing fuel and air prior to entering the combustion chamber. This enables turbine power output at proportionally lower combustion temperature, thereby materially reducing NOx concentration in exhaust (by approximately 70%)	Practice technology assessment and selection. Emissions performance monitoring requirements specified in EP Act Pt V Licences	
Selective Catalytic Reduction (SCR) at onshore processing facilities[122].	F: Potentially; subject to sufficient space and technical integration and safety requirements. Installation of SCR on gas turbines to reduce NOx emissions is proven in the power industry. Woodside is not aware of any instances where this has been retrofitted to mechanical drive turbines such as those used in LNG trains. CS: Substantial cost and significant business disruption. The installation of SCR systems introduces material new hazards to facilities, including the need to import significant amounts of ammonia daily,	SCR technology converts NOx to other compounds using a catalyst and gaseous reagent, usually ammonia or urea. If feasible, the installation of SCR on existing turbines could deliver a material reduction in NOx emissions from onshore processing.	Not proportional based on current impact profile. SCR was not selected for Pluto Train 1 nor recent Train 2, however the design was subject to peer review and EPA assessment with regard to best practice emission controls. Retrofitting on operational processing facilities carries significant cost, safety considerations and complexity.	No

[122] Proposed by Friends of Australian Rock Art in consultation (Refer to Appendix F)

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/ Sacrifice (CS)**	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
	and potentially introduces risks associated with ammonia emissions while operating (which are also being monitored for potential impact to rock art). New gas fired boilers would be required to replace lost ability to extract heat from best-practice exhaust waste-heat recovery systems.			

ALARP Statement:

On the basis of the environmental risk assessment outcomes and the use of the relevant tools appropriate to decision type B for indirect emissions from gas processing onshore, Woodside considers the adopted controls appropriate to manage the risk.

Air emissions from onshore processing at Pluto LNG Facility are managed under Ministerial Statement 757.

Air emissions from onshore processing at the NWS Project have been assessed and approved in accordance with Ministerial Statement 536 (and others). Air emissions from onshore processing at the NWS Project Extension (i.e., an extension of the life of the NWSV beyond 2030) have been assessed by the EPA under Assessment Report 1727, and approved by Ministerial Statement 1233. Both facilities are subject to the provisions of Commonwealth and State legislation to ensure unacceptable environmental impacts are avoided.

The assessment in the ALARP table reflects the current status of controls related to routine atmospheric emissions, in the context that there is currently no scientific consensus that anthropogenic emissions are accelerating weathering of Murujuga rock art. These current controls are considered to appropriately implement a risk-weighted precautionary principle.

As described above, established programs and frameworks such as MRAS/MRAMP are designed to investigate theorised impact pathways and determine whether impact is occurring. Should credible scientific evidence emerge that anthropogenic emissions associated with processing of Pluto gas are causing accelerated weathering of Murujuga rock art as an outcome of MRAMP, the impact profile of onshore atmospheric emissions may change. In this eventuality, sufficient provisions exist in the relevant onshore regulatory frameworks to ensure that onshore atmospheric emissions are limited to acceptable levels, which may require review of controls currently in place at onshore processing facilities to manage potential impacts.

As no reasonable additional/alternative controls were identified that would further reduce the impacts without being grossly disproportionate the impacts and risks are considered ALARP.

Societal Values

Consultation was undertaken for this program to identify the views and concerns of relevant stakeholders. Industrial air emissions on the Burrup Peninsula are being managed by the EPA as part of the EP Act Part IV assessment process and DWER as part of their EP Act Part V process and via the MRAS. It is important to note that operators of the Pluto LNG Facility and Northwest Shelf Karratha Gas Plant have both made public commitments to supporting the outcomes of MRAS.

Atmospheric emissions associated with onshore processing of Pluto gas and potential for impact of those emissions on rock art was noted as a material issue for relevant persons consulted in the course of preparing this EP. All

Demonstration of ALARP				
Control Considered	**Control Feasibility (F) and Cost/ Sacrifice (CS)**	**Benefit in Impact/Risk Reduction**	**Proportionality**	**Control Adopted**
feedback, claims or objections from relevant persons has been appropriately responded to, addressed (see Appendix F and controls proposed have been assessed in the EP. ***Summary of ALARP Statement:*** On the basis of the environmental risk assessment outcomes and use of the relevant tools appropriate to the decision type (i.e., Decision Type B for indirect emissions), the adopted controls are appropriate to manage the indirect impacts of air emissions related with processing Pluto gas onshore. The adopted controls meet NEPM, EP Act Part IV and Part V legislative requirements, and include application of precautionary measures to protect environmental cultural heritage values. As no reasonable additional/alternative controls were identified that would further reduce the impacts without being grossly disproportionate sacrifice, the impacts and risks are considered ALARP.				

Demonstration of Acceptability
Acceptability Criteria and Assessment
Acceptability Statement: Indirect Atmospheric Emissions The impact assessment concludes that indirect atmospheric emissions from the onshore processing of Pluto gas contribute only a minor portion to the overall industrial emission airshed load on the Burrup Peninsula. Atmospheric emissions within the Murujuga airshed from both Pluto LNG, NWS Project Extension have undergone independent assessment by the WA and agencies and have been considered acceptable, and are subject to management conditions. Woodside supports the ongoing management of heritage values under listings; Murujuga Cultural Landscape, Murujuga National Park and Dampier Archipelago (Including Burrup Peninsula) National Heritage Place. Planned activities under the PAP are not inconsistent with relevant heritage legislation, management plans and agreements under which these values are protected. Based on the implemented controls and the inconclusive evidence for any causal link between industrial air emissions and anthropogenic change to rock art, uncertainty and precaution are addressed by the existing State regulatory processes including the MRAS, which can apply adaptive management and mitigation measures as further scientific knowledge of potential pathways and indirect links to rock art are established. Ongoing reduction of NOx emissions to the Murujuga airshed is required and regulated under EP Act Ministerial Conditions. Therefore, based on application of a risk-weighted precautionary principle and adaptive management in the airshed, impacts from indirect air emissions as a result of onshore processing of Pluto gas are considered Negligible and of an ALARP and Acceptable level.

Environmental Performance Outcomes, Standards and Measurement Criteria			
EPO	***Adopted Control(s)***	***EPS***	***MC***
EPO 11 Prevent accelerated weathering of Murujuga rock art or impact to human health from air emissions that result from onshore processing of	**C 10.9** Forecast, measure, monitor and or estimate facility fuel and flare emissions (in accordance with NGERS and WMS procedures named in Section 7.2.11.2) to inform optimisation management practices and minimise environmental impact of emissions.	**PS 10.9.1** Integrity will be managed in accordance with SCE Management Procedures (Section 7.4) and SCE Technical Performance Standard(s) to prevent environment risk related damage to SCEs for:	**MC 1.16.1** Records demonstrate implementation of SCE Technical Performance Standard(s) and Management of Hardware Controls in the Operate Phase Procedure (Section 7.4.2), in order to achieve the functional objective of the control. Records may include implementation and maintain/assure and manage-change information summarised in Section 7.4.2

Environmental Performance Outcomes, Standards and Measurement Criteria			
EPO	***Adopted Control(s)***	***EPS***	***MC***
Pluto gas[123]. .		• P31 – Environmental Emissions Monitoring and Controls, • to provide means of detection of environmental releases, emissions and discharges to prevent MEEs from manifesting over time, and/or as required to assure compliance monitoring and reporting equipment.	
		PS 10.9.2 Flare and emissions targets (includes fuel) tracked, as required by WMS procedures named in Section 7.2.11.2.	**MC 10.9.1** Records demonstrate performance against annual flare and emissions targets.
	C 11.1 The Murujuga Rock Art Strategy and Monitoring Program (MRAS/MRAMP), run by DWER and MAC, is in place to protect the Aboriginal rock art by providing a long-term framework that builds on previous work to deliver an improved approach to monitoring, analysis and management. Woodside will maintain its support of the MRAS/MRAMP, monitor the outcomes and assesses relevance to this activity as part of the implementation strategy of this EP.	**PS 11.1** Pluto PAA activities process gas through Burrup onshore facilities where a functioning MRAS and MRAMP framework is in place (or subsequent position on risk/impact and applicable program or controls if relevant). Continued support for the MRAS / MRAMP by Woodside and implementation of relevant findings or recommendations as required.	**MC 11.1** Annual review of existence of MRAS/MRAMP (or subsequent applicable program or controls) associated results, and applicability for managing the associated risk. **MC 29.2.1** Records demonstrate Change Management and Management of Knowledge processes have been followed where new controls or management measures identified (Section 7.3).

[123] Proposed by Doctors for the Environment Australia during consultation (Refer to Appendix F)

Environmental Performance Outcomes, Standards and Measurement Criteria				
EPO	***Adopted Control(s)***	***EPS***	***MC***	
	C 11.2 Onshore processing facilities (Pluto LNG, NWS Karratha Gas Plant) are subject to assessment and compliance under the Environmental Protection Act 1986 (WA), including: Existence of applicable Ministerial Statement(s) Implementation of potential EQMF if developed as an outcome of MRAS NOx concentration limits at emission point sources (via. EP Act Part V Licencing) Implementation of Part IV conditions. Requirement to assess and implement NOx reduction measures, (e.g. Pluto Best Practice Report, NWS AQMP MA4) This includes implementation of potential EQMF developed as an outcome of MRAS; and measures such as NOx concentration limits at emissions point sources under EP Act Part V licences, and implementation of Part IV conditions. The NWS AQMP also requires MA5 development of an adaptive management plan to address the potential impact to rock art from industrial emissions.	**PS 11.2.1** Verify Pluto gas onshore processing facilities (Pluto LNG, NWS Karratha Gas Plant) are subject to assessment under the Environmental Protection Act 1986 (WA).	**MC 11.2.1** Ministerial statement(s) applicable to onshore processing facilities, and compliance demonstrated via required annual compliance report(s).	
		PS 11.2.2 Onshore processing facilities commit to implement adaptive management in the result of an adverse finding from MRAMP applicable to their operations, to appropriately reduce NOx emissions to acceptable levels. (Existing mechanisms require this, for example under section 2 of MS1233 for NWS, or section 10 of the Pluto AQMP)	**MC 11.2.2** Onshore facility approvals documents include change/adaptive management obligations. In response to relevant MRAMP findings, records demonstrate that appropriate measures are taken at onshore facilities which process Pluto gas to reduce NOx emissions to acceptable levels.	
	C 11.3 Implement the PAP in a manner that is not inconsistent with the objectives of the Murujuga National Park Management Plan 78, through execution of the Conservation Agreement and Deep Gorge Joint Statement.		**PS 11.3.1** Comply with relevant commitments and obligations under the Conservation Agreement and Deep Gorge Joint Statement.	**MC 11.3.1** Records demonstrate continued compliance with relevant commitments and obligations under the Conservation Agreement and Deep Gorge Joint Statement.

Environmental Performance Outcomes, Standards and Measurement Criteria				
EPO	***Adopted Control(s)***	***EPS***	***MC***	
			PS 11.3.2 Ensure Onshore Processing Facilities comply with relevant facility Cultural Heritage Management Plan(s)	**MC 11.3.2** Onshore processing facilities Annual Compliance Reports demonstrate compliance with facility Cultural Heritage Management Plan(s).
	C 11.4 Processing of Pluto gas into LNG trains at Pluto LNG Plant and KGP (T4/T5) equipped with Dry Low NOx (DLN) technologies.		**PS 11.4.1** Ensure processing of Pluto gas into LNG trains at Pluto LNG Plant and KGP (T4/T5) is equipped with Dry Low NOx (DLN) technologies. Emissions performance monitored annually in compliance with applicable EP Act Part V Licence(s).	**MC 11.4.1** Licence(s) applicable to Pluto and KGP onshore processing facilities, and monitoring compliance demonstrated via required annual compliance report(s).

6.7.12 Routine Light Emissions: Light Emissions from Facility Operations and Xena-03 Tie-back Activities

Context		
Platform Lighting – Section 3.6.1 Operational Flaring – Section3.7.1 Support Vessel Operations - Section 3.8 Xena-03 Tie-back Activities – Section 3.11 Vessel-based Activities for the Xena-03 Tie-back - Section 3.12	Protected Species – Section 4.6	Consultation – Section 5

Impacts and Risks Evaluation Summary

Source of Impact	***Environmental Value Potentially Impacted***							***Evaluation***						
	Soil and Groundwater	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/Habitat	Species	Socio-economic	Decision Type	Consequence/Impact	Likelihood	Risk Rating	ALARP Tool	Acceptability	Outcome
Light emissions from the Pluto Facility, ASV, MODU, installation and support vessels						x		A	F	-	-	GP PJ	Broadly Acceptable	EPO 12a EPO 12b
Light emissions during flaring						x		A	F	-	-			EPO 12c

Description of Source of Impact

Operations

When the riser platform is not crewed, lighting is limited to essential navigational and aviation requirements to communicate the presence of the riser platform and vessels to other marine users (i.e., navigation lights). Navigational lights are located on the facility's tallest structures (i.e., crane boom). Helideck lighting is provided to assist helicopter landings.

When crewed, which is generally ten times per year for approximately 14 days at a time, the platform and support vessels have adequate lighting to allow safe working conditions during 24-hour operations. Lights are not normally directed outwards away from work areas except when necessary for safe operations outboard, such as lifting operations, and deployment/retrieval of equipment from IMMR activities. A relatively small quantity of gas is required to be continuously flared associated with purge and pilot of the flare system and produced water treatment system low pressure gas streams that are not able to be recovered to the process. Intermittent flaring may occur during facility shutdowns/blowdown, pigging, restart, flowline depressurisation for subsea system integrity management and in case of emergency.

The distance to the horizon at which components of the facility will be directly visible can be estimated using the formula below:

$$horizon\ distance\ = 3.57 \times \sqrt{height}$$

Where horizon distance is the distance to the horizon at sea level in kilometres and height is the height above sea level of the light source in metres. Using this formula, the approximate distances at which the production deck and flare tower top will be visible at sea level are (based on the weather deck height above sea level of 47.4 m and flare tower height of 44 m – given an angle of 30°):

- weather deck: approximately 25 km from riser platform
- flare tower tip: approximately 34 km from riser platform.

The ASV has the majority of its lighting sources located on the main accommodation decks below the bridge at heights extending from ~47 m to ~100 m above sea level (while at operating draft). Therefore, the majority of the lighting is approximately at, or below, the level of the most significant light source on the riser platform (the flare tower tip). Accordingly, cumulative light from the ASV and riser platform will not be visible beyond approximately 36 km from the facilities.

IMMR activities

In addition to lighting to allow safe operations, and to meet mandatory navigational requirements, during IMMR activities underwater lighting is generated for short periods while ROVs/AUVs are in use. Given the typical intensity of ROV/AUV lights and inspection tools and the attenuation of light in seawater, light from these sources will be localised to the vicinity of the ROV/AUV, operating in close proximity to subsea infrastructure. During IMMR activities, vessels generally move slowly over the subsea infrastructure and are in the Operational Area for short periods of time.

Whilst subsea support vessel light inventories may vary, they are not considered to be greater than those of a trailer suction hopper dredge (TSHD) or pipelay vessel which have been previously modelled for Woodside activities (PENV 2022). These vessels were used as conservative analogues for IMMR activities in the Petroleum Activities Program. For evaluating the impact of Artificial Light at Night (ALAN) on marine turtles, PENV developed an approach based on the visibility of the full moon. Modelling undertaken indicated that light emissions were predicted to reduce to ambient levels (0.01, or 1%, radiance of a full moon) at 5.7 km and 3.2 km from a representative pipelay vessel and TSHD, respectively (PENV 2022).

Xena-03 Tie-back Activities

The MODU and project vessels will have external lighting to support safe navigation and safe operations at night. This lighting typically consists of bright white (i.e. metal halide, halogen, fluorescent) lights, and is not dissimilar to lighting used for other offshore activities, including fishing and shipping. Lighting is required for the safe operation of the MODU and project vessels cannot be reasonably eliminated.

The extent of potential impact for this activity is restricted to the line of sight for each source emitting light. Based on other previous work undertaken by Woodside this is about 30 km from the MODU during drilling activities and 30 km from vessels (Woodside, 2014). For contingent well flowback, specifically flaring, the distance at which the flare will be visible is expected to be less than 50 km from the source, and potentially around a further 10 km during emergency flaring (Woodside Energy Limited, 2011). Contingent well flowback activities would be intermittent and of a short duration, where alternate options for reservoir fluids during well unloading activities cannot be achieved (i.e., directed to the onshore LNG plant via the Pluto Facility).

Whilst the line of sight may extend tens of kilometres from the source, the light density (measured in Lux – which represents the intensity of light that arrives at or leaves a surface, as perceived by the human eye) rapidly decreases as distance increases from the source of the light. Monitoring undertaken as a part of Woodside's 2014 study indicated that light density (from navigational lighting) attenuated to below 1.00 Lux and 0.03 Lux at distances of 300 m and 1.4 km, respectively, from the source (a MODU). Light densities of 1.00 and 0.03 Lux are comparable to natural light densities experienced during deep twilight and during a quarter moon. Navigational lighting from vessels is less than lighting on a MODU. Therefore, light emissions from the MODU and installation vessel are expected to be below 1.00 Lux within 300 m from the source during Xena-03 Tie-back activities.

Cumulative light sources

Cumulative increases in light levels will occur during Xena-03 tie-back activities and commissioning/maintenance visits where the facility will be crewed and may also be utilising an ASV (up to 90 days per campaign). There will be additional lighting for safe operations of the MODU and installation and support vessels present in these periods. These scenarios will be short term (~12 weeks for tie-back activities).

Light emissions associated with routine operations will also arise from flaring at the riser platform, IMMR activities and vessel lighting from several nearby platforms including Wheatstone, Reindeer and Goodwyn (see Section 4.10.5) that are located within 50 km of Pluto. These activities combined may result in slightly elevated ambient light levels.

Impact Assessment

Lighting from the facility, MODU, ASV, project and support vessels may appear from direct unshielded light sources or through skyglow. Where direct light falls upon the ocean, this area of light is referred to as light spill. Skyglow is the diffuse glow caused by light that is screened from view, but through reflection and refraction creates a glow in the atmosphere. The distance at which direct light and skyglow may be visible from the source is dependent on the lighting on the facility / vessel and environmental conditions.

Receptors that have important habitat present within a 20 km buffer of artificial light sources were considered as having potential for interaction, based on recommendations of the National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds (NLPG). The 20 km threshold provides a precautionary limit based on observed effects of sky glow on marine turtle hatchlings (15 to 18 km) and fledgling seabirds grounded in response to artificial light 15 km away (Commonwealth of Australia, 2020).

- The breeding BIA for the Wedge-tailed shearwater and the foraging BIA for the whale shark overlaps all three Operational Areas.

- The following turtle BIAs overlap operational areas:
- Flatback turtle internesting buffer (all three Operational Area)
- Green turtle internesting buffer (Export Pipeline Operational Area)
- Hawksbill turtle internesting buffer (Export Pipeline Operational Area)
- Loggerhead turtle internesting buffer (Export Pipeline Operational Area)
- Habitat critical to the survival of the flatback turtle overlap all three Operational Areas. The habitat critical to the survival of the green and hawksbill turtle both overlap the Export Pipeline Operational Area.
- Other marine turtle BIAs within 20 km of the PAA include:
- Flatback turtle foraging, mating, nesting and migration BIA (Export Pipeline Operational Area)
- Green turtle interesting buffer, foraging, mating, nesting and migration BIA (Export Pipeline Operational Area)
- Hawksbill turtle foraging, mating, nesting and migration BIA (Export Pipeline Operational Area)
- Loggerhead turtle nesting BIA (Export Pipeline Operational Area)
- Given that lighting from flaring may be visible up to 36 km from the riser platform, species with BIAs outside of 20 km and within 36 km of the Facility Operational Area and Xena-03 Operational Area were also identified. Although the NLPG suggest that impact to these species is unlikely beyond 20 km from the source, an assessment of these species has been included for completeness:
- Green turtle habitat critical to the survival (Facility Operational Area)
- Green turtle foraging, mating and nesting BIA (Facility Operational Area)
- Loggerhead turtle internesting buffer (Facility Operational Area)

Light emissions can affect fauna in two main ways:

- Behaviour: many organisms are adapted to natural levels of lighting and the natural changes associated with the day and night cycle as well as the phase of the moon. Artificial lighting has the potential to create a constant level of light at night that can override these natural levels and cycles.
- Orientation: organisms such as marine turtles and birds may use lighting from natural sources to orient themselves in a certain direction at night. In instances where an artificial light source is brighter than a natural source, the artificial light may act to override natural cues, leading to disorientation.

Vessel operations will take place within the PAA located in an open water, offshore environment, about 30 km from the nearest emergent islands (Montebello Islands). A number of BIAs overlap the PAA and EPBC Act listed fauna may transit through (refer to Section 4.6).

Light pollution is identified as a key threat to species of marine turtles and seabirds identified as occurring within the PAA (Section 6.10). Relevant conservation actions outlined in recovery plans and Wildlife Conservation Management plans for these species are also outlined in Section 6.10..

Seabirds

Artificial lighting can attract and disorient seabird species resulting in species behavioural changes (e.g., circling light sources or disrupted foraging), injury or mortality near the light source as a result of collision (Longcore and Rich, 2004; Gaston et al., 2014). All seabird species active at night are vulnerable to artificial light as it can disrupt their ability to orient towards the sea (Commonwealth of Australia, 2020). The potential for bird interactions is dependent upon their ability to perceive the dominant wavelengths in the spectral composition of a light source (PENV, 2023). Species with a nocturnal component to their behaviour and life history, such as procellariforms (including wedge-tailed shearwaters), are at greater risk of negative impacts from artificial light sources at night. The bulk of the literature concerning impacts of lighting upon procellariforms relates to the synchronised mass exodus of fledgling seabirds from their nesting sites (Deppe et al., 2017; Raine et al., 2007; Rodriguez et al., 2017a; Rodriguez et al., 2017b), with fewer investigating the impacts of light at sea. Diurnal seabird species, such as terns, noddies and boobies, in contrast to procellariforms, are less vulnerable to impacts resulting from nocturnal behaviours. However, the presence of lit facilities can result in localised alteration of foraging behaviours such as extended foraging durations. When Seabirds and shorebirds interact with bright light sources which could alter migratory pathways and/or nocturnal roosting behaviours when artificial light spill occurs over the habitat (PENV, 2023).

The breeding BIA for the wedge-tailed shearwater overlaps all three Operational areas, with the breeding period occurring from August to April. Adult shearwaters are vulnerable to artificial lighting during the breeding cycle, when returning to and leaving the nesting colony to maintain nesting sites or forage.

Facility and Xena-03 Operational Areas

Artificial light at night can alter foraging and migratory behaviours of avian species and lead to disorientation, grounding or death. Foraging wedge tailed shearwaters may be attracted to artificial light sources to feed upon fish drawn to the light; however, the species feeds predominantly during the day in association with pelagic predators (Catry et al., 2009; Whittow, 1997). The majority of foraging trips are short, with single day foraging trips significantly more common than any other length trip, with birds returning to nesting/roosting sites between trips (Congdon et al., 2005). As the Facility and Xena-03 Operational Areas are offshore and away from islands or other emergent features

(the distance to nearest landfall at the Montebello Islands from the riser platform is 43 km), any presence of seabirds or shorebirds is considered likely to be of a transient nature only. As such, the numbers of wedge-tailed shearwaters present in the Facility Operational Area or Xena-03 Operational Area at night is expected to be low relative to daylight hours, and any potential changes to behaviour would only affect a relatively low number of birds. Given the species' global distribution and primarily diurnal foraging behaviour, impacts to wedge-tailed shearwaters from artificial lighting are considered to be negligible.

Export Pipeline Operational Area

The nearest potential seabird roosting habitat on natural emergent land, the Dampier Archipelago, lie approximately 10 km from the Export Pipeline Operational Area (at the perimeter to state waters).

The breeding BIAs for the roseate tern and fairy tern overlap the Export Pipeline Operational Area, with breeding occurring in June to March for the Australian fairy tern, and breeding varying throughout the year for the roseate tern.

Adult shearwaters are vulnerable to artificial lighting in the breeding cycle, when returning to and leaving the nesting colony to maintain nesting sites or forage. Foraging wedge-tailed shearwaters may be attracted to sources of light emissions to feed on fish drawn to the light, however the species reportedly feeds predominately during the day (Catry et al. 2009). Artificial light can also impact behaviour and adult nest attendance, or confuse shearwater species, resulting in injury or mortality as a result of birds colliding with structures (Cianchetti-Benedetti et al. 2018; Rodriguez et al. 2017a and b). Fledglings of burrow-nesting seabirds, and to a lesser extent adults, are attracted to and then grounded (i.e., forced to land) by lights when they fly at night with the most affected seabirds being petrels and shearwaters (Procellariiformes) (Rodriguez et al. 2017). Shearwater fledglings are predominately impacted by onshore lighting sources, which can override sea finding cues and attract fledglings further inland, preventing them from reaching the sea (Mitkus et al. 2016; Telfer et al., 1987). Fledglings leave the nesting colony for the sea at night and the main fledgling period for shearwaters in Western Australia is reportedly April (Advisian, 2022). Reported mass groundings and mortalities are associated with formerly uninhabited islands and the risk of light pollution from tourism and urban sprawl, and generally occur during adverse weather conditions. This is probably because of the potential for clouds, mist and rain to increase light pollution levels (Kyba et al., 2011), however recent research is revealing added complexity including moon phase, wind strength and direction (see Commonwealth of Australia, 2020b for review).

Potential for overlap of IMMR activities, near the State waters boundary, with the wedge-tailed shearwater fledgling exodus from islands of the Dampier Archipelago in April is possible. However, given the localised vessel light emissions predicted and existing light sources in the marine waters in the area, vessels are expected to move at varying speeds and the expected, generally benign weather conditions in this region, the potential for wedged-tailed shearwater fledglings leaving burrows at night to collide, ground or become disoriented are considered unlikely. Artificial light from the PAP is not predicted to disrupt critical breeding behaviours within important nesting habitat or displace seabirds from nesting habitat.

The magnitude of impact to seabirds and migratory shorebirds in the Export Pipeline Operational Area from artificial light emissions is expected to be localised and temporary and only contribute negligibly to the incremental increase of vessel lighting in a region that already experiences considerable vessel traffic.

Riser Platform

Large numbers of migratory seabirds have been observed opportunistically roosting on the facility. If maintenance, process safety and/or health risks are identified associated with the presence of birds, it may be necessary to deter them from roosting on the riser platform by installing bird proofing/exclusion devices. The installation of bird proofing poses the potential risk of entanglement for individual birds. There have been no reported bird injuries or deaths at the facility, and consequently future adverse interactions are considered highly unlikely with no lasting effects on populations or impacts to critical habitat anticipated. If deterrents are installed birds will be likely to relocate to previous ranges (i.e. rather than landing on the platform), therefore no lasting effect is anticipated. The risk associated with collision from seabirds attracted to the light is considered to be low, given that lighting will be limited, except during intermittent periods when the riser platform is crewed and during support, IMMR and Xena-03 Tie-back activities.

Migratory shorebirds may be present in or fly through the offshore region of the riser platform between July and December, and again between March and April as they complete migrations between Australia and offshore locations (Commonwealth of Australia, 2015). The risk associated with collision from seabirds or migratory shorebirds attracted to artificial lighting is considered to be low, impacts are expected to be limited to localised behavioural disturbance to isolated individuals, with no displacement from important habitat.

The most vulnerable life stages for seabirds and migratory shorebirds are nesting adults or fledglings. Nesting or fledgling seabirds and migratory shorebirds are vulnerable to artificial lighting within 20 km of the nesting location (Commonwealth of Australia, 2020). For shearwater species, fledglings are predominantly impacted by onshore lighting sources, which can override sea finding cues and attract fledglings further inland, preventing them from reaching the sea (Mitkus et al., 2018). Artificial light can also impact important behaviour of nesting adults (e.g., adult nest attendance, maintaining nest sites) or confuse shearwater species, resulting in injury or mortality as a result of birds colliding with structures (Cianchetti-Benedetti et al., 2018; Rodriguez et al., 2017). As the riser platform is 43 km from the nearest emergent land, impacts to adult nesting or fledgling seabirds and migratory shorebirds are not expected. No nesting activity has been identified on the Pluto facility. Artificial light from the platform as well as

support, IMMR and Xena-03 tie-back activities are not predicted to disrupt critical breeding behaviours within important nesting habitat or displace seabirds from nesting habitat.

Marine Turtles

The following turtle BIAs overlap operational areas:

- Flatback turtle internesting buffer (all three Operational Area)
- Green turtle internesting buffer (Export Pipeline Operational Area)
- Hawksbill turtle internesting buffer (Export Pipeline Operational Area)
- Loggerhead turtle internesting buffer (Export Pipeline Operational Area)

Habitat critical to the survival of the flatback turtle overlap all three Operational Areas. The habitat critical to the survival of the green and hawksbill turtle both overlap the Export Pipeline Operational Area.

Other marine turtle BIAs within 20 km of the PAA include:

- Flatback turtle foraging, mating, nesting and migration BIA (Export Pipeline Operational Area)
- Green turtle interesting buffer, foraging, mating, nesting and migration BIA (Export Pipeline Operational Area)
- Hawksbill turtle foraging, mating, nesting and migration BIA (Export Pipeline Operational Area)
- Loggerhead turtle nesting BIA (Export Pipeline Operational Area)

Given that lighting from flaring may be visible up to 36 km from the riser platform, species with BIAs outside of 20 km and within 36 km of the Facility Operational Area and Xena-03 Operational Area were also identified. Although the NLPG suggest that impact to these species is unlikely beyond 20 km from the source, an assessment of these species has been included for completeness:

- Green turtle habitat critical to the survival (Facility Operational Area)
- Green turtle foraging, mating and nesting BIA (Facility Operational Area)
- Loggerhead turtle internesting buffer (Facility Operational Area)

Green turtle foraging, mating and nesting BIA as well as habitat critical to the survival are located approximately 36 km from the Facility Operational Area. The loggerhead turtle interesting BIA is located approximately 24 km from the Facility Operational Area and 37 km from the Xena-03 Tie-back Operational Area. Lighting from flaring may be visible up to 36 km away, however, the locations of flaring will be more distant than the estimated distance from the perimeter of the operational area. Whilst internesting loggerhead turtles may come within the light footprint from flaring at the riser platform, light is not thought to be an important cue for individuals that may move through the offshore area around the riser platform or Xena-03 tie-back activities. Adult turtles migrating through these Operational Areas may temporarily alter their normal behaviour if attracted to flaring from these facilities and activities.

Hatchlings

Light pollution is listed as a key threat to all marine turtle species, with advice to minimise light. The nearest potential nesting site in relation to the Facility and Xena-03 Operational Area is the Montebello Islands, approximately 43 km from the Xena-03 Tie-back and Pluto Facility Operational Areas. Given this, platform lighting and the tip of the flare tower will not be directly visible from this potential nesting site.

Light emissions reaching turtle nesting beaches is widely considered detrimental owing to interference with important nocturnal activities including choice of nesting sites and orientation/navigation to the sea by post-nesting females and hatchlings (Lorne and Salmon, 2007; Salmon, 2003; Tuxbury and Salmon, 2005).

Turtle hatchlings emerge from the nest and orient towards the sea. After entering the water, hatchlings use a combination of cues (wave direction and currents) to orient and travel into offshore waters. Impacts to the sea-finding behaviour of hatchlings are more common for light sources behind a beach, as lighting offshore will orient emerging hatchlings towards the sea. Artificial light at close distances can also impact hatchling dispersal once they are in the water. Light spill may ‘entrap’ hatchling swimming behaviour, reducing the success of their seaward dispersion and potentially increasing their exposure to predators via silhouetting (Salmon et al., 1992).

Sky glow, particularly from flaring on the riser platform, is also unlikely to be visible at the closest nesting locations and is unlikely to cause behavioural impacts. In any case, the light source is located directly offshore in the same direction that emerging hatchlings would be heading in during normal sea-finding behaviour, meaning that no significant misorientation or disorientation would occur.

The weather deck is approximately 47 m above sea level, with the highest point of the facility (the top of the flare tower) reaching approximately 91 m above sea level. The distance to visible horizon is ~34 km, i.e., anything beyond this distance is below the horizon and direct light would not be visible. Therefore, direct light from facility will not reach any nesting location. Sky glow (particularly from flaring) is also unlikely to be visible at the closest nesting locations resulting in no behavioural impact (i.e., not biologically relevant). Even in the scenarios where these areas may be affected, the light source is located directly offshore in the same direction that emerging hatchlings would be heading in during normal sea-finding behaviour, meaning that no disorientation impacts would occur.

The maximum likely height for a derrick on a MODU contracted for the PAP is ~50 m and subsequently have a lesser visible reach than the facility flare tower. External lighting on vessels is typically lower than the facility lights, with vessel lighting usually reduced to improve night vision of bridge crew.

During IMMR activities vessels may come within 10 km of turtle nesting beaches, mainly within the Dampier Archipelago when operating in the Export Pipeline Operational Area. Modelling predicted that light emissions would reduce to 0.01, or 1% radiance of a full moon (equivalent to the light output of the first quarter moon) within 5.7 km (PV) and 3.2 km (TSHD) (PENV 2022). At this level, light or light glow is visible but impact on hatchling behaviour is considered unlikely (i.e., not biologically relevant) (Aube et al., 2005).

There is potential for behavioural impacts to marine turtles to occur (greater than 0.1 full moon equivalent) within 1.8 km (PV) and 0.7 km (TSHD) (PENV 2022), but behavioural impacts are more likely (greater than radiance of one full moon) within 0.6 km (PV) and 0.2 km (TSHD) (PENV 2022).

Given that hatchlings' distribution is likely to be governed by currents, any hatchlings dispersed by water currents to within 1.8 km of an IMMR vessel risking entrapment by lighting, would be very limited.

Given the distance from the nearest nesting location to the Operational Area (10 km at the closest point) and the short term, infrequent nature of IMMR activities, any impacts to isolated hatchlings offshore are expected to be minor and temporary.

Adults

Artificial lighting may affect the location that turtles emerge to the beach, the success of nest construction, whether nesting is abandoned, and even the seaward return of adults (Salmon et al., 1995a, 1995b; Salmon and Witherington, 1995). However, such lighting is typically from residential and industrial development overlapping the coastline, rather than offshore from nesting beaches. It is acknowledged that the Facility Operational Area and Xena-03 Operational Area overlaps a 40 km internesting buffer BIA for flatback turtles and that marine turtles may occur in low densities in this area. However, no impacts to nesting flatback turtles will occur due to light generated within this section of the PAA given the riser platform's NNC status and the distance to the nearest landfall.

Within the Export Pipeline Operational Area, a higher abundance of turtles may be present. The Export Pipeline Operational Area overlaps internesting buffer BIAs for green, hawksbill and loggerhead turtles and is within 10 km of the nearest nesting beaches in the Dampier Archipelago. Although light from IMMR vessels may be visible from these beaches, nesting females are not considered highly vulnerable to disorientation from offshore artificial light (Pendoley, 2020). It is also highly unlikely that the PAP would cause disruption to sea-finding behaviour post nesting as the light source is located directly offshore in the same direction that females would be heading during normal sea-finding behaviour and IMMR activities requiring vessels have short durations and are very infrequent. As such, vessel light sources will not discourage females from nesting, or affect nest site selection, and therefore are not expected to displace females from nesting habitat. Given also the short-term and infrequent occurrence of IMMR activities, no impacts to nesting turtles of these species are expected to occur

Fish

Lighting from the presence of the facility, MODU, project and support vessels may result in the localised aggregation of fish. These aggregations of fish are considered localised and temporary and any long-term changes to fish species composition or abundance is considered highly unlikely. This localised increase in fish extends to those comprising the whale shark's diet which has a foraging BIA that intersects majority of the PAA. However, given that a large proportion of the diet comprises krill and other planktonic larvae, it is unlikely a light source would lead to a significant increase in whale shark abundance in the vicinity of the facility or vessels. Similarly, any localised impacts to marine fish are not expected to impact on any commercial fishers in the area.

Cumulative Impacts

There is potential for overlap when the Pluto facility becomes staffed during commissioning and tie-back activities where cumulative light emissions would occur from lighting required for safe operations from the facility, MODU and project vessels. As outlined above, these scenarios will be short term. The cumulative impact is likely to be minor, due to the low light intensities of the vessel navigational lighting, MODU and facility lighting, short and intermittent nature of the impact, and is not anticipated to adversely affect any sensitive receptors.

Cumulative light impacts have the potential to occur from flaring, IMMR activities and project vessel lighting from several nearby gas platforms; however, negligible detrimental impact to biological communities is expected.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[124]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Legislation, Codes and Standards				
None identified.				
Good Practice				
Implement a Seabird Management Plan that includes: • standardisation and maintenance of record keeping and reporting of seabird interactions • procedures on seabird intervention, care and management • regulatory reporting requirements for seabirds (unintentional death of or injury to seabirds that constitute MNES). • A scalable adaptive management process should negative light impacts to nocturnal seabirds be detected.	F: Yes. CS: Minimal.	Potential for slight reduction in the likelihood of seabird attraction to vessels and facility resulting in a reduced likelihood of bird strikes.	Potential benefits outweigh cost/sacrifice.	Yes C 12.1
Lighting limited to the minimum required for navigational and safety requirements, with the exception of emergency events.	F. Yes. Lighting is typically appropriate for navigation and safety.	Given the potential impacts to turtles during this activity is insignificant, implementation of this control would not result in a reduction in consequence.	While the control does not result in significant reduction of impacts, it is good practice and not at significant cost.	Yes C 12.2
Well unloading acceptance criteria that define the well objectives will be established.	F: Yes. CS: Standard practice.	Eliminates unnecessary flared volumes and corresponding emissions (light and GHG).	Benefits outweigh cost/sacrifice.	Yes C 10.11

[124] Qualitative measure.

Lighting modifications (shielding, directional lighting) to minimise over water light spill and light emissions during peak turtle hatchling season (Dec to Mar).	F: Yes, lighting is able to be modified on the facility and vessel(s). CS: Financial cost of changes and time associated with implementing these.	Reducing light spill over water and overall light glow from a vessel can reduce the likelihood that hatchling behaviour will be influenced.	The cost/sacrifice outweighs benefit gained. Due to the short-term and infrequent nature of IMMR activities and the minimum distance of the Export Pipeline Operational Area from nearest nesting beaches (10 km) the benefits of implementing this control are expected to be minimal.	No
IMMR vessel crew will be trained in light reduction measures when operating within 20 km of islands between December and April (peak turtle hatchling emergence period is Dec-Mar, with the wedge-tailed shearwater fledgling emergence in Apr).	F: Yes. CS: Minimal cost/sacrifice.	Reducing overall light emissions from the IMMR activities can reduce light glow and potentially lower the area over which vessel lighting may impact turtle and wedge-tailed shearwater fledglings' behaviour. Given distance of the Operational Area from known turtle nesting beaches, a reduction in consequence from implementation of this control is not expected, however is possibly beneficial for wedge-tailed shearwater fledglings.	While the control does not result in significant reduction of potential impacts, it is good practice to raise awareness.	Yes 12.3
Professional Judgement – Eliminate				
No external lighting during Petroleum Activities Program.	F: No. Light management is consistent with that required to provide a safe working environment on-board the facility and support vessels. Lighting is required to enable monitoring of the platform from Pluto CCR. CS: Not considered, control not feasible.	Not considered, control not feasible.	Not considered, control not feasible.	No
Variation of the timing of the tie-back activities to avoid peak turtle internesting periods (December to January).	F: Yes CS: Significant cost and schedule impact due to delays in securing vessels/MODU for specific timeframes.	Not considered, control not feasible.	Not considered, control not feasible.	No

Substitute external lighting with light sources designed to minimise impacts to seabirds, shorebirds and marine turtles as outlined in the NLPG, considered for the riser platform, MODU, ASV, installation and support vessels including IMMR vessels: • Use flashing/ intermittent lights instead of fixed beam. • Use motion sensors to turn lights on only when needed. • Use luminaires with spectral content appropriate for the species present. • Avoid high intensity light of any colour.	F: Yes. Replacement of external lighting with lighting appropriate for turtles and seabirds is technically feasible, although is not considered to be practicable. CS: Significant cost sacrifice. The retrofitting of all external lighting on the facilities, etc, would result in considerable cost and time expenditure. Considerable logistical effort to source sufficient inventory of the range of light types.	Given the potential impacts to turtles, nesting seabirds and fledglings during this activity are insignificant, implementation of this control would not result in a reduction in consequence. Potential for minor reduction in impact to individual foraging seabirds that may transit the PAA.	Grossly disproportionate. Implementation of the control requires considerable cost sacrifice for minimal environmental benefit. The cost/sacrifice outweighs the benefit gained.	No
No flaring during Petroleum Activities Program.	F: No. The ability to flare hydrocarbons is a safety and integrity critical requirement for the facility. Note, Woodside is committed to reducing flaring and has developed annual internal facility flare targets against which progress is monitored (see Section 7.2.11.2). CS: Not considered, control not feasible.	Not considered, control not feasible.	Not considered, control not feasible.	No
Variation of the timing of the PAP to avoid IMMR activities during peak turtle internesting periods (October to February).	F: Yes. It is possible to avoid peak turtle hatchling emergence periods, through scheduling. CS: Significant cost and schedule impact due to delays in securing vessels for specific timeframes	Implementation of this control would not result in a reduction in consequence due to the distance of the Export Pipeline Operational Area from turtle nesting beaches.	The cost/sacrifice outweighs benefit gained.	No
Subsea support vessel activities which require direction of floodlights outside vessel(s) will preferentially occur during daylight hours	F: Yes. CS: Cost implication and delay of required IMMR activities.	Reducing light spill onto the water can reduce hatchling attraction to vessel(s). Given the distance of the Export Pipeline Operational Area	Implementation would be disproportionate to the risk reduction. While the control may reduce light spill, any IMMR	No

for IMMR operations in December and April (peak turtle hatchling emergence period is Dec-Mar, with the wedge-tailed shearwater fledgling exodus in Apr).		from known turtle nesting beaches and wedge-tailed shearwater rookeries, a reduction in consequence from implementation of this control is not expected.	activity is expected to be short in duration and infrequent.	
Professional Judgement – Substitute				
None identified				
Professional Judgement – Engineered Solution				
IMMR vessels to use block-out blinds / curtains on accommodation windows at night between December and April (peak turtle hatchling emergence period is Dec-Mar, with the wedge-tailed shearwater fledgling exodus in Apr).	F: Yes. Installing block-out blinds / curtains is technically feasible. CS: Minimal cost/sacrifice. Accommodation modules on vessels usually have window treatments for crew comfort.	Reducing light emissions from the vessel at night can reduced light glow and the area over which light may impact turtle hatchling emergence and wedge-tailed shearwater fledgling exodus.	Benefits outweigh minimal cost/ sacrifice of implementation.	Yes C 12.4

ALARP Statement:

On the basis of the environmental impact assessment outcomes and use of the relevant tools appropriate to the decision type, Woodside considers the potential impacts from routine light emissions from the facility, MODU and vessels to be ALARP. As no reasonable additional/alternative controls were identified that would further reduce the impacts without grossly disproportionate sacrifice, the impacts and risks are considered ALARP.

Demonstration of Acceptability

Acceptability Statement:

The impact assessment has determined that, given the adopted controls, routine light emissions from external lighting on Pluto facility, MODU, ASV, installation and support vessels represent a localised impact /disturbance to marine fauna within the PAA, the majority of which will occur in the Facility Operational Area and Xena-03 Operational Area.

The PAA overlaps with the whale shark foraging BIA as well as BIAs for the loggerhead turtle, green turtle, hawksbill turtle, and flatback turtle, and Habitat Critical to the green turtle, hawksbill turtle, and loggerhead turtle. The PAA also overlaps the breeding BIA for the wedge-tailed shearwater, roseate tern, and fairy tern. Conservation advice and the NLPG were taken into consideration during the impact evaluation. The PAP is deemed consistent with the conservation advice and guideline.

Further opportunities to reduce the impacts have been investigated above. The potential impacts are consistent with good oil-field practice/industry best practice and are considered to be broadly acceptable if the adopted controls are implemented. Therefore, Woodside considers the adopted controls appropriate to manage the impacts of light emissions to a level that is broadly acceptable and demonstrate the EPOs are met.

EPOs, EPSs and MC for Pluto Facility Operations

Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 12a No impacts to marine fauna greater than that caused by minimum required light emissions for safe work and navigation.	**C 12.1** Implement a Seabird Management Plan.	**PS 12.1** Implement the Seabird Management Plan, including: • minimise potential for light attraction	**MC 12.1.1** Records demonstrate Seabird Management Plan implemented.

EPOs, EPSs and MC for Pluto Facility Operations			
EPO 12b No displacement of marine turtles from habitat critical during nesting and internesting periods and marine turtles' biologically important behaviour can continue in biologically important areas. **EPO 12c** No disruption to the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of nocturnal seabirds.		• standardise and maintain record keeping and reporting of seabird interactions • provide procedures on seabird intervention, care and management • follow regulatory reporting requirements of seabird (unintentional death of or injury to seabirds that constitute MNES). • A scalable adaptive management process should negative light impacts to nocturnal seabirds be detected.	
	C 12.2 Lighting limited to the minimum required for navigational and safety requirements, with the exception of emergency events.	**PS 12.2** Lighting will be limited to that required for safe work/navigation.	**MC 12.2.1** Inspection verifies no excessive light being used beyond that required for safe work/ navigation.
	C 12.3 IMMR vessel crew will be trained in light reduction measures when operating within 20 km of islands between December and April (peak turtle hatchling emergence period is Dec-Mar, with the wedge-tailed shearwater fledgling emergence in Apr).	**PS 12.3** IMMR crew will be trained in light reduction measures.	**MC 12.3.1** Crew training records
	C 12.4 IMMR vessels to use block-out blinds / curtains on accommodation windows at night between December and April (peak turtle hatchling emergence period is Dec-Mar, with the wedge-tailed shearwater fledgling exodus in Apr).	**PS 12.4** Block out blinds available and used in accommodation quarters on IMMR vessels at night.	**MC 12.4.1** Inspection records show block-out blinds / curtains on vessel windows have been closed at night-time, as required.

EPOs, EPSs and MC for Xena-03 Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 12a No impacts to marine fauna greater than that caused by minimum required light emissions for safe work and navigation. **EPO 12b** No displacement of marine turtles from habitat critical during nesting and internesting periods and marine turtles' biologically important behaviour can continue in biologically important areas. **EPO 12c** No disruption to the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of nocturnal seabirds.	**C 12.1** Implement a Seabird Management Plan.	**PS 12.1** Implement the Seabird Management Plan, including: • minimise potential for light attraction • Standardise and maintain record keeping and reporting of seabird interactions • provide procedures on seabird intervention, care and management • follow regulatory reporting requirements of seabird (unintentional death of or injury to seabirds that constitute MNES). • A scalable adaptive management process should negative light impacts to nocturnal seabirds be detected.	**MC 12.1.1** Records demonstrate Seabird Management Plan implemented.
	C 12.2 Lighting limited to the minimum required for navigational and safety requirements, with the exception of emergency events.	**PS 12.2** Lighting will be limited to that required for safe work/navigation.	**MC 12.1.2** Inspection verifies no excessive light being used beyond that required for safe work/ navigation.
	C 10.11 Well unloading acceptance criteria that define the well objectives will be established.	**PS 10.11** Flaring restricted to a duration necessary to achieve the well objectives.	**MS 10.11.1** Records demonstrate flaring was restricted to a duration necessary to achieve the well objectives.

6.8 Unplanned Activities (Accidents, Incidents, Emergency Situations) – Major Environmental Events

For Woodside's production facilities, an analysis is undertaken to identify, classify and analyse major environmental events (MEEs), as described in Section 2.7. This extra level of rigour is applied so that sufficient controls for operational activities are in place for risks with potential Major and above environment event related consequences as per Woodside's Risk Matrix.

MEEs are evaluated against credible worst-case scenarios that may occur when all controls are absent or have failed. The risks considered in this section have therefore been identified as MEEs due to the potential for significant consequence. These sources of risk are subject to additional consideration in accordance with the process described in Section 2.6.4. Risks associated with the PAP that have been classified as MEEs are summarised in Section 6.8.1 and include a range of hydrocarbon spills. The quantitative spill risk assessment methodology used to assess the potential consequence of credible spills is outlined in Section 6.8.2. Credible hydrocarbon spills that have not been classified as MEEs have also been assessed in Section 6.8. Risks that do not meet the MEE definition, although screened out of the MEE process, are still evaluated for ALARP and risk acceptability using the methodology described in Section 2.8. These include credible hydrocarbon spills during drilling and tie-back activities, which are not classified as MEEs for the following reasons:

- Drilling and subsea installation activities are performed outside of operations asset controls and ownership. Ownership is only handed over in cold commissioning when the asset gains control of subsea systems and well control, as such a different set of controls and safety systems are used in the lead up to pre-commissioning.
- The vessel safety case contains safety systems that prevent the occurrence of hydrocarbon spills during drilling and subsea installation.
- Hydrocarbon spills assessed for the drilling and subsea installation phase align with vessel safety case risk assessments and mitigation to reflect controls proportionate to the short duration elevated risk activities.

Drilling and subsea installation activities conclude with the hand over to the asset along with the subsequent risk and consequence from the activities.

6.8.1 Major Environmental Events Overview

Section 2.7 outlines the process for additional analysis and evaluation of MEEs. The bowtie output for each MEE identified has been provided in Table 6-31.

Table 6-31: Major environmental events for the Pluto facility operations

No.	Hazard	Top Event
MEE-01	Hydrocarbons in reservoirs, wells, wellheads and xmas trees	Well loss of containment
MEE-02	Hydrocarbons in subsea equipment (pipelines, flowlines and risers)	Subsea equipment loss of containment
MEE-03	Hydrocarbons in subsea and topsides equipment	Loss of structural integrity
MEE-04	Hydrocarbons in subsea and topsides equipment and marine vessels	Loss of marine vessel separation with platform
MEE-05	Hydrocarbons in subsea and topsides equipment	Loss of control of suspended load from platform

Each section includes a summary of the hazard description, hazard management, emergency response, ALARP summary and a list of SCE barriers identified on the bowties. Each group of SCEs is listed under Technical Performance Standards, with consistent naming conventions used across

Woodside's process safety management processes (e.g., pipeline integrity SCEs are captured as P09 – Pipeline Systems).

Section 6.8.8 presents the generic SCE Failure and Human Error bowties that illustrate the causes, outcomes and controls/barriers in place to manage potential common cause event (CCE) failure mechanisms for MEE controls associated with generic SCE equipment failure (CCE-01), and also human error (CCE-02). Controls and specific measures are listed for both bowties. Human Error is managed via the WMS and the generic Human Error bowtie is included in the MEE section for completeness.

ALARP is demonstrated through controls and barriers being analysed for selection based on their independence, prioritised in accordance with the hierarchy of controls where controls further up the hierarchy take precedence over controls further down, and further analysed to consider the type of effect the control provides. ALARP controls presented for MEE bowties are labelled in accordance with Type of Effect classifications presented.

Woodside has developed a tailored ALARP position for hydrocarbon spill response, including EPOs, EPSs and MC for preparedness and response. The response arrangements are a mitigative control that applies to all MEEs where a hydrocarbon release may credibly occur. The hydrocarbon spill response arrangements are described in Section 7.

Table 6-32: Barrier hierarchy and type of effect

Type of Effect	Legend	Description
Elimination (Technical)		Elimination controls form the 'first line of defence'. They eliminate the underlying hazard and therefore are the most effective category of control measure. If practicable, they should be selected in preference to any other type, as their existence removes the need for any other controls (e.g., a corrosion-resistant metal could replace the original material of construction).
Elimination (Administration)		
Prevention (Technical)		Prevention controls are intended to remove certain causes of incidents or reduce their likelihood. The corresponding hazard remains, but the frequency of incidents involving the hazard is lowered (e.g., introduction of regular maintenance programs can prevent the development of events involving the hazard). Where hazards and causes could not be 'eliminated', controls are required to prevent them from leading to unwanted events and consequences.
Prevention (Administration)		
Detection (Technical)		Detection controls are those that identify a potentially hazardous scenario (e.g., a change in operating parameters), allowing initiation of procedures or systems to prevent the cause occurring. Controls that detect the occurrence of events are often critical to being able to respond with other control measures that reduce the propagation of the events. Detection controls themselves often provide no actual control other than the awareness of the need to respond.
Detection (Administration)		
Reduction/Control (Technical)		Reduction controls are intended to limit the scale and consequence of incidents. They include systems that detect incidents and take some action (e.g., to reduce the rate of leakage of a toxic gas) and also aspects such as inter-unit separation that prevent escalation of fire and explosion incidents. As there is always potential for controls to fail, additional measures are required to limit the scale and severity of any unwanted event or outcome that may arise, by providing the ability to intervene and limit the propagation of the events.
Reduction/Control (Administration)		
Mitigation (Technical)		Mitigation controls take effect in response to an incident. They include controls that lessen the significance or damage caused by an

Type of Effect	Legend	Description
Mitigation (Administration)		unwanted event. Such controls only take effect after the hazardous event and outcomes occur. Mitigation controls are generally those designed to protect personnel against the consequences of a hazard or to aid in recovering from the effects of the hazard.

6.8.2 Quantitative Spill Risk Assessment Methodology

As part of the risk identification process, Woodside identified the range of credible hydrocarbon spill scenarios that may occur during the PAP. Scenarios that have been classified as MEEs are assessed in Sections 6.8.3 to 6.8.7. Scenarios that are not classified as MEEs are assessed in Section 6.9.

Quantitative hydrocarbon spill modelling was undertaken by RPS, on behalf of Woodside, using a three-dimensional (3D) hydrocarbon spill trajectory and weathering model, SIMAP (Spill Impact Mapping and Analysis Program), which is designed to simulate the transport, spreading and weathering of specific hydrocarbon types under the influence of changing meteorological and oceanographic forces.

A stochastic modelling scheme was followed in this study, whereby SIMAP was applied to repeatedly simulate the defined credible spill scenarios using different samples of current and wind data. These data samples were selected randomly from an historic time-series of wind and current data representative of the study area. Results of the replicate simulations were then statistically analysed and mapped to define contours of percentage probability of contact at identified thresholds around the hydrocarbon release point.

The model simulates surface releases and uses the unique physical and chemical properties of a hydrocarbon type to calculate rates of evaporation and viscosity change, including the tendency to form oil in water emulsions. Moreover, the unique transport and dispersion of surface slicks and in water components (entrained and dissolved) are modelled separately. Thus, the model can be used to understand the wider potential consequences of a spill, including direct contact of hydrocarbons due to surface slicks (floating hydrocarbon) and exposure of organisms to entrained and dissolved aromatic hydrocarbons in the water column.

During each simulation, the SIMAP model records the location (by latitude, longitude and depth) of each of the particles (representing a given mass of hydrocarbons) on or in the water column, at regular time steps. For any particles that contact a shoreline, the model records the accumulation of hydrocarbon mass that arrives on each section of shoreline over time, less any mass that is lost to evaporation and/or subsequent removal by current and wind forces.

The collective records from all simulations are then analysed by dividing the study region into a 3D grid. For surface hydrocarbons (floating oil), the sum of the mass in all hydrocarbon particles located within a grid cell, divided by the area of the cell, provides hydrocarbon concentration estimates in that grid cell at each model output time interval. For entrained and dissolved aromatic hydrocarbon particles, concentrations are calculated at each time step by summing the mass of particles within a grid cell and dividing by the volume of the grid cell. The process is also subject to the application of spreading filters that represent the expected mass distribution of each distinct particle. The concentrations of hydrocarbons calculated for each grid cell, at each time step, are then analysed to determine whether concentration estimates exceed defined threshold concentrations.

Hydrocarbon spill modelling assessments undertaken by RPS undergo initial sensitivity modelling to determine appropriate time to add to the simulation after the cessation of the spill. The amount of time following the spill is based on the time required for the modelled concentrations to practically drop below threshold concentrations anywhere in the model domain in the test cases. This assessment is done by post-processing the sensitivity test results and analysing time-series of median and maximum concentrations in the water and on the surface.

6.8.2.1 Hydrocarbon Characteristics

The characteristics of the hydrocarbons used as the basis for the modelling studies and subsequently to inform the assessment of credible hydrocarbon spills is summarised in Table 6-33. Additional detail on the characteristics of these hydrocarbons is also provided below.

Table 6-33: Characteristics of the hydrocarbon types used for modelling and ecotoxicological studies

Hydrocarbon Type	Density (g/cm3) at 15°C	Viscosity (cP) at 15°C	Component	Volatile (%)	Semi-volatile (%)	Low Volatility (%)	Residual (%)	Aromatics (%)
			Boiling Point (°C)	<180	180-265	265-380	>380	Of Whole Oil <380
Pluto condensate (PLA02 operations) (at seabed temperature and pressure)	0.699	0.7032	% of total	67.97	18.48	10.05	2.53	9.83
			% aromatics	6.93	1.88	1.02	-	-
Pluto condensate (trunkline operations) (at seabed temperature and pressure)	0.733	0.583	% of total	76	14	9.5	0.5	-
			% aromatics	1.8	1.7	0	-	-
Eris-1 and Pluto analogues condensate applicable to XNA03 drilling (at surface temperature and pressure)	0.819	4.922	% of total	14.97	48.43	26.6	10.01	9.85
			% aromatics	1.64	5.3	2.91	-	-
Eris-1 and Pluto analogues condensate applicable to XNA03 drilling (at seabed temperature and pressure)	0.746	0.68	% of total	65.99	21.6	9.02	3.39	9.84
			% aromatics	6.72	2.2	0.92	-	-
Marine diesel (as marine gas oil) *	0.829 *	4.00*	% of total	6	34.6	54.4	5.0	3.0
			% aromatics	1.8	1.0	0.2	-	-

** at 25°C*

6.8.2.1.1 Pluto Condensate (PLA02 Operations)

Pluto condensate (applicable to PLA02 Operations) is a mixture of volatile and persistent hydrocarbons with high proportions of volatile and semi-volatile components. In favourable conditions, about 68% of the oil mass should evaporate within the first 12 hours (boiling point

<180°C); a further 18.48% should evaporate within the first 24 hours (180°C < boiling point < 265°C); and a further 10.05% should evaporate over several days (265°C < boiling point < 380°C). About 2.5% of the oil is shown to be persistent. The aromatic content of the oil is about 9.83% (RPS Group, 2024b).

Soluble, aromatic, hydrocarbons contribute to approximately 9.83% mass of the total oil. A further 10.05% has low volatility and a further 18.48% is semi-volatile. These compounds dissolve more slowly but tend to persist in soluble form for longer. Discharge onto the water surface will favour the process of evaporation over dissolution under calm sea conditions, but increased entrainment of oil and dissolution of soluble compounds can be expected under breaking wave conditions (RPS Group, 2024b).

The mass balance forecast for the constant-wind case shows that approximately 85% of the oil is predicted to evaporate within 24 hours. Under calm conditions, most of the remaining oil on the water surface will weather at a slower rate due to being comprised of the longer-chain compounds with higher boiling points. Evaporation of the residual compounds will slow significantly, and they will then be subject to more gradual decay through biological and photochemical processes (RPS Group, 2024b).

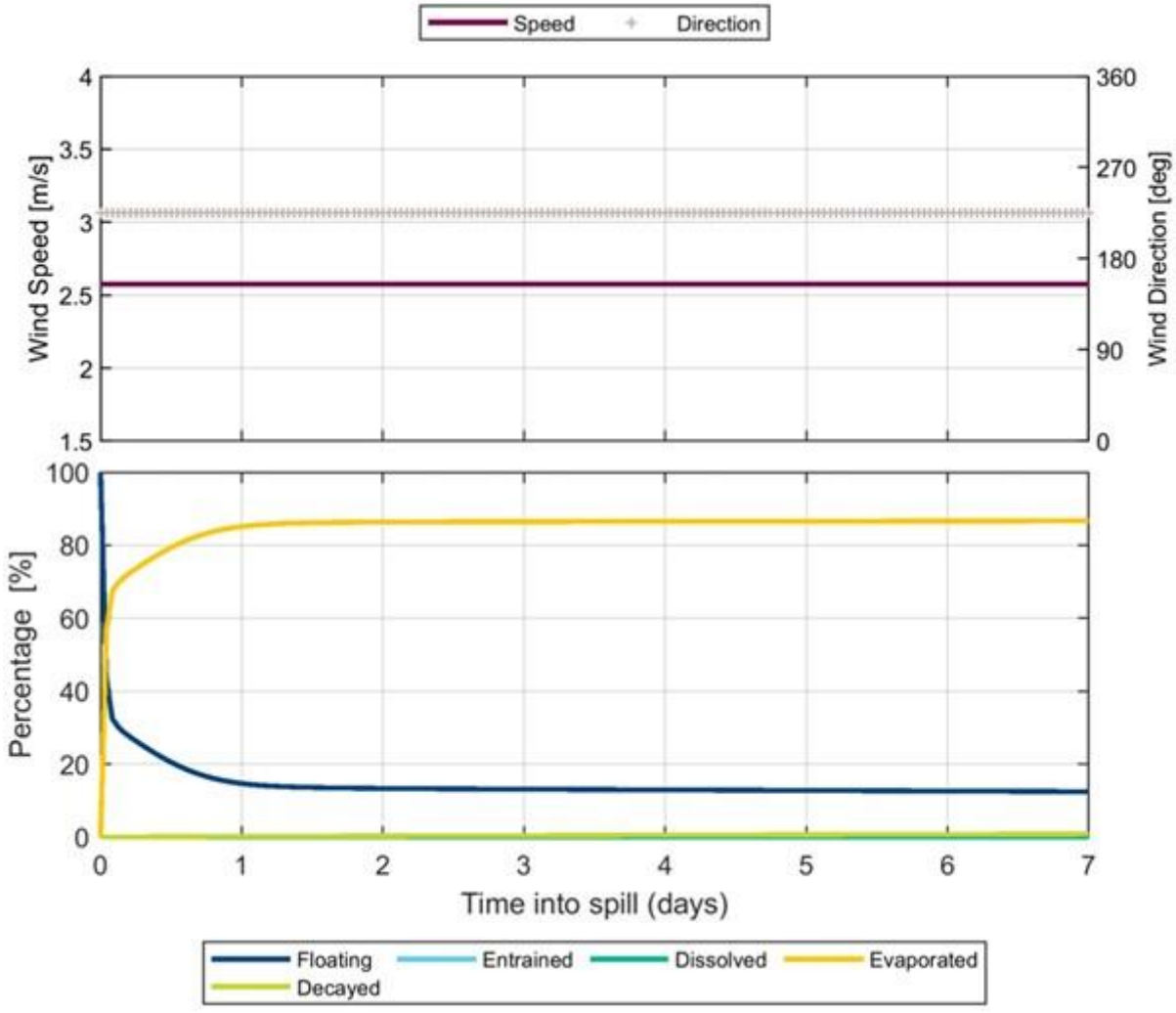

Figure 6-9: Proportional mass balance plot representing the weathering of Pluto condensate spilled onto the water surface as a one-off instantaneous release (50 m³) and subject to a constant 5 kn (2.6 m/s) wind at 27°C water temperature and 25°C air temperature

Under the variable-wind case, where the winds are of greater strength on average, entrainment of Pluto condensate into the water column is predicted to increase. Approximately 24 hours after the spill, around 16% of the oil mass is forecast to have entrained and a further 82% is forecast to have evaporated, leaving only a small proportion of the oil floating on the water surface (<0.1%). The residual compounds will tend to remain entrained beneath the surface under conditions that generate wind waves (approximately >6 m/s) (RPS Group, 2024b).

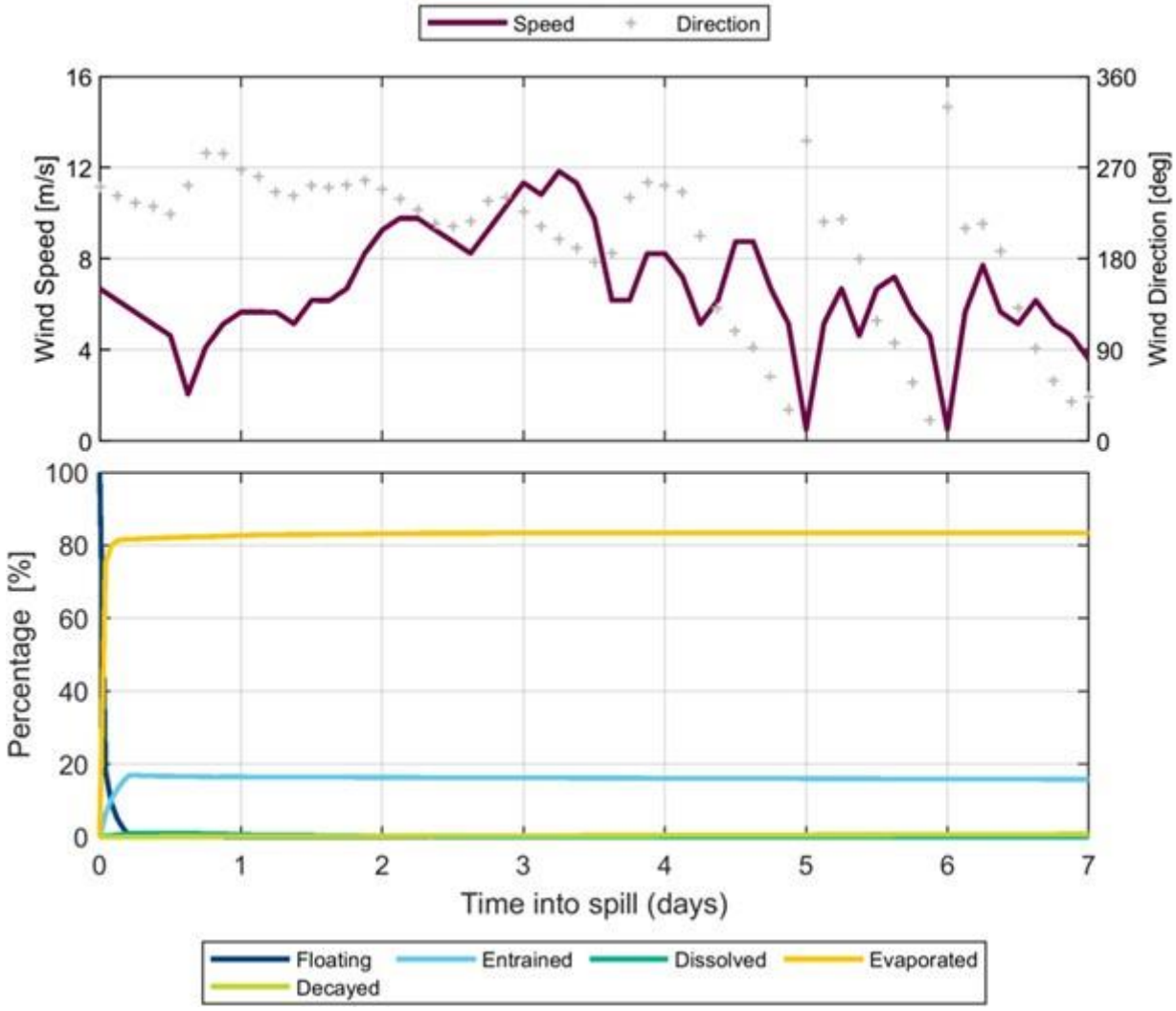

Figure 6-10: Proportional mass balance plot representing the weathering of Pluto condensate spilled onto the water surface as a one-off instantaneous release (50 m³) and subject to variable wind at 27°C water temperature and 25°C air temperature

6.8.2.1.2 Pluto Condensate (Trunkline Operations)

Pluto condensate is a mixture of volatile and persistent hydrocarbons with high proportions of volatile and semi-volatile components. In favourable conditions, about 76% of the oil mass should evaporate within the first 12 hours (boiling point <180°C); a further 14% should evaporate within the first 24 hours (180°C < boiling point < 265°C); and a further 9.5% should evaporate over several days (265°C < boiling point < 380°C). About 0.5% of the oil is shown to be persistent (RPS Group, 2024c, 2024d).

Around 76% of the oil is highly soluble and highly volatile. A further 14% is semi-volatile, and a further 9.5% has low volatility. These compounds dissolve more slowly but tend to persist in soluble form

for longer. Discharge onto the water surface will favour the process of evaporation over dissolution under calm sea conditions, but increased entrainment of oil and dissolution of soluble compounds can be expected under breaking wave conditions (RPS Group, 2024c, 2024d).

The mass balance forecast for the constant low-wind case for Pluto shows that approximately 90% of the oil should evaporate within 24 hours. Under calm conditions, most of the remaining oil on the water surface will weather at a slower rate due to being comprised of the longer-chain compounds with higher boiling points. Evaporation of the residual compounds will slow significantly, and they will then be subject to more gradual decay through biological and photochemical processes (RPS Group, 2024c, 2024d).

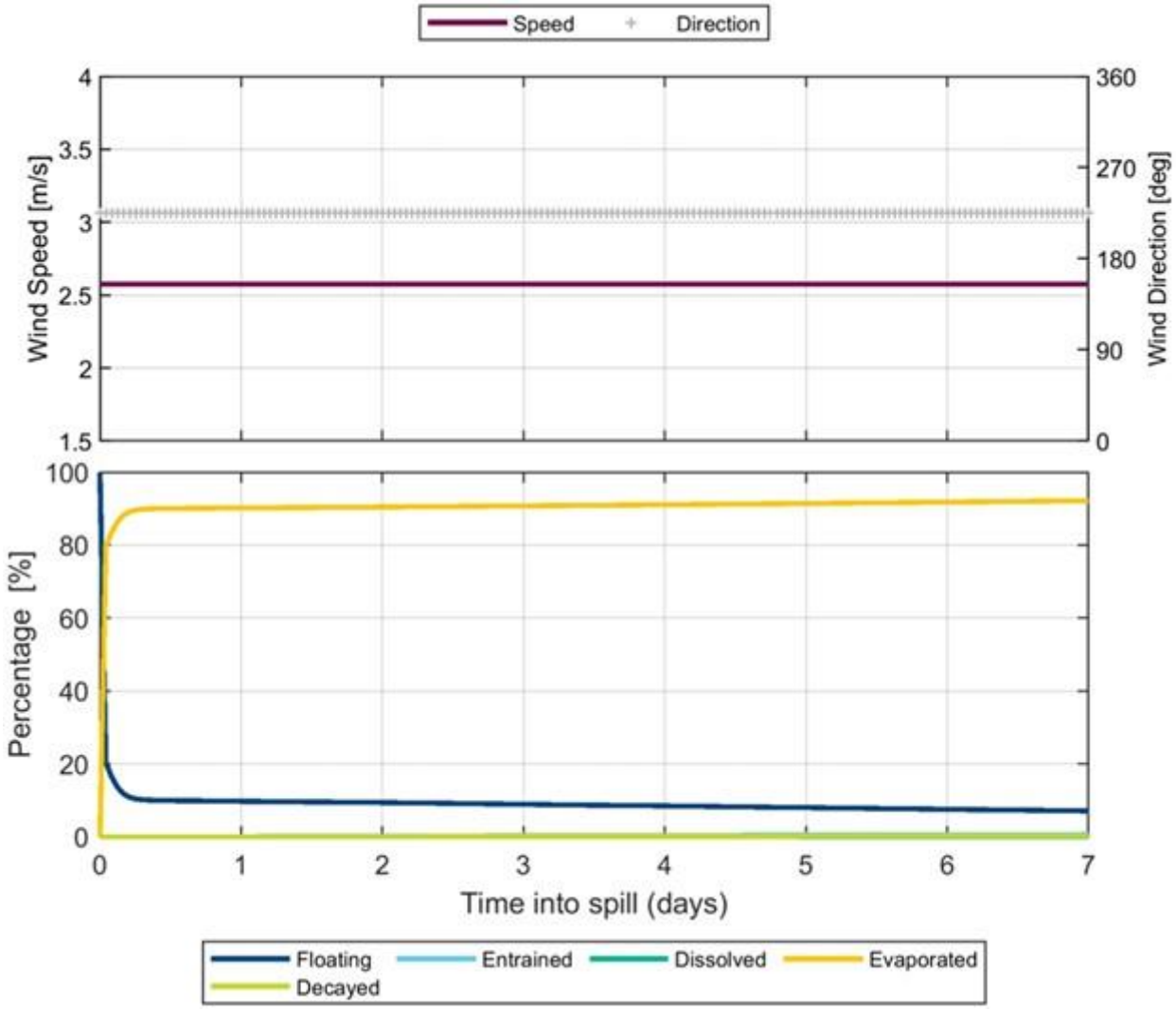

Figure 6-11: Proportional mass balance plot representing the weathering of Pluto condensate spilled onto the water surface as a one-off instantaneous release (50 m³) and subject to a constant 5 kn (2.6 m/s) wind at 27°C water temperature and 25°C air temperature

Under the variable-wind case, where the winds are of greater strength on average, entrainment of Pluto Condensate into the water column is predicted to increase. Approximately 24 hours after the spill, around 12% of the oil mass is predicted to have entrained and a further 87% is predicted to have evaporated, leaving only a small proportion of oil floating on the water surface (<1%). The residual compounds will tend to remain entrained beneath the surface under conditions that generate wind waves (approximately >6 m/s) (RPS Group, 2024c, 2024d).

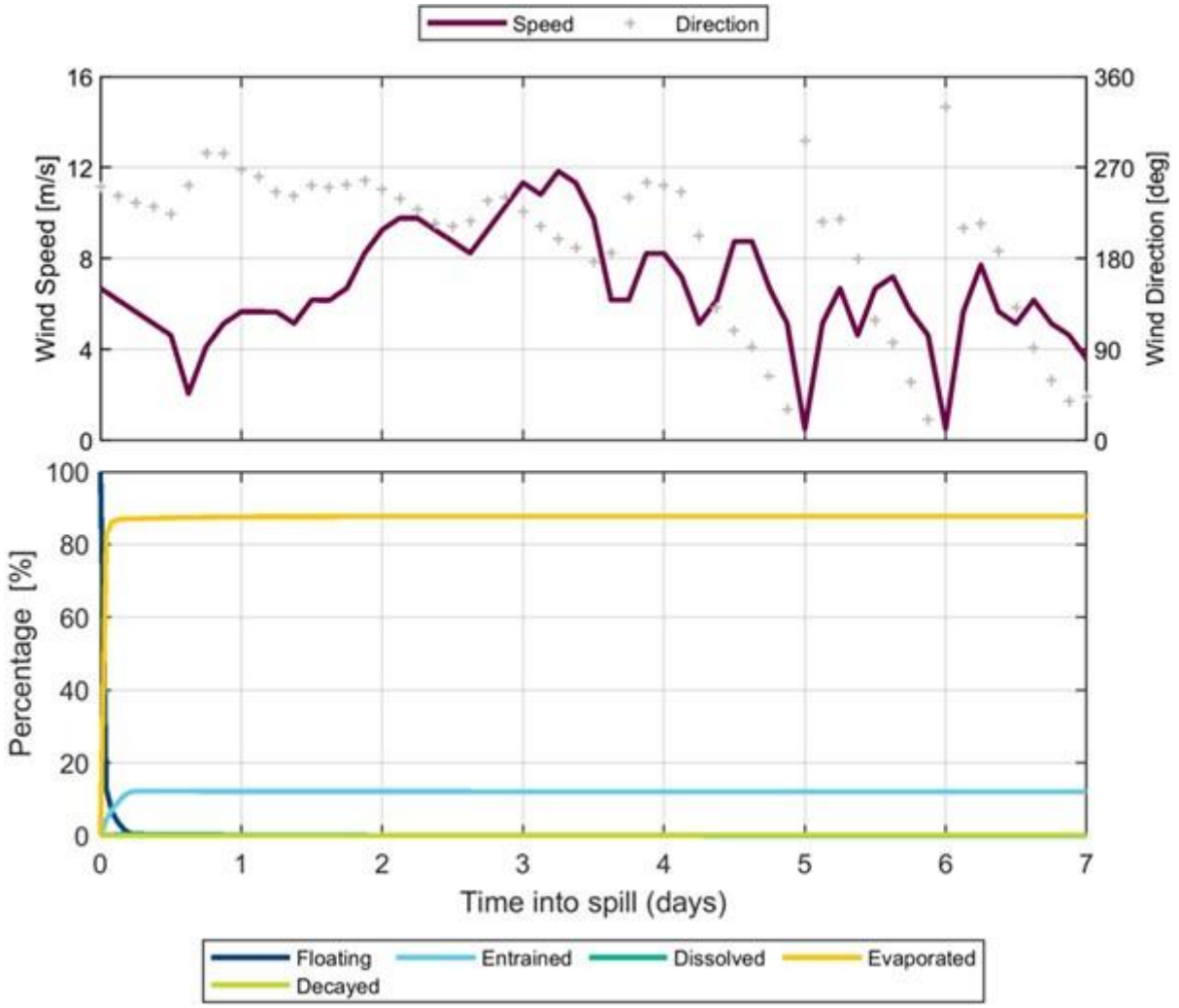

Figure 6-12: Proportional mass balance plot representing the weathering of Pluto condensate spilled onto the water surface as a one-off instantaneous release (50 m³) and subject to variable wind at 27°C water temperature and 25°C air temperature

6.8.2.1.3 Condensate – Eris-1 and Pluto Analogues (Surface and Seabed)

Eris-1 and Pluto analogues condensate (Eris-1), applicable for Xena-03 hydrocarbon QSRA, is a mixture of hydrocarbon compounds that would condense from the gas-phase on exposure to the lower pressures and temperatures of ambient conditions. As these conditions would differ, the hydrocarbon characteristics of the condensate at the surface and the seabed have both been accounted for.

Eris-1 condensate released at the surface is a mixture of volatile and persistent hydrocarbons with high proportions of volatile and semi-volatile components. In favourable conditions, about 15% of the oil mass should evaporate within the first 12 hours (boiling point <180°C); a further 48.43% should evaporate within the first 24 hours (180°C < boiling point < 265°C); and a further 26.6% should evaporate over several days (265°C < boiling point < 380°C). About 10% of the oil is shown to be persistent. The aromatic content of the oil is about 9.85% (RPS Group, 2024a).

Soluble, aromatic, hydrocarbons contribute approximately 9.85% by mass of the whole oil. Around 14.97% is highly soluble and highly volatile. A further 48.43% is semi-volatile and a 26.6% has a low volatility. These compounds dissolve more slowly but tend to persist in soluble form for longer. Discharge onto the water surface will favour the process of evaporation over dissolution under calm

sea conditions, but increased entrainment of oil and dissolution of soluble compounds can be expected under breaking wave conditions (RPS Group, 2024a).

The mass balance forecast for the constant wind case for the Eris-1 condensate (surface) shows that approximately 64% of the oil should evaporate within 24 hours. Under calm conditions, the majority of the remaining oil on the water surface will weather at a slower rate due to being comprised of the longer-chain compounds with higher boiling points. Evaporation of the residual compounds will slow significantly, and they will then be subject to more gradual decay through biological and photochemical processes (RPS Group, 2024a).

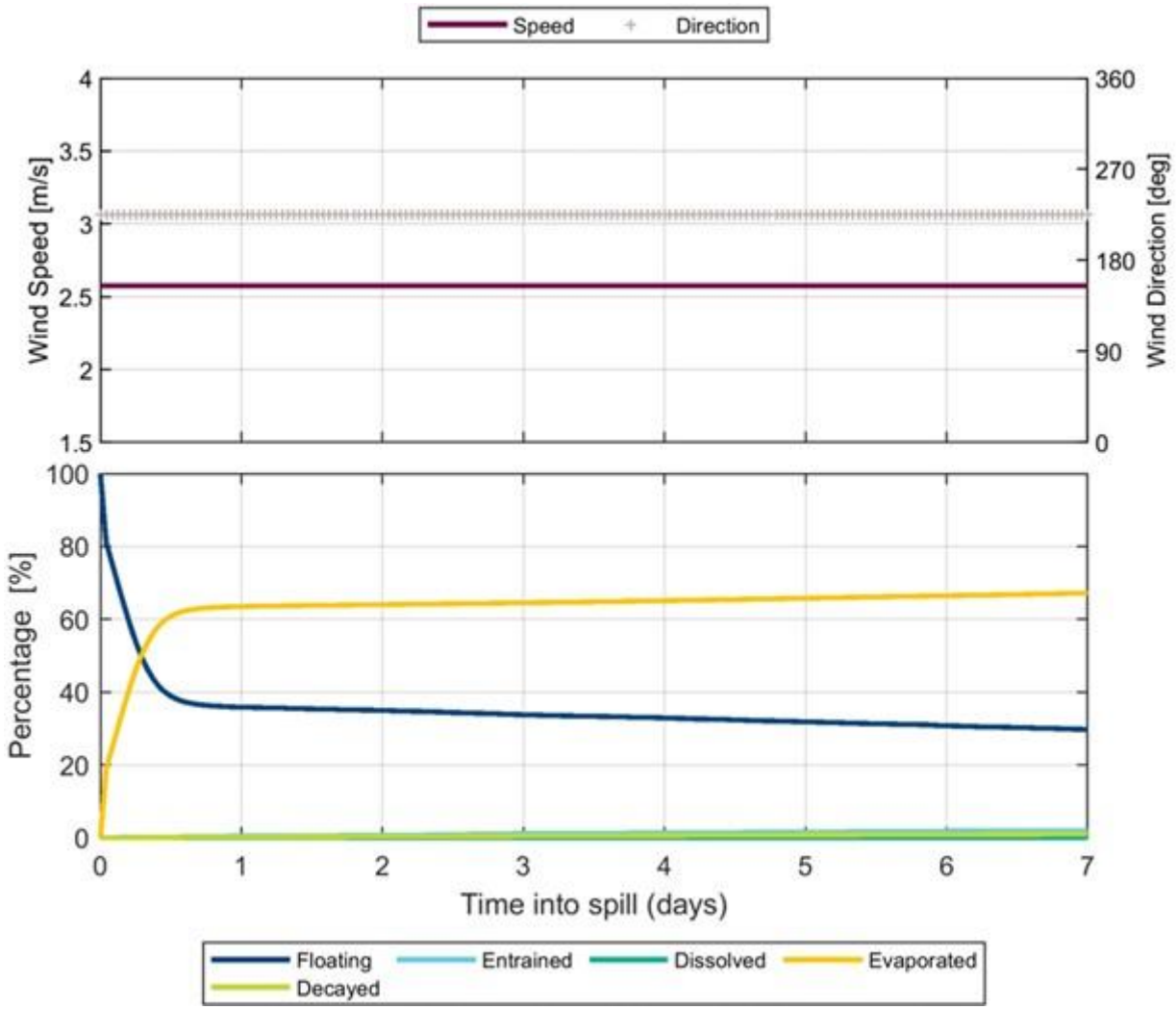

Figure 6-13: Proportional mass balance plot representing the weathering of Eris-1 condensate spilled onto the water surface as a one-off instantaneous release (50 m³) and subject to a constant 5 kn (2.6 m/s) wind at 27°C water temperature and 25°C air temperature

Under the variable-wind case, where the winds are of greater strength on average, entrainment of Eris-1 condensate (surface) into the water column is predicted to increase. Approximately 24 hours after the spill, around 54% of the oil mass is expected to have entrained and a further 43% is forecasted to have evaporated, leaving only a small proportion of oil floating on the water surface (<15). The residual compounds will tend to remain entrained beneath the surface under conditions that generate wind waves (approximately >6 m/s) (RPS Group, 2024a).

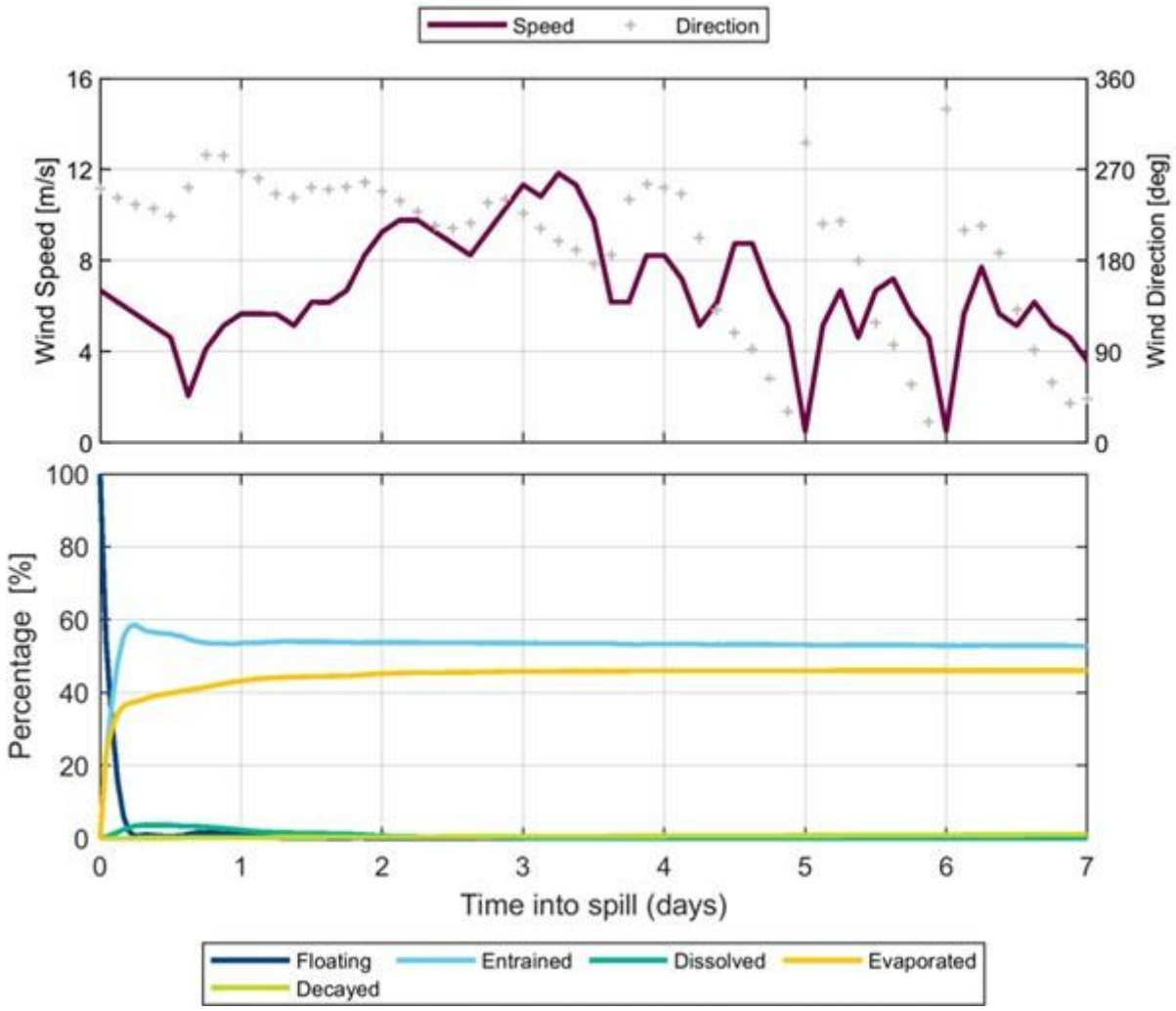

Figure 6-14: Proportional mass balance plot representing the weathering of Xena fluid spilled onto the water surface as a one-off instantaneous release (50 m³) and subject to variable wind at 27°C water temperature and 25°C air temperature

6.8.2.1.4 Marine Diesel

Marine diesel, 'marine gas oil' (MGO) is a mixture of volatile and persistent hydrocarbons with low proportions of highly volatile and residual components. Modelling for marine diesel used information for a comparable MGO. In favourable conditions, about 6% of the oil mass should evaporate within the first 12 hours (boiling point <180°C); a further 34.6% should evaporate within the first 24 hours (180°C < boiling point < 265°C); and a further 54.4% should evaporate over several days (265°C < boiling point < 380°C). About 5% of the oil is shown to be persistent. The aromatic content of the oil is about 3% (RPS Group, 2024e).

The mass balance forecast for the constant-wind case for MGO shows that about 38% of the oil is predicted to evaporate within 24 hours. Under these calm conditions the majority of the remaining oil on the water surface weathers at a slower rate due to comprising the longer-chain compounds with higher boiling points. Evaporation of the residual compounds slows significantly and is then subject to more gradual decay through biological and photochemical processes (RPS Group, 2024e).

Under the more realistic variable-wind case, where the winds are of greater strength, entrainment of MGO into the water column is indicated to be significant. About 24 hours after the spill, around 74%

of the oil mass is forecast to have entrained and a further 26% is forecast to have evaporated, leaving only a small proportion of the oil floating on the water surface (<1%). The residual compounds tend to remain entrained beneath the surface under conditions that generate wind waves (about >6 m/s).

The increased level of entrainment in the variable-wind case results in a higher percentage of biological and photochemical degradation. Given the large proportion of entrained oil and the tendency for it to remain mixed in the water column, the remaining hydrocarbons decay and/or evaporate over time scales of several weeks to a few months. This long weathering duration extends the area of potential effect (RPS Group, 2024e).

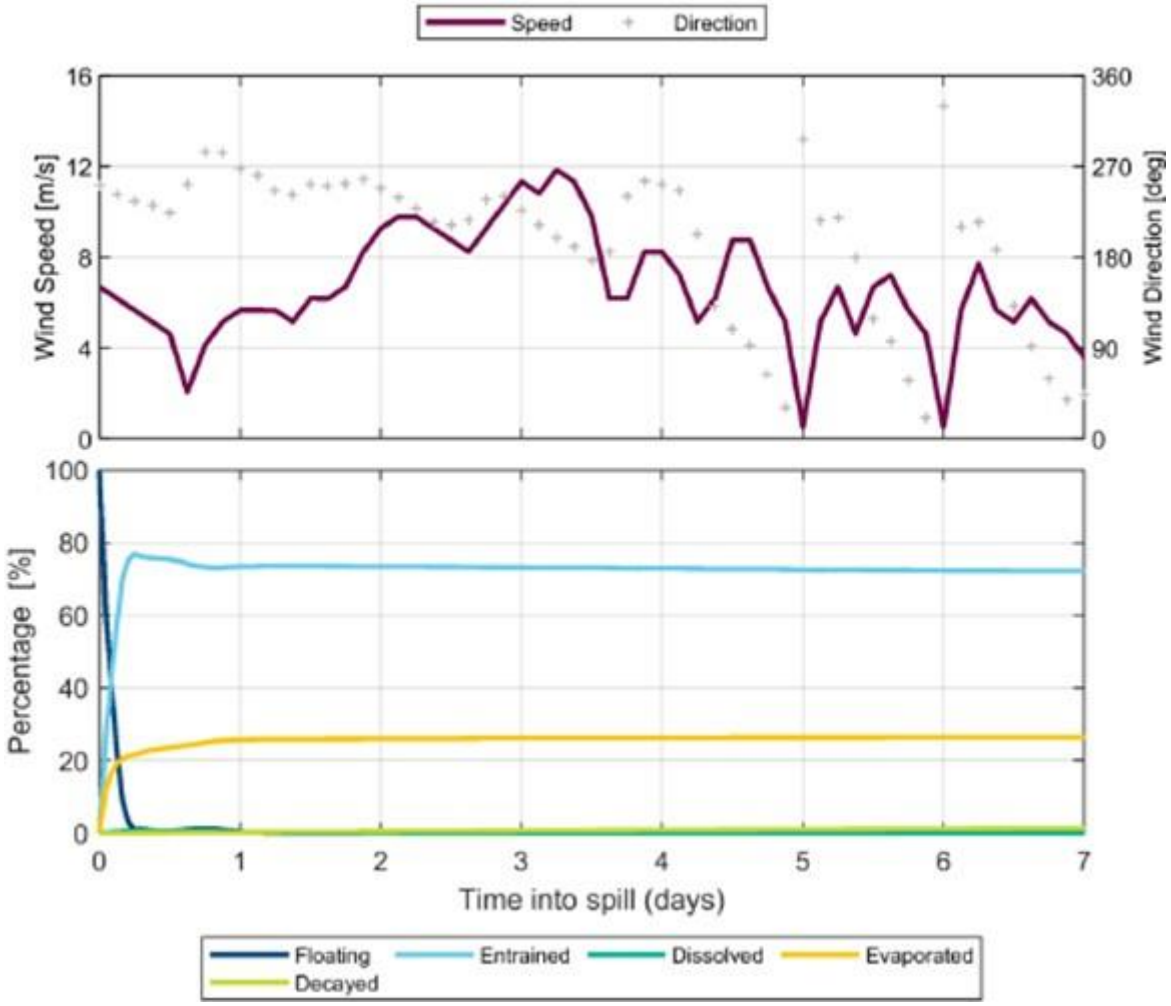

Figure 6-15: Proportional mass balance plot representing the weathering of marine gas oil spilled onto the water surface as a one-off release (50 m³ over one hour) and subject to variable wind at 27°C water temperature and 25°C air temperature

6.8.2.2 EMBA and Hydrocarbon Contact Thresholds

The outputs of the quantitative hydrocarbon spill modelling are used to assess the environmental consequence by delineating which areas of the marine environment could be exposed to hydrocarbon levels exceeding selected hydrocarbon threshold concentrations (Table 6-34), if a credible hydrocarbon spill scenario occurred. The summary of the locations where hydrocarbon thresholds could be exceeded by any of the simulations modelled is defined as the EMBA. The EMBA covers a larger area than the area that is likely to be affected during any single spill event, as the model was run for a variety of weather and metocean conditions, and the EMBA represents the

total extent of all the locations where hydrocarbon thresholds could be exceeded from all modelling runs.

As the weathering of different fates of hydrocarbons (surface, entrained and dissolved) differs due to the influence of the metocean mechanism of transportation, a different EMBA is presented for each hydrocarbon fate. Together, these EMBA have defined the spatial extent for the existing environment described in Section 4.

The spill modelling outputs are presented as areas that meet threshold concentrations for surface, entrained and dissolved hydrocarbons for the modelled scenarios. Surface spill concentrations are expressed as grams per square metre (g/m²), with entrained and dissolved aromatic hydrocarbon concentrations expressed as parts per billion (ppb). A conservative approach to selecting thresholds was taken by adopting the guideline impact thresholds (NOPSEMA, 2019) for surface, entrained, dissolved and accumulated hydrocarbons to define the EMBA for condensate spills from a loss of well control and marine diesel spills. An additional threshold has been included to define the boundary within which socio-cultural impacts may occur, based on visible surface oil (1 g/m²) impacting on the visual amenity of the marine environment. Each of these hydrocarbon thresholds are presented in Table 6-34 and described in the sub-sections below.

Table 6-34: Summary of thresholds applied to the quantitative hydrocarbon spill risk modelling results

Hydrocarbon Type	EMBA				Socio-cultural EMBA	
	Dissolved Hydrocarbon (ppb)	Entrained Hydrocarbon (ppb)	Surface Hydrocarbon (g/m²)	Accumulated Shoreline Hydrocarbon (g/m²)	Surface Hydrocarbon (g/m²)	Accumulated Shoreline Hydrocarbon (g/m²)
Condensate	50	100	10	100	1	10
Marine Gas Oil	50	100	10	100	1	10

6.8.2.2.1 Surface Hydrocarbon Threshold Concentrations

The spill modelling outputs defined the EMBA for surface hydrocarbons resulting from a spill (presence on surface waters) using a threshold of ≥10 g/m². This threshold is used to define an area within which ecological impacts to the marine environment may occur from surface hydrocarbons. It represents the minimum oil thickness (0.01 mm) at which ecological impacts (e.g. to birds and marine mammals) are expected to occur.

Thresholds for registering biological impacts resulting from contact of surface slicks have been estimated by different researchers at about 10–25 g/m² (French et al., 1999; Koops et al., 2004; National Oceanic and Atmospheric Administration, 1996). Potential impacts of surface slick concentrations in this range for floating hydrocarbons may include harm to seabirds through ingestion from preening of contaminated feathers, or the loss of the thermal protection of their feathers. The 10 g/m² threshold is the reported level of oiling to instigate impacts to seabirds and is also applied to other wildlife, though it is recognised that 'unfurred' animals, where hydrocarbon adherence is less, may be less vulnerable. 'Oiling' at this threshold is taken to be of a magnitude that can cause a response from the most vulnerable wildlife such as seabirds. Due to weathering processes, surface hydrocarbons will have a lower toxicity due to change in their composition over time.

A lower concentration of 1 g/m^2 is used to define an area within which social-cultural impacts to the visual amenity of the marine environment may occur. The surface threshold of ≥1 g/m² is based on the relationship between film thickness and appearance (Bonn Agreement oil appearance code,

2015), and represents a 'rainbow sheen' appearance. This threshold is considered below levels which would cause ecological impacts, and instead represents potential for visual amenity impacts. This threshold area is used to inform the 'socio-cultural EMBA'.

6.8.2.2.2 Accumulated Hydrocarbon Threshold Concentrations

Owens et al (1994) define accumulated hydrocarbon <100 g/m² to have an appearance of a stain on shorelines. French-McCay (2009) defines accumulated hydrocarbons ≥100 g/m² to be the threshold that could impact the survival and reproductive capacity of benthic epifaunal invertebrates living in intertidal habitat. A threshold of ≥100 g/m² has been adopted as the threshold for shoreline accumulation and has been included in the EMBA.

A lower concentration of 10 g/m^2 is used to define an area within which social-cultural impacts to the visual amenity along the shoreline may occur.

6.8.2.2.3 Entrained Hydrocarbon Threshold Concentrations

This threshold is used to define an area within which ecological impacts to the marine environment may occur from entrained hydrocarbons. Therefore, it may also be associated with socio-cultural impacts.

Entrained hydrocarbons present a number of possible mechanisms for toxic exposure to marine organisms. The entrained hydrocarbon droplets may contain soluble compounds, hence have the potential for generating elevated concentrations of dissolved aromatic hydrocarbons (e.g. if mixed by breaking waves against a shoreline). Physical and chemical effects of the entrained hydrocarbon droplets have also been demonstrated through direct contact with organisms; for example, through physical coating of gills and body surfaces, and accidental ingestion (National Research Council, 2005).

The entrained threshold has been selected to be consistent with the NOPSEMA Oil Spill Modelling Guidance Bulletin (NOPSEMA, 2019). An entrained threshold of 100 ppb is considered to be appropriate given the oil characteristics for informing potential impacts to receptors.

6.8.2.2.4 Dissolved Aromatic Hydrocarbon Threshold Concentrations

Dissolved hydrocarbons present a narcotic effect resulting from uptake into the tissues of marine organisms. This effect is additive, increasing with exposure concentration or with time of exposure (French-McCay, 2002; National Resource Council, 2005). The dissolved aromatic threshold of 50 ppb has been selected as a medium level threshold to approximate the potential toxic effects, particularly sublethal effects to sensitive species, as consistent with the NOPSEMA Oil Spill Modelling Guidance Bulletin (NOPSEMA, 2019).

6.8.2.2.5 Scientific Monitoring

A planning area for scientific monitoring is also described in the Oil Spill Preparedness and Response Mitigation Assessment (Appendix H). This planning area has been set with reference to the low exposure entrained value of 10 ppb detailed in the NOPSEMA (2019) bulletin Oil Spill Modelling.

A scientific monitoring program may be activated following a release event with the potential to contact sensitive environmental receptors. This would consider receptors at risk (ecological and socio-economic) and in particular, any identified pre-emptive baseline areas (PBAs), for the worst-case credible spill scenario or other identified unplanned hydrocarbon releases associated with the operational activities.

6.8.3 Unplanned Hydrocarbon Release: Loss of Well Containment from Operating Wells (MEE-01)

Context		
Reservoir and Wells – Section 3.4.2	Physical Environment – Section 4.4 Habitats and Biological Communities – Section 4.5 Protected Species – Section 4.6 Protected Places – Section 4.8 Socio-economic and Cultural – Section 4.9	Consultation – Section 5

Impacts and Risks Evaluation Summary

Source of Risk	***Environmental Value Potentially Impacted***							***Evaluation***						
	Soil and Groundwater	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/Habitat	Species	Socio-economic	Decision Type	Consequence	Likelihood	Risk Rating	ALARP Tool	Acceptability	Outcome
Release of hydrocarbons resulting from subsea well loss of containment		x	x	x	x	x	x	B	C	1	M	LCS GP PJ RBA CV SV	Acceptable if ALARP	EPO 13

Description of Source of Risk

During operations, the facility will receive hydrocarbons via the Pluto flowline from wells in the Pluto, Xena and Pyxis fields, as described in Section 3.

Loss of well containment can lead to an uncontrolled release of reservoir hydrocarbons and well fluids to the environment. Woodside has identified a loss of well containment (LOWC) as the scenario with the worst-case credible environmental outcome as a result of this event. A loss of well containment during operations could occur due to a variety of causes, including:

- internal corrosion
- external corrosion
- erosion
- overpressure of the annuli
- fatigue
- loss of control of suspended load from vessel (operating near subsea wells) (MEE-04; Section 6.8.6)
- loss of well system structural integrity.

A number of common failure causes due to human error and SCC failures are presented in the generic Human Error and SCE Failure bowties in Section 6.8.8.

The LOWC scenario that may occur during the drilling and any MODU-based well test of Xena-03 is considered separately in Section 6.9.1.

Loss of Well Control – Credible Scenario

The PAP includes production from a series of subsea wells (Section 3.4.2). To assess the potential consequences, a worst credible hydrocarbon release scenario has been defined for a Pluto well (PLA02). The Pluto well scenario is based on a loss of containment from a well which represents the overall characteristics of the Pluto reservoir and is a high producing well, thus representing a worst credible volume release and potential environmental impact, for current Pluto, Pyxis and Xena wells. Future wells (PLA08 and XNA03) were considered but the existing PLA02 scenario is considered to be worst case.

The LOWC was assumed to have a release duration of 77 days. This duration is based on the estimated time required to successfully drill an intervention well (refer to Appendix H for additional discussion of relief well timing). The characteristic of the release scenario is summarised in Table 6-35. The characteristics of Pluto condensate was used as the basis in the modelling the LOWC scenario (RPS, 2024b); refer to Sections 6.8.2 and 6.8.2.2 for additional information on modelling methods, hydrocarbon characteristics and environmental impact thresholds.

Table 6-35: Summary of worst-case loss of well containment hydrocarbon release scenarios

Scenario	Hydrocarbon	Average Rate (m^3/day)	Duration (days)	Depth (m)	Latitude	Longitude	Total Condensate Release Volume (Sm^3)
Scenario 2: Well blowout at seabed PLA02	Pluto Condensate	4848	77	829	19° 54' 48.266" S	115° 7' 54.151" E	59,459

Decision Type, Risk Analysis and ALARP Tools

Woodside implements industry standard practice in well design and construction. In the company's recent history, it has not experienced any well integrity events that have resulted in significant releases or significant environmental impacts. Woodside has never experienced a worst-case loss of well containment in its operational history.

Decision Type

Decision Type B has been applied to this risk under the Guidance on Risk Related Decision Making (Oil and Gas UK, 2014). This reflects the complexity of the risk, the higher potential consequence and stakeholder implications should the event be realised. To align with this decision type, a further level of analysis has been applied using risk-based tools including the bowtie methodology (described in Section 2.7.3) and hydrocarbon spill trajectory modelling. Company and societal values were also considered in the demonstration of ALARP and acceptability, considered through internal reviews, and stakeholder consultation (Section 5).

The release of hydrocarbons as a result of well loss of containment is considered a major environment event (MEE-01). The hazard associated with this MEE is hydrocarbons in reservoirs, wells, wellheads and xmas trees tied back to the facility.

Quantitative Spill Risk Assessment

Spill modelling of the worst-case credible loss of well containment spill scenario was undertaken by RPS, to determine the fate of hydrocarbons released based on the assumptions. Modelling was undertaken over all seasons to address year-round operations (RPS, 2024b). This is considered to provide a conservative estimate of the EMBA and the potential impacts from the identified worst-case credible release volumes for all loss of well containment scenarios.

Hydrocarbon Characteristics

Hydrocarbon characteristics of Pluto condensate are provided and described in more detail in Section 6.8.2.

Subsea Plume Dynamics

The subsea loss of well containment scenario would result in a buoyant plume of hydrocarbons, which has been modelled using the OILMAP-Deep numerical model.

Table 6-36: Near-field subsurface discharge model parameters for loss of well containment scenario

Scenario	Hydrocarbon	Rate (m^3/hr)	Duration (days)	Depth (m)
Well blowout at seabed (PLA02)	Pluto condensate	202	77	829

Likelihood

In accordance with the Woodside Risk Matrix, a worst-case loss of well containment has been defined as a 'highly unlikely' event as it 'has occurred once or twice in the industry' (experience-based likelihood) and aligns with a frequency of a '1 in 10,000 to 1 in 100,000 year' event. Information to support this likelihood determination is outlined below.

The blowout likelihood was evaluated using Blowout and Well release Frequencies based on SINTEF offshore blowout database as analysed in the IOGP, 2019 Study "Risk Assessment Data Directory Blowout Frequencies – Report 434-02" (September 2019). This uses data from 1980 to 2014 to determine likelihood for well blowouts and releases. For a gas well, the IOGP study calculated gas blowout frequency during production as 7.20 × 10-5 per year per well.

Given consideration for up to 13 subsea gas wells and using SINTEF/IOGP database, blowout during production occurs with a frequency of 9.36E-04 per year which gives a likelihood level of 2 “Unlikely” on the Woodside Risk Matrix. An order of magnitude reduction has been taken to reduce the likelihood of significant environmental impacts to Level 1 “Highly Unlikely”, for the following reasons:

SINTEF and Lloyds data presented in the IOGP 2019 Blowout Frequencies study considers Production well integrity events between 1980 and 2011, with some additional data from the North Sea between 2011 and 2014. Frequencies are informed by incidents which occurred in Gulf of Mexico, which occurred prior to standards improvement following the Macondo event. Similarly, improvements in standards have been achieved in the North Sea compared to the pre-Macondo era. External causes are excluded for subsea production wells, as causes discussed appears to only be relevant to dry-tree/platform wells.

For the international blowout incidents analysed, these are expected to have resulted in varied release outcomes with varied flow and environmental consequence outcomes – not all are aligned with a worst case unconstrained full-bore blowout, from the highest flowing well, nor necessarily required a relief well to remediate (which is the basis for this risk assessment)

Woodside have adopted international best practice – the O&G UK Well Lifecycle Integrity Guidelines (post-Macondo industry improvements). Woodside continue to apply a rigorous well integrity management program (refer WOMP) as required under WMS and Australian Regulations, including verification, and testing of key barriers including SSSVs.

Additionally, when considering likelihood from an ‘experience’ perspective, and considering the significant environmental consequence likelihood as the outcome of a blowout event; historical blowouts resulting in major impacts to the environment have not occurred “many times in industry”. Hence, alignment with Highly Unlikely likelihood classification is deemed appropriate.

Consequence

The spatial extent and fate (including weathering) of the spilled hydrocarbon were considered during the impact assessment for a worst-case loss of well containment (presented in the following section). These considerations were informed primarily by the outputs from the numerical modelling studies undertaken by RPS (2024b), available information on environmental sensitivities that may credibly be impacted in the event of a worst-case spill, and relevant literature and studies considering the effects of hydrocarbon exposure.

Consequence Assessment

Environment that May Be Affected

Surface Hydrocarbons

Hydrocarbon spill modelling for surface hydrocarbons indicated that concentrations equal to or greater than the 10 g/m² ecological threshold could potentially be found, in the form of slicks, up to 20 km (south-west) from the release location. There is minimal surface hydrocarbon contact with receptors for the worst-case scenario. The probability of films arriving at receptors were <1%.

Entrained Hydrocarbons

Entrained oil concentrations equal to or greater than the 100 ppb ecological thresholds are predicted to be found up to 420 km (south-west) from the release location. A number of receptors were predicted to be contacted by entrained hydrocarbons. The greatest probabilities of contact by entrained hydrocarbons were at Gascoyne MP (2%) and Montebello MP (71%).

Dissolved Hydrocarbons

Dissolved aromatic hydrocarbon concentrations equal to or greater than the 50 ppb ecological threshold are predicted to be found up to 80 km (south-west) from the release location. The greatest probabilities of contact by dissolved hydrocarbons were at Montebello MP (3%).

Accumulated Hydrocarbons

A number of receptors were predicted to potentially receive shoreline hydrocarbons in the spill modelling. The hydrocarbon contact is expected to be minimal for all receptors for the worst-case scenario. The probability of shoreline accumulation on receptors at all thresholds were <1%.

Summary of Potential Impacts to Environmental Values

The combined EMBA for loss of well containment within which all other credible hydrocarbon spill EMBAs are contained, i.e. the sensitive receptors and their locations that may be exposed to hydrocarbons (surface, entrained, dissolved and accumulated) at or above the set threshold concentrations in the unlikely event of a loss of well containment during the PAP are outlined in Section 4. The potential biological and ecological impacts of an unplanned hydrocarbon release as a result of a LOWC during the PAP are discussed in the following sections.

Table 6-37: EMBA– key receptor locations and sensitivities potentially contacted above impact thresholds by the loss of well containment scenario with summary hydrocarbon spill contact ≥ 1% probability

Environmental Setting	Receptor	Environmental, Social, Cultural, Heritage and Economic Aspects Presented as per the Environmental Risk Definitions (Woodside's Risk Management Procedure)																															Probability of Hydrocarbon Contact and Fate (%)[125]					
		Physical		*Biological*																					*Socio-economic and Cultural*															
							Other Communities/Habitats								*Protected Species*									*Other Species*													*Socio-cultural EMBA*		*EMBA*			
		Water Quality	*Sediment Quality*	*Marine Primary Producers*																																					
		Open Water (Pristine)	Marine Sediment (Pristine)	Coral Reef	Seagrass Beds/Macroalgae	Mangroves	Spawning/Nursery Areas	Open Water – Productivity/Upwelling	Non-biogenic Reefs	Offshore Filter Feeders and/or Deepwater Benthic Communities	Nearshore Filter Feeders	Sandy Shores	Estuaries/Tributaries/Creeks/Lagoons (including Mudflats)	Rocky Shores	Cetaceans – Migratory Whales	Cetaceans – Dolphins and Porpoises	Dugongs	Pinnipeds (Sea Lions/Fur Seals)	Marine Turtles (Foraging and Internesting Areas and Significant Nesting Beaches)	Sea Snakes	Whale Sharks	Sharks and Rays	Seabirds and Migratory Shorebirds	Pelagic Fish Populations	Demersal Fish Populations	Fisheries – Commercial	Fisheries – Traditional	Tourism and Recreation	Protected Areas/Heritage – European and Indigenous/Underwater Cultural Heritage	Offshore Oil and Gas Infrastructure (Topside and Subsea)	Surface Hydrocarbon (1 to 10 g/m²)	Accumulated Hydrocarbons (10 to 100 g/m²)	Surface Hydrocarbons (≥ 10 g/m²)	Entrained Hydrocarbons (≥ 100 ppb)	Dissolved Hydrocarbons (≥50 ppb)	Accumulated Hydrocarbons (≥ 100 g/m²)
Australian Marine Parks	Gascoyne MP	✓	✓					✓							✓	✓			✓			✓	✓	✓		✓			✓					2		
	Montebello MP	✓	✓	✓			✓	✓							✓	✓			✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		40			71	3	

[125] Worst case probability

Open Water Environment (Near Spill Area)
Air Quality A hydrocarbon release during a loss of well containment has the potential to result in localised, temporary reduction in air quality and contribution of greenhouse gases to the global concentration of these gases in the atmosphere. Potential impacts from reduced air quality are expected to be minor, short-term and predominantly localised due to rapid entrainment and dissolution of gas bubbles into the water column. There is potential for human health effects for workers in the immediate vicinity of atmospheric emissions that potentially reach the surface. The ambient concentrations of methane and VOCs released from diffuse sources is difficult to accurately quantify, although the behaviour and fate is predictable in open offshore environments as rapidly dissolved in deep waters, and it is dispersed rapidly by meteorological factors such as wind and temperature. Methane and VOC emissions from a hydrocarbon release in such environments are rapidly degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals. Due to the unlikely occurrence of a loss of well containment; the temporary nature of any methane or VOC emissions (from either gas surfacing or weathering of liquid hydrocarbons from a loss of well containment); the predicted behaviour and fate of methane and VOCs in open offshore environments; and the significant distance from the PAA to the nearest sensitive air shed (town of Dampier, about 157 km away), the potential impacts are expected to be minor and short-term.
Water Quality Water quality would be affected in the offshore environment within the EMBA due to hydrocarbon contamination from entrained, dissolved and surface hydrocarbons. Due to the weathering processes of the hydrocarbons, impacts to water quality are anticipated to be minor long term and/or significant short term as a result of hydrocarbon contamination above background levels.
Marine Sediment Quality Studies of hydrocarbon concentrations in deep sea sediments in the vicinity of a catastrophic well blowout indicate hydrocarbon from the blowouts can be incorporated into marine sediments (Romero et al., 2015). Proposed mechanisms for hydrocarbon contamination of sediments include sedimentation of hydrocarbons and direct contact between submerged plumes and the seabed (Romero et al., 2015). In the event of a major hydrocarbon release at the seabed, modelling indicates that a pressurised release of condensate would atomise into droplets that would be transported into the water column to the surface. As a result, the extent of potential impacts to the seabed area at and surrounding the release site would be confined to a localised footprint. Marine sediment quality would be reduced as a consequence of hydrocarbon contamination for a small area within the immediate release site for a long to medium term.
Benthic Fauna Communities In the event of a loss of well containment at the seabed, the spill modelling predicted hydrocarbon droplets would be entrained in a gas plume, transporting them through the water column and to the sea surface. As a result, the low sensitivity benthic communities associated with the unconsolidated, soft sediment habitat within the PAA are generally not expected to be exposed to released hydrocarbons. A localised area of impact relating to the hydrocarbon plume at the point of release is however predicted, which would result in a small area of seabed and any associated epifauna and infauna being exposed to hydrocarbons. Impacts to benthic communities within the PAA would subsequently be limited to the immediate area around the release site and may include lethal or sub-lethal impacts. Within the offshore waters of the EMBA, impacts to benthic fauna on the seafloor are not anticipated as hydrocarbons are not expected to gravitate toward the seafloor (as described above). Benthic fauna at geomorphic features located within the water column such as shoals and banks are not predicted to be impacted by dissolved and/or entrained hydrocarbons above the ecological thresholds. Offshore features such as Rankin Bank support benthic communities; however, the modelling indicated that hydrocarbon contact would only occur at low thresholds below the ecological threshold. Notably, given the depths of offshore benthic communities such as Rankin Bank, the potential for impacts to benthic communities is considered to be significantly reduced given hydrocarbons will primarily feature in the upper water column.
The Ancient Coastline at 125 m Depth Contour and Continental Slope Demersal Fish Communities KEFs overlap the PAA (Figure 4-10). The Continental Slope Demersal Fish Communities KEF overlaps the Pluto Facility Operational Area. Other KEFs that overlap and are in proximity to the combined EMBA are listed in Section 4.7. These KEFs and geomorphic features may host relatively diverse or abundant fish assemblages compared to the otherwise relatively featureless continental shelf habitats of the NWMR. Impacts to KEFs are discussed below. In summary, impacts to these features are considered to be unlikely. Indirect impacts due to decreased habitat quality at these KEFs to pelagic and demersal fish communities are, therefore, considered unlikely. Impacts to pelagic fish (associated with receptors such as the Rankin Bank) from hydrocarbons are described herein. The values of these KEFs are described in further details within the Appendix K). Fish mortalities are rarely observed to occur as a result of hydrocarbon spills (International Tanker Owners Pollution Federation, 2011b). This has generally been attributed to the possibility that pelagic fish are able to detect and avoid

surface waters underneath hydrocarbon spills by swimming into deeper water or away from the spill affected areas. Fish that have been exposed to dissolved aromatic hydrocarbons are capable of eliminating the toxicants once placed in clean water. Hence individuals exposed to a spill are likely to recover (King et al., 1996). Where fish mortalities have been recorded historically, the spills (resulting from the groundings of the tankers Amoco Cadiz in 1978 and the Florida in 1969) have occurred in sheltered bays.

Laboratory studies have shown that adult fish are able to detect hydrocarbons in water at very low concentrations, and large numbers of dead fish have rarely been reported after hydrocarbon spills (Hjermann et al., 2007). This suggests that juvenile and adult fish are capable of avoiding water contaminated with high concentrations of hydrocarbons. However, sub-lethal impacts to adult and juvenile fish may be possible, given long-term exposure (days to weeks) to polyaromatic hydrocarbon (PAH) concentrations (Hjermann et al., 2007). While modelling of the loss of well containment indicates the potential EMBA for dissolved hydrocarbons is relatively extensive, no time-integrated exposure metrics were modelled; given the oceanographic environment within the EMBA, PAH exposures in the order of weeks for pelagic fish are not considered credible.

The effects of exposure to oil on the metabolism of fish appears to vary according to the organs involved, exposure concentrations and route of exposure (waterborne or food intake). Oil reduces the aerobic capacity of fish exposed to aromatics in the water and to a lesser extent affects fish consuming contaminated food (Cohen et al., 2005). The liver, a major detoxification organ, appears to be the organ where anaerobic activity is most impacted, probably increasing anaerobic activity to facilitate the elimination of ingested oil from the fish (Cohen et al., 2005).

Fish are perhaps most susceptible to the effects of spilled oil in their early life stages, particularly during egg and planktonic larval stages, which can become entrained in spilled oil. Contact with oil droplets can mechanically damage feeding and breathing apparatus of embryos and larvae (Fodrie and Heck, 2011). The toxic hydrocarbons in water can result in genetic damage, physical deformities and altered developmental timing for larvae and eggs exposed to even low concentrations over prolonged timeframes (days to weeks) (Fodrie and Heck, 2011). More subtle, chronic effects on the life history of fish as a result of exposure of early life stages to hydrocarbons include disruption to complex behaviours such as predator avoidance, reproductive and social behaviour (Hjermann et al. 2007). Prolonged exposure of eggs and larvae to weathered concentrations of hydrocarbons in water has also been shown to cause immunosuppression and allows expression of viral diseases (Hjermann et al., 2007). PAHs have also been linked to increased mortality and stunted growth rates of early life history (pre-settlement) of reef fishes, as well as behavioural impacts that may increase predation of post-settlement larvae (Johansen et al., 2017). However, the effect of a hydrocarbon spill on a population of fish in an area with fish larvae and/or eggs, and the extent to which any of the adverse impacts may occur, depends greatly on prevailing oceanographic and ecological conditions at the time of the spill and its contact with fish eggs or larvae. Hydrocarbons above ecological thresholds although not predicted to, may subsequently impact populations located near to the release location for the worst-case spill scenario, with lethal impacts not considered likely in this offshore environment. No significant escarpments, species of conservation significance, emergent features or areas of high biological productivity characteristically associated with the Continental Slope Demersal Fish Communities KEF have been observed in the PAA. Therefore, potential impacts to these regional-scale KEFs are not expected.

Protected Places

Receptors

The modelling of the worst-case LOWC indicated that Australian Marine Parks may be impacted by entrained (Gascoyne and Montebello Marine Park) and dissolved (Montebello Marine Park) hydrocarbons. No AMPs were predicted to potentially be contacted by surface hydrocarbons in the event of a worst-case spill scenario (RPS, 2024b).

Impacts

The Montebello Marine Park is the closest AMP to the PAA (overlapped by the facility Operational Area) predicted to be contacted by hydrocarbons. Impacts to this AMP are discussed below. Impacts to the natural, cultural, heritage and socio-economic values of the other three AMPs predicted to be contacted by hydrocarbons in a worst-case spill scenario are expected to be similar, however, of lower severity and duration due to their being at least 100 km further from the PAA.

Montebello Marine Park

The Montebello Marine Park comprises an area of about 3413 km², all of which is zoned as a Multiple Use Zone (IUCN VI). The AMP ranges in water depths from less than 15 m up to 150 m.

The Montebello Marine Park is significant as it contains habitats, species and ecological communities' representative of the Northwest Shelf Province. It overlaps with The Ancient Coastline at the 125m Depth Contour KEF (see 'Key Ecological Features' above for a discussion of impacts to KEFs). The AMP provides connectivity between the deeper waters of the continental shelf and slope, and the adjacent Barrow Island and Montebello Islands State Marine Parks. A prominent seafloor feature in the AMP is Trial Rocks, which consists of two close coral reefs that are emergent at low tide. There is subsequently potential for impacts to shallow coral reef communities at Tryal Rocks, as discussed in the section 'Marine Primary Producers – Coral Reef' above. The specific values of the AMP and associated impacts are summarised here.

Natural values – The AMP includes diverse benthic and pelagic fish communities and ancient coastline thought to be an important seafloor feature (KEF) and a migratory pathway for humpback whales (BIA). The AMP supports a range of species, including those listed as threatened, migratory, marine and/or cetacean under the EPBC Act. BIAs within the AMP include breeding habitat for seabirds, internesting, foraging, mating and nesting habitat for marine turtles, a migratory pathway for humpback whales and foraging habitat for whale sharks. Impacts to the relevant species and BIAs are discussed in the sections above.

Cultural values – There is limited information about the cultural significance of this AMP; however, it is noted that Sea Country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their Sea Country for tens of thousands of years. Potential impacts to cultural values of the AMP will closely tie in with the impacts to the natural values of the Marine Park, as addressed above and below; and range from moderate mid-term potential impacts to major long-term potential impacts.

Heritage values – There are no World, National or Commonwealth heritage listings that apply to the AMP. Two historic shipwrecks are located within the Marine Park. Impacts to shipwrecks are discussed below under 'Cultural Heritage'.

Social and economic values – Tourism, commercial fishing, mining and recreation are important activities in the AMP. These activities contribute to the wellbeing of regional communities and the prosperity of the nation. Impacts to tourism and recreation within the AMP are discussed with regard to offshore and nearshore waters in the sections 'Tourism and Recreation' below.

A worst-case hydrocarbon spill scenario has the potential to result in impacts to these AMPs that range from moderate, medium-term to major, long-term, with the consequence severity dependent on the actual timing, duration and extent of a spill.

Key Ecological Features

KEFs located within the combined EMBA are listed in Section 4.7 (described in the Master EE(Appendix K)).

The modelling for the worst-case LOWC (MEE-01) predicted an overlap of entrained hydrocarbons above the ecological threshold with the offshore features of:

- Ancient Coastline at the 125 m Depth Contour KEF
- Continental Slope Demersal Fish Communities KEF
- Glomar Shoals KEF.

The Ancient Coastline, Glomar Shoals and Continental Slope Demersal Fish Communities are KEFs primarily defined by seabed geomorphological features and have been classified as KEFs in recognition of the potential for increased biological productivity and, therefore, ecological significance. Potential impacts to these KEFs include the direct and indirect impacts to benthic fauna/habitats and associated impacts to demersal fish populations described in the sections above.

In-water hydrocarbon exposure (entrained and dissolved) is only predicted to occur within the upper 0–10 m of the water column, therefore, benthic values of these KEFs are not anticipated to be impacted following a LOWC.

Notably, other than some small outcrops of hard substrate, no features indicative of the Ancient Coastline have been identified within the portion of this KEF overlapping the PAA (as per Section 4.7) These KEFs cover extensive areas (as listed in Appendix K) and, should impacts to receptors within the KEFs (e.g., benthic communities) occur, these would be anticipated to be short lived with no permanent impacts to the KEF.

Protected Species

A number of cetaceans were identified as potentially occurring within the PAA and the combined EMBA (see Section 4). In the event of a worst-case LOWC, surface, entrained and dissolved hydrocarbons exceeding environmental impact threshold concentrations may drift across habitat for oceanic cetacean species and the migratory routes and/or BIAs of cetaceans considered to be MNES (e.g., humpback whale and pygmy blue whale north and southbound migrations).

Cetaceans that have direct physical contact with surface, entrained or dissolved aromatic hydrocarbons may suffer surface fouling, ingestion of hydrocarbons (including from prey, water and sediments), aspiration of oily water or droplets and inhalation of toxic vapours (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016). This may result in the irritation of sensitive membranes such as the eyes, mouth, digestive and respiratory tracts and organs, impairment of the immune system, neurological damage (Helm et al., 2015), reproductive failure, adverse health effects (e.g., lung disease, poor body condition) and, potentially, mortality (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016).

Given cetaceans maintain thick skin and blubber, external exposure to hydrocarbons is more likely to result in irritation to the more exposed skin and eyes. Entrained hydrocarbons may also be ingested, particularly by baleen whales which feed by filtering large volumes of water. Fresh hydrocarbons (i.e., typically in the vicinity of the release location) may have a higher potential to cause toxic effects when ingested, while weathered hydrocarbons are considered to be less likely to result in toxic effects.

Given the non-persistent nature of the relevant hydrocarbons, such as Pluto condensate, and the relatively small floating hydrocarbon release of the worst-case LOWC EMBA (RPS Group, 2024a, 2024b), the area where potential impacts from inhalation and physical contact with surface slicks may occur would primarily be localised around the

release location and impacts would most likely be expected to be limited to individuals that contact the slick, as discussed above. The modelling for surface hydrocarbons above the ecological threshold did not overlap any cetacean BIAs beyond those that are found within the PAA: the EIO pygmy blue whale migration and distribution BIA and the humpback whale migration (north and south) BIA.

There is a small overlap of the southern right whale migration and reproduction BIAs in proximity to the North West Cape with entrained and dissolved oil exceeding thresholds, however no floating oil is present in this area and no hydrocarbons are predicted to enter the Exmouth Gulf, which is used as a resting area by humpback whales during the southern migration and a reproduction area by the Southern Right Whale.

In a review of the impacts of large-scale hydrocarbon spills on cetaceans, it was found that exposure to oil from the Deepwater Horizon resulted in increased mortality to cetaceans in the Gulf of Mexico (DHNRDT, 2016), and long-term population level impacts to killer whales were linked to the Exxon Valdez tanker spill (Matkin et al., 2008). Given the nature of the condensate (compared with crude oil from these two spills) and relatively small nature of the surface slick, such exposure impacts to cetaceans may not eventuate.

Geraci (1988) has identified behavioural disturbance (i.e., avoiding spilled hydrocarbons) in some instances for several species of cetacean, suggesting that cetaceans have the ability to detect and avoid surface slicks. However, observations during spills have also recorded larger whales (both mysticetes and odontocetes) and smaller delphinids traveling through and feeding in oil slicks. During the Deepwater Horizon spill cetaceans were routinely seems swimming in surface slicks offshore (and nearshore) (Aichinger Dias et al., 2017).

Suitable habitat for oceanic toothed whales (e.g. sperm whales) and dolphins (e.g., long-snouted spinner dolphin) is broadly distributed throughout the NWMR and, as such, while these species may be present within the combined EMBA, impacts from a spill are unlikely to affect an entire population. Notably, there are no known aggregation areas or BIAs for dolphins or whales within the PAA.

East Indian Ocean (EIO) Pygmy Blue Whale and Humpback Whale

EIO PBW and humpback whales are known to migrate seasonally through the worst-case LOWC EMBA. A migration and distribution BIA for the pygmy blue whale overlaps the PAA and Facility and Xena-03 Operational Areas. A major spill event in June through to November would coincide with the humpback whale migration through the waters off the Pilbara, North West Cape and Shark Bay (outside the EMBA). A major spill in April to July or October to January would coincide with EIO pygmy blue whale migration (Double et al., 2010). Both the pygmy blue and humpback whales are baleen whales and are therefore most likely to be significantly impacted by toxic effects of the oil which can be engulfed during feeding. However, feeding during migrations is typically low level and opportunistic, with most feeding for both species occurring in the Southern Ocean (Thums et al., 2022). Subsequently the risk of ingestion of hydrocarbons through feeding is low.

Migrations of both pygmy blue whales and humpback whales are protracted through time and space (i.e., the whole population will not be within the worst-case LOWC EMBA at any one time), and as such, a hydrocarbon loss of containment is not considered likely to affect an entire population.

Dugong

There are no BIAs or known areas of aggregation in the offshore waters of either the combined EMBA or worst-case LOWC for the dugong. The BIAs are only found in nearshore waters, which is assessed below.

Summary

A worst-case hydrocarbon spill scenario has the potential to result in moderate, medium-term impacts to offshore cetacean species, with consequence severity dependent on the actual timing, duration and extent of a spill in relation to species' migratory movements and distributions.

Marine Turtles

Five of the six marine turtle species were identified as potentially occurring within the combined EMBA of all spill scenarios, with a number of BIAs and Habitat Critical areas also identified. A flatback turtle internesting BIA intersects the PAA and the Facility and Xena-03 Operational Areas (see Section 4.6.2).

Modelling for the worst-case LOWC (MEE-01) predicted a low probability of overlap by entrained hydrocarbons within a number of BIAs, including the green turtle, hawksbill, and flat back turtle internesting buffer (RPS, 2024b). The modelling predicted no exposure to shorelines at any exposure threshold. Therefore, impacts to Habitat Critical areas are not anticipated following a LOWC.

Adult marine turtles exhibit no avoidance behaviour when they encounter hydrocarbon spills (National Oceanic and Atmospheric Administration, 2010). Contact with surface slicks or entrained hydrocarbon can therefore result in hydrocarbon adherence to body surfaces (Gagnon and Rawson, 2010), causing irritation of mucous membranes in the nose, throat and eyes leading to inflammation and infection (National Oceanic and Atmospheric Administration, 2010). Oiling can also irritate and injure skin, which is most evident on pliable areas such as the neck and flippers (Lutcavage et al., 1995). A stress response associated with this exposure pathway includes an increase in the production of white blood cells and even a short exposure to hydrocarbons may affect the functioning of their salt glands (Lutcavage et al., 1995).

Hydrocarbons in surface waters may also impact turtles when they surface to breathe and inhale toxic vapours. Their breathing pattern, involving large 'tidal' volumes and rapid inhalation before diving, results in direct exposure to petroleum vapours which are the most toxic component of the hydrocarbon spill (Milton and Lutz 2003). This can lead

to lung damage and congestion, interstitial emphysema, inhalant pneumonia and neurological impairment (National Oceanic and Atmospheric Administration, 2010).

Given the hydrocarbon is expected to weather rapidly when released to the environment, relatively fresh entrained hydrocarbons (which are typically relatively close to the release location) are considered to have the greatest potential for impact. Given the non-persistent nature of the hydrocarbons and the relatively small floating hydrocarbon EMBA, the area where potential impacts from inhalation may occur would be localised around the release location. There is also minimal surface hydrocarbon contact with the marine turtle BIAs and Habitat Critical areas listed in Section 4.6.2.

Due to the offshore location and water depths within the PAA, this area is unlikely to represent important habitat for marine turtles. There are also no known areas of aggregation (i.e., BIAs, Habitat Critical) for marine turtles within the PAA.

The LOWC EMBA only overlapped the outer edges of a few marine turtle internesting BIAs, with no overlap of Habitat Critical areas for marine turtles (RPS, 2024b). Marine turtles are, therefore, likely to be present in the offshore waters of the EMBA, particularly as they are a migratory species which often travel large distances during migration periods. Important areas of aggregation for foraging, nesting and mating are typically associated with nearshore islands along the Pilbara and Gascoyne coastlines, as opposed to offshore waters.

Summary

In the event of a LOWC, there is potential that surface, entrained and dissolved hydrocarbons exceeding environmental impact threshold concentrations will be present in offshore waters. Therefore, a hydrocarbon spill may disrupt a portion of marine turtle populations for the green, flatback, hawksbill, loggerhead and/or leatherback turtle. However, there is considered to be no threat to overall population viability given the non-persistent nature of predicted hydrocarbons.

Sea Snakes

A number of sea snake species which are listed Marine under the EPBC Act were identified by the PMST as potentially occurring within the combined EMBA. Two critically endangered species were identified as known to occur within the EMBA, the short-nosed sea snake and the leaf-scaled sea snake.

Impacts to seasnakes from direct contact with hydrocarbons are likely to result in similar physical effects to those recorded for marine turtles and may include potential damage to the dermis and irritation to mucus membranes of the eyes, nose and throat (International Tanker Owners Pollution Federation, 2011a). They may also be impacted when they return to the surface to breathe and inhale the toxic vapours associated with the hydrocarbons, resulting in damage to their respiratory system. Oiling of the sensory and respiratory areas on the body of the snake is shown to prevent the mouth from opening and obstructing the nares and airway which can interfere with feeding and result in asphyxiation. Oiling of the outer body surface has shown to inhibit their movements which can lead to overexertion and drowning. Sea snakes are also capable of transcutaneous oxygen uptake, therefore oiling to the surface of their cutaneous layer can compromise this ability (Yaghmour et al., 2022).

In general, sea snakes frequent the waters of the continental shelf area around offshore islands and potentially submerged shoals (water depths <100 m) (impacts described below). However, it is acknowledged that sea snakes may be present in the PAA and within the EMBA. Their abundance is not expected to be high, given the water depth and offshore environment.

In summary, a hydrocarbon spill may have a minor disruption to some individuals in the offshore environment. Population level impacts to sea snake species are not, however, considered credible.

Sharks and Rays

A number of shark and ray species were identified as potentially occurring within the PAA and/or combined EMBA (see Section 4.6.1). Two foraging BIAs for the whale shark overlap the combined EMBA: foraging (northward from Ningaloo along the 200 m isobath; PAA, combined EMBA) and foraging (high prey density – Ningaloo Marine Park; EMBA). Whale sharks are, therefore, likely to transit the open offshore waters within the EMBA whilst they migrate to and from Ningaloo Reef between July and November. Modelling for the worst-case LOWC scenario (MEE-01) predicted exposure to only one of the whale shark foraging BIA: foraging (northward from Ningaloo along the 200 m isobath) (RPS, 2024b).

Other listed Threatened pelagic species identified in the PMST report as potentially occurring within the combined EMBA include the white shark and grey nurse shark. There are no known areas of aggregation for these species in the offshore waters of the combined EMBA.

Impacts to sharks and rays may occur through direct contact with hydrocarbons and contaminate the tissues and internal organs either through direct contact or via the food chain (i.e., consumption of prey). As gill breathing organisms, sharks and rays may be vulnerable to toxic effects of dissolved hydrocarbons (entering the body via the gills) and entrained hydrocarbons (coating of the gills inhibiting gas exchange). In the offshore environment, it is probable that pelagic shark species, such as the whale shark, are able to detect and avoid surface waters underneath hydrocarbon spills by swimming into deeper water or away from the affected areas.

Impacts to whale sharks from a hydrocarbon spill will depend on the timing of the spill, however; whale sharks as a pelagic species are expected to demonstrate avoidance behaviour and population level impacts are not anticipated.

Seabirds

A number of EPBC Act listed Threatened and/or Migratory seabird and shorebird species were identified by the PMST as potentially occurring within the PAA and/or combined EMBA (see Section **Error! Reference source not found.**). The EMBA for the worst-case LOWC (MEE-01) also predicted exposure to a number of seabird BIAs, including the wedge-tailed shearwater roseate tern breeding and foraging BIAs.

Seabirds and migratory shorebirds are particularly vulnerable to contact with floating hydrocarbons, which may mat their feathers. This may lead to hypothermia from loss of insulation and ingestion of hydrocarbons when preening to remove hydrocarbons; both impacts may result in mortality (Hassan and Javed, 2011). Notably, the credible loss of well containment scenarios result in a relatively small floating hydrocarbon EMBA which is primarily centred around the release location. Subsequently, the potential for seabird exposure to floating hydrocarbons is considered to be low. Migratory shorebirds are considered unlikely to interact with spilled hydrocarbons as they are not expected to stop over within the offshore waters surrounding the PAA during their migrations between mainland/island areas. Many seabirds and migratory shorebirds forage over extensive areas (some hundreds of kilometres out to sea) so individuals may be present. Seabirds which are roosting or resting on the Pluto platform may also be impacted, however; these would be individuals and not populations.

Seabirds which plunge dive to feed on prey may contact entrained or dissolved hydrocarbons, most likely through ingestion of prey which are contaminated. Impacts to prey abundance as a result of hydrocarbons may also indirectly impact individuals.

There are several breeding BIAs for seabirds and migratory shorebirds that overlap with the combined EMBA and breeding BIAs within the LOWC EMBA, which are associated with breeding and nesting at locations along the Gascoyne and Pilbara coastlines (including near-shore islands). The outer edge of a breeding BIA for the wedge-tailed shearwater overlaps with the PAA, and another is less than a kilometre away. It is likely that individual birds may, therefore, transit the PAA.

However, the EMBA for the worst-case LOWC predicted no impact to shorelines at any thresholds, therefore impacts to breeding sites are not anticipated in the event of a LOWC.

Given the relatively low area of floating hydrocarbons and the lack of key aggregation areas for migratory shorebirds and seabirds within the PAA, impacts at the population level are not anticipated. Individual animals may, however, be impacted with potential fatalities occurring from oiling.

Nearshore Waters (Mainland and Islands)

The combined EMBA overlaps the nearshore waters of a few shorelines and islands. However, the modelling for the LOWC scenario EMBA (MEE-01), predicted no shoreline, entrained or dissolved hydrocarbons (at or above the defined ecological thresholds) to potentially contact shallow, nearshore waters of identified islands and mainland coastlines. Therefore, impacts to nearshore waters is not predicted from a MEE-01 scenario.

Submerged Shoals and Banks

The combined EMBA overlaps a few submerged shoals and banks (Section 4.5). However, the modelling for the LOWC scenario EMBA (MEE-01) did not predict entrained or dissolved hydrocarbons (at or above the defined ecological threshold) to contact any submerged shoals and banks. Therefore, impacts are not anticipated for a MEE-01 scenario at these receptors.

All Settings

Coral Reefs

Receptors

There are no coral reef habitats located within the PAA. The closest coral reef habitats exist at Rankin Bank, Muiron Islands, the Montebello Islands, Barrow Island, Dampier Archipelago, Lowendal Island and numerous receptors associated with Ningaloo Reef, including the reef itself (see Section 4.5).

As discussed in ‘Benthic Fauna’, no dissolved or entrained hydrocarbons above the ecological threshold are anticipated to contact these known coral habitat areas for MEE-01. Therefore, impacts to coral reef habitats at these features are not anticipated during this scenario.

Modelling for the vessel separation scenario (MEE-04) also predicted low probability of hydrocarbon contact at the Montebello Shoals, Outtrim Patches and Tryal Rocks.

Productivity Primary production by plankton (supported by sporadic upwelling events in the offshore waters of the NWS) is an important component of the primary marine food web. Planktonic communities are generally mixed, including phytoplankton (cyanobacteria and other microalgae) and secondary consuming zooplankton, such as crustaceans (e.g., copepods), and the eggs and larvae of fish and invertebrates (meroplankton). Plankton exposure to hydrocarbons in the water column can result in changes in species composition with declines or increases in one or more species or taxonomic groups (Batten et al., 1998). Phytoplankton may also experience decreased rates of photosynthesis (Tomajka, 1985). For zooplankton, direct effects of contamination may include toxicity, suffocation, changes in behaviour, or environmental changes that make them more susceptible to predation. Impacts on plankton communities are likely to occur in areas where entrained or dissolved aromatic hydrocarbon threshold concentrations are exceeded, but communities are expected to recover relatively quickly (within weeks or months). This is due to high population turnover with copious production within short generation times that also buffers the potential for long-term (i.e., years) population declines (International Tanker Owners Pollution Federation, 2011a). Therefore, any impacts to exposed planktonic communities present within the EMBA are anticipated to be short-term.
Filter Feeders Hydrocarbon exposure to offshore filter feeding communities may occur, however, due to the hydrocarbon modelling predicting no contact above the ecological threshold and the anticipated depth of the entrained and dissolved aromatic hydrocarbons. See discussion above on potential impacts. Nearshore filter feeders that are present in shallower water <20 m are unlikely to be impacted by entrained hydrocarbon based on the predicted modelling. The released hydrocarbons are predicted to be weathered and less likely to result in toxic effects in comparison to fresh hydrocarbons (i.e., typically in the vicinity of the release location) before they reach any potential filter feeder community. Therefore, impacts such as localised, long-term effects to community structure and habitat are not predicted.
Seagrass Beds, Macroalgae and Mangroves No primary macroalgal/seagrass communities identified within the worst-case LOWC EMBA (RPS, 2024b). Therefore, these communities not predicted to be exposed to hydrocarbons above the ecological threshold.

Summary of Potential Impacts to Socio-economic Values	
Setting	***Receptor Group***
All Settings	***Cultural Features and Heritage Values*** Through consultation and review of available literature (Section 4.9), Woodside understands that Sea Country, including marine ecosystems and species, archaeological heritage and heritage sites, marine parks, as well as intangible cultural heritage may be impacted in the event of a hydrocarbon release from a loss of well containment. Cultural features and heritage values that have the potential to be impacted include: Marine Ecosystems and Species: Marine ecosystems may hold both cultural and environmental value to Traditional Custodians (see Section 4.9), with cultural and environmental values intrinsically linked (DCCEEW, 2023; MAC, 2021 as cited in Woodside, 2023a). It necessarily follows that an impact to marine ecosystems has the potential to impact cultural features where the impact is detectable within Sea Country – the seascape which Traditional Custodians view, interact with or hold knowledge of. The EMBA is known to include habitat for culturally important species such as whales, whale sharks, turtles, dugongs, plankton and seagrass (Sections 4.6 and 4.9). In the event of a worst-case release of hydrocarbons, individual fauna may be directly impacted or impacted through temporary degradation of their habitats; however, no population level impacts as expected. Impacts are not expected to occur to ecologically significant proportions of the populations of the species, nor expected to result in a decrease of the quality of the habitat such that the extent of these species is likely to decline. As such, cultural values and intangible cultural heritage associated with these species are expected to be maintained. Heritage Sites: The combined EMBA overlaps a number of native features and heritage values (see Section 4.9) Any oil (combined EMBA – not applicable to MEE01) that reaches the shoreline has potential to impact on indigenous heritage places along the coastline. In the unlikely event of a hydrocarbon release, shoreline accumulation may affect sensitive artefacts or areas, which could damage their heritage value. Marine Parks: The combined EMBA overlaps a number of AMPs under the North-West Marine Parks Network Management Plan 2018 and a few State Marine Parks. Management Plans for these parks recognise cultural values of Indigenous groups (Section 4.9). Due to the low

	maximum concentrations predicted to reach any marine park, it is not anticipated that their values will be compromised. Intangible Cultural Heritage: Impacts may occur to intangible cultural values such as songlines; creation/dreaming sites, sacred sites, ancestral beings; cultural obligations to care for Country; knowledge of Country/customary law and transfer of knowledge; connection to Country; Access to Country; kinship systems and totemic species, resource collection. Related intangible cultural heritage may include the transmission of cultural knowledge about whales and whale behaviour, including birthing areas, whale communication and migratory patterns. Such cultural knowledge may be associated with various cultural functions and activities that support the social and economic life of a community (Fijn, 2021). Inter-generational transmission of cultural knowledge (including songlines) relating to marine reptiles may be impacted where changes results in reduced sightings (e.g., through population decline, changes to migration routes or changes to migration seasonality). This transfer of knowledge may be integral to managing a group's intangible cultural heritage (UNESCO, 2003). In the unlikely event of a hydrocarbon release, intangible cultural heritage values may be impacted.
Offshore Waters	***Fisheries – Commercial*** Please refer to Section 4.10.1 for a list of the fisheries occurring within the EMBA, and for those considered to have potential for impact with the PAP. A worst-case hydrocarbon spill, as modelled for this EP, is not considered likely to cause significant direct impacts on the target species of these commercial fisheries, as discussed below. Refer to above sections for a discussion of impacts to spawning. Fish exposure to hydrocarbon can result in 'tainting' of their tissues. Even very low levels of hydrocarbons can impart a taint or 'off' flavour or smell in seafood. Tainting is reversible through the process of depuration which removes hydrocarbons from tissues by metabolic processes, although it is dependent upon the magnitude of the hydrocarbon contamination. Fish have a high capacity to metabolise these hydrocarbons while crustaceans (such as prawns) have a comparably reduced ability (Yender et al., 2002). Seafood safety is a concern associated with spill incidents. Therefore, actual or potential contamination of seafood can affect commercial and recreational fishers and can impact seafood markets long after any actual risk to seafood from a spill has subsided (Yender et al., 2002). A major hydrocarbon spill would result in the establishment of an exclusion zone around the spill affected area. There would also be a temporary prohibition on fishing activities for a period. Subsequently, there is potential for economic impacts to the affected commercial fishing operators. Additionally, hydrocarbon can foul fishing equipment such as traps and trawl nets, requiring cleaning or replacement. Impact to fishers would subsequently be dependent on the extent of the spill and resulting exclusion zone and may cause economic impacts due to fishing bans, damaged equipment and/or consumer perception of seafood safety. These impacts would not be expected to be long term or affect the viability of the fishery.
	Tourism and Recreation Tourism would likely be adversely affected if a visible surface slick entered areas of tourism activity. Spill modelling predicted low probability of hydrocarbon contact to the closest tourism area, such as the Montebello MP, Rankin Bank, and the Dampier AMP. These areas have some seasonal charter boat operators and recreational fishing activities, mainly concentrated around the islands. Recreational fishers predominantly target tropical species, such as emperor, snapper, grouper, mackerel, trevally and other game fish. Recreational angling activities include shore-based fishing, private boat and charter boat fishing, with the peak in activity between April and October (Smallwood et al., 2011). Impacts on species that are recreationally fished are described above under 'Commercial Fisheries' and 'Pelagic and Demersal Fish'. In the event of a major spill, tourists and recreational users may also avoid areas due to perceived impacts, including after the hydrocarbon spill has dispersed. There is also the potential for stakeholder perception that this remote environment will be contaminated over a larger area and for the longer term resulting in a prolonged period of tourism decline. Oxford Economics (2010) assessed the duration of hydrocarbon spill in relation to tourism impacts and found that on average, it took 12 to 28 months to return to baseline visitor spending. There is likely to be significant impacts to the tourism industry, wider service industry (hotels, restaurants and their supply chain) and local communities in terms of economic loss as a result of spill impacts to tourism. Recovery and return of tourism to pre-spill levels will depend on the size of the spill, effectiveness of the spill clean-up and change in any public misconceptions regarding the spill (Oxford Economics, 2010).

	However, based on the low levels of tourism and recreation at these locations (compared to other locations such as the Ningaloo Coast), and the low probability of hydrocarbons above the socio-economic thresholds contacting these areas impacts are not expected to be significant.
	Offshore Oil and Gas Infrastructure Surface hydrocarbons from a worst-case spill may affect production from existing offshore petroleum facilities (e.g., platforms and FPSOs). For example, facility water intakes for cooling and fire hydrants could be shut off which could in turn lead to the temporary cessation of production activities. Spill exclusion zones established to manage the spill could also prohibit activity support vessel access as well as tankers approaching facilities on the NWS. However, no petroleum operations are located within the spill EMBA that would likely be affected. The closest oil and gas operation is the Wheatstone platform (operated by Chevron). Other nearby facilities include the Woodside-operated Angel platform, GWA and the Santos operated John Brookes platform (Section 4.10.5). Operation of these facilities is unlikely to be affected in the event of a worst-case loss of well containment.

MEE-01 Well Loss of Containment – Risk Analysis
A bowtie risk analysis was undertaken to assess MEE-01; refer to the below figures for bowtie diagrams that were an output of Woodside's risk analysis process.

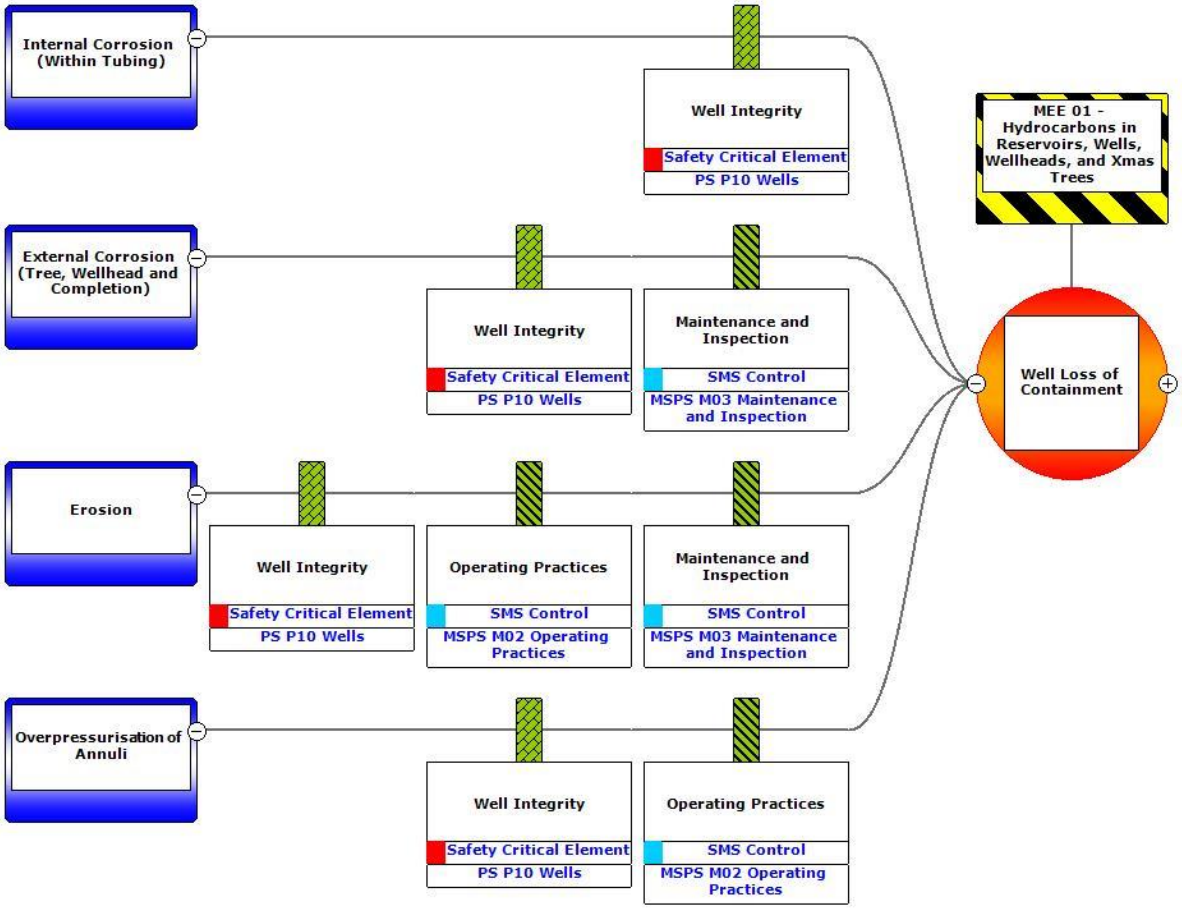

Figure 6-16: MEE-01 Wells loss of containment (Causes 1–4)

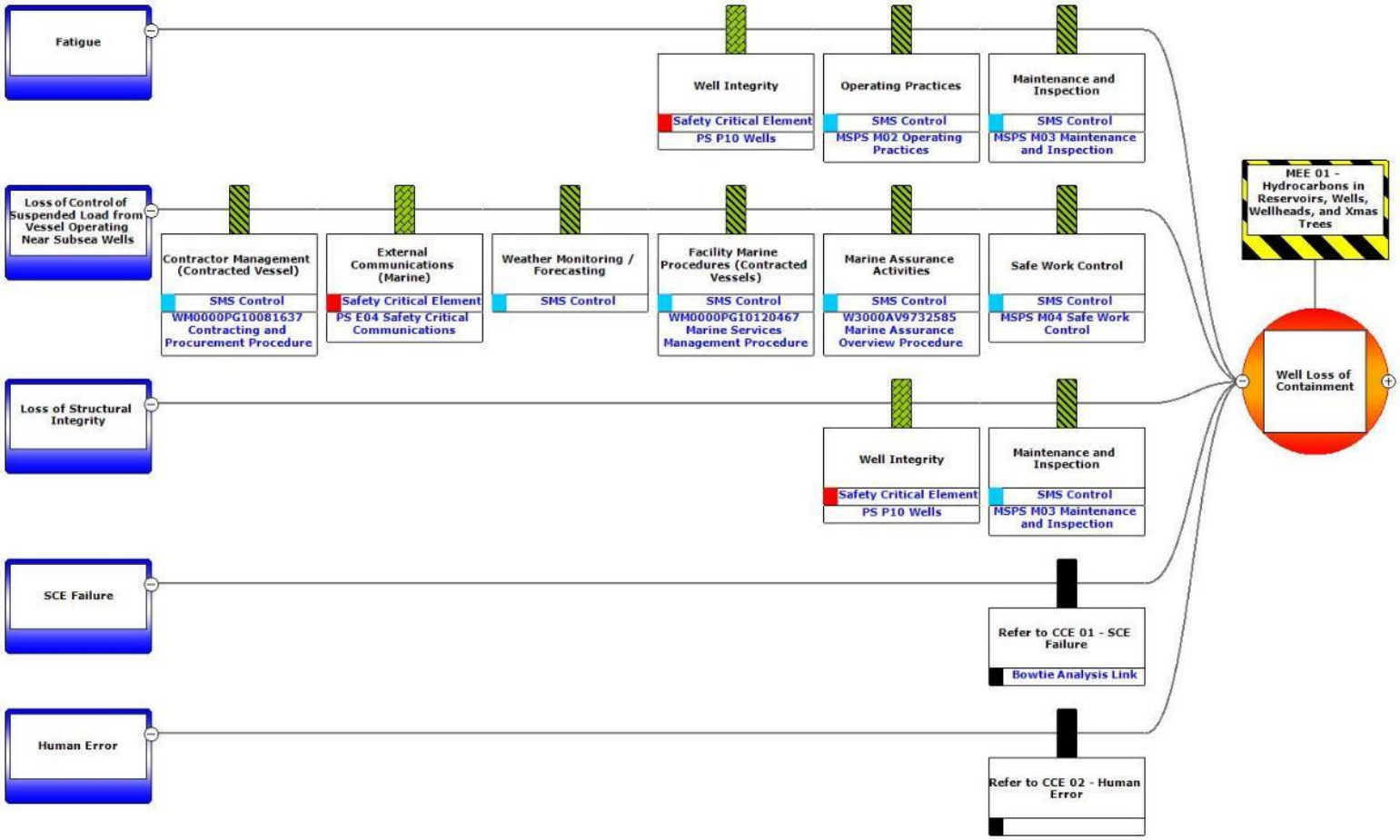

Figure 6-17: MEE-01 Wells loss of containment (Causes 5–9)

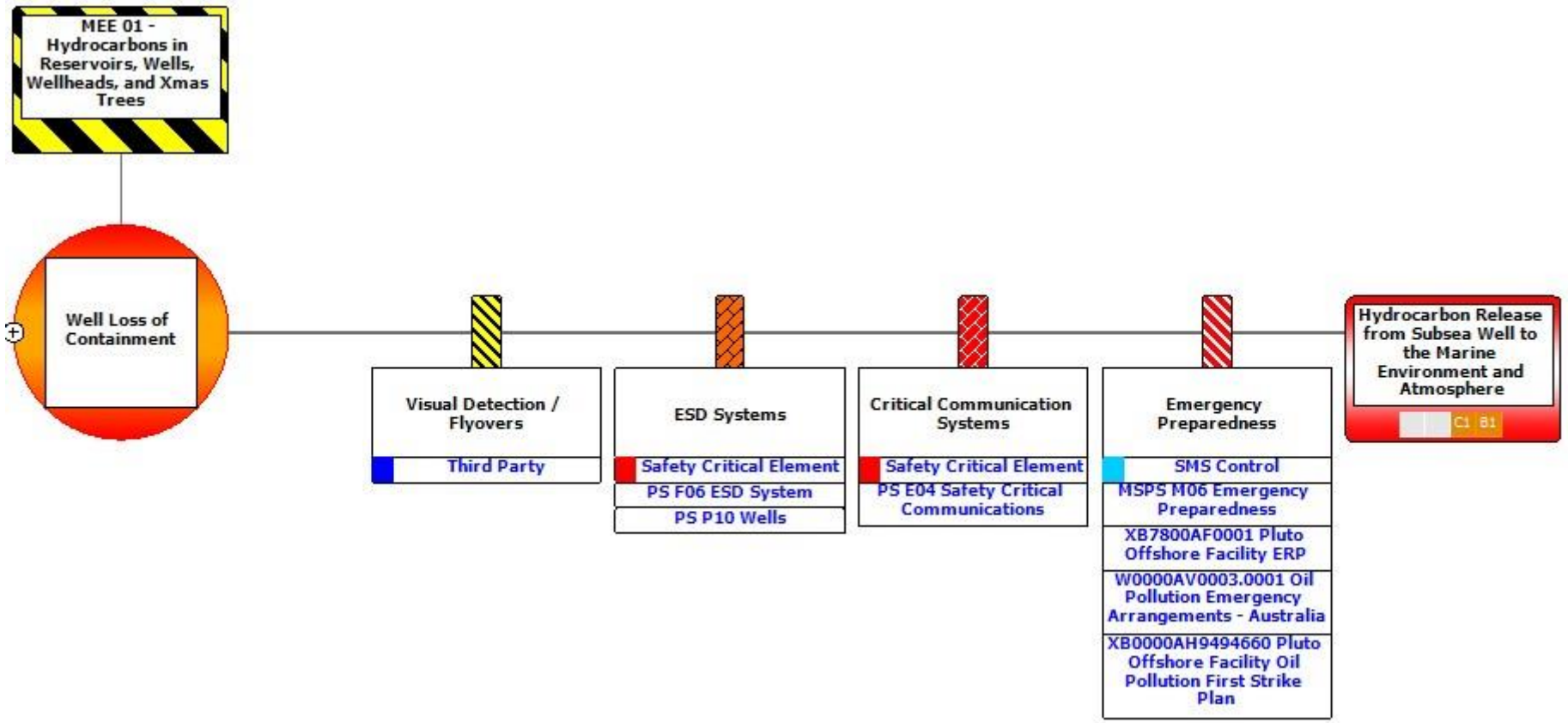

Figure 6-18: MEE-01 Wells loss of containment (outcomes)

MEE-01 Loss of Well Containment – Demonstration of ALARP ALARP Control Measures				
Hierarchy	***Control/Barrier***	***SCE/Management System Reference***	***Type of Effect***	***Control Adopted***
Preventative Barriers – Safety and Environmental Critical Elements				
Elimination	N/A.	No elimination or substitution controls were identified beyond those incorporated in design.		
Substitution				
Engineering Controls	Maintain well mechanical integrity to contain reservoir fluids within the well envelope to avoid an MEE.	P10 – Wells	Prevention (Technical)	Yes C 13.1
Engineering Controls	Maintain availability of critical external and internal communication systems to facilitate response to accidents and emergencies.	E04 – Safety Critical Communication Systems	Prevention /Mitigation (Technical)	Yes C 13.2
Mitigating Barrier – Safety and Environmental Critical Elements				
Engineering Controls	Maintaining Safety Instrumented System (Safety Instrumented Functions and ESD actions) and valves to detect and respond to pre-defined initiating conditions, and/or initiating responses that put the process plant, equipment, and the wells in a safe condition to prevent or mitigate the effects of an MEE.	F06 – Safety Instrumented System P10 – Wells	Reduction/ Control (Technical)	Yes C 13.3
Legislation Codes and Standards				
Procedures and Administration	OPGGS (Resource Management and Administration) Regulations 2011: Accepted WOMP to demonstrate that the risks to well integrity are managed in accordance with sound engineering principles, standards, specifications, and good oilfield practice. It describes the systems that are in place to ensure well design and integrity is managed for the well lifecycle, thus contributing to management of associated potential environmental consequences of well integrity events.	Pluto Well Operations Management Plan	Prevention/ Mitigation (Administration)	Yes C 13.4 Control based on legislative requirements – must be adopted)

MEE-01 Loss of Well Containment – Demonstration of ALARP ALARP Control Measures				
Hierarchy	***Control/Barrier***	***SCE/Management System Reference***	***Type of Effect***	***Control Adopted***
Procedures and Administration	Incident reports are raised for unplanned releases within event reporting system.	Woodside Health, Safety and Environment Event Reporting and Investigation Procedure	Prevention/ Mitigation (Administration)	Yes C 13.5 Control based on Woodside Standards
Management System Specific Measures: Key Standards or Procedures				
Procedures and Administration	Implementing management systems to maintain: • M02 – Operating practices • M03 – Maintenance and inspections • M04 – Safe work control • Marine Services Management Procedure • Marine Assurance Overview Procedure • Contracting and Procurement Procedure.	MSPS-02 – Operating Practices MSPS-03 – Maintenance and Inspections MSPS-04 – Safe Work Control	Prevention (Administration)	Yes – see Section 7
Emergency Response and Contingency Planning	Implementing management systems to maintain: • M06 – Emergency Preparedness • Pluto Offshore Facility Emergency Response Plan • Pluto Offshore Facility Oil Pollution First Strike Plan • Oil Pollution Emergency Arrangements – Australia.	MSPSM06 – Emergency Preparedness Pluto Offshore Facility Emergency Response Plan Pluto Offshore Facility Oil Pollution First Strike Plan Oil Pollution Emergency Arrangements – Australia	Mitigation (Administration)	Yes – See Section 7 Refer to Appendix H: Oil Spill Preparedness and Response Mitigation Assessment for discussion around the ALARP assessment of controls related to hydrocarbon spill response

MEE-01 Loss of Well Containment – Demonstration of ALARP ALARP Control Measures				
Hierarchy	***Control/Barrier***	***SCE/Management System Reference***	***Type of Effect***	***Control Adopted***

Risk Based Analysis

For risks identified as MEEs, a detailed risk-based Bowtie Analysis (as outlined in Section 2.7.3) has been used to identify, analyse and demonstrate that controls in place reduce the risk associated with each MEE to ALARP. Controls have been selected following hierarchy of control principles and consider independence of each barrier and their type of effect in controlling the hazardous event.

Application of Woodside's Risk Management Procedures and implementation of the WOMP ensures the continuous identification of hazards, systematic assessment of risks, and ongoing assessment of alternative control measures to reduce risk to ALARP, which includes:

- ongoing hazard identification, risk assessment and the identification of control measures
- ongoing integrity management of hardware control measures in accordance with the operational performance standards which define requirements to be suitably maintained, such that they retain effectiveness, functionality, availability and survivability
- well integrity codes and standards.

For each SCE, detailed requirements for equipment functionality, availability, reliability and survivability are incorporated into SCE Performance Standards which also include the relevant assurance tasks (e.g., inspection, maintenance, testing and monitoring requirements) to ensure technical integrity.

Bowtie analysis was undertaken to assess MEE-01, with review of well integrity formal safety and design studies.

Company Values

Woodside's corporate values require all personnel to comply with appropriate policies, standards, procedures and processes while being accountable for their actions and holding others to account in line with Our Values. As detailed above, the PAP is undertaken in line with these policies, standards and procedures that include suitable controls to prevent loss of well containment, and response should a loss of well containment occur.

Societal Values

Due to the Petroleum Activities Program's proximity to sensitive receptors (e.g. Barrow Island, Ningaloo Coast) and the potential extent of the wider EMBA, a major hydrocarbon spill could have impacts to a community. However, due to the low maximum concentrations predicted to reach sensitive receptors, it is not anticipated that their values will be compromised. Therefore, the LOWC risk rating presents a Decision Type B in accordance with the decision support framework described in Section 2.6.1. Extensive consultation was undertaken for this program to identify the views and concerns of relevant persons, as described in Section 5.

Woodside has sent an Activity Factsheet to all identified relevant persons regarding the PAP (Section 5). Woodside has consulted with AMSA and the WA Department of Transport (DoT) on spill response strategies. A copy of the Oil Pollution First Strike Plan was provided to AMSA and DoT.

ALARP Statement:

On the basis of the environmental risk assessment outcomes and use of the relevant tools appropriate to the decision type, Woodside considers the adopted controls appropriate to manage the impacts and risks of a very low likelihood unplanned hydrocarbon release as a result of a loss of well containment.

The principle of inherent safety and environmental protection is based on prevention of the MEE through design of well integrity, ensuring the wells are operated within their design envelope through operating practices, and assurance through maintenance and inspection. If hydrocarbon loss of containment occurs, mitigation measures are in place to minimise the consequence, by limiting the inventory which can be released and implementing remediation.

The controls in place for prevention and mitigation of MEEs are specified and assured through implementing the WOMP, SCE management procedures including performance standards for SCEs, and Management System Performance Standards (MSPSs) for Safety Critical Management System Controls.

The application of Woodside Risk Management Procedures and implementation of the WOMP ensures the continuous identification of hazards, systematic assessment of risks and ongoing assessment of alternative control measures to reduce risk to ALARP, which includes:

- ongoing hazard identification, risk assessment and the identification of control measures
- ongoing integrity management of hardware control measures in accordance with the technical performance standards which define requirements to be suitably maintained, such that they retain effectiveness, functionality, availability and survivability
- well integrity codes and standards.

MEE-01 Loss of Well Containment – Demonstration of ALARP ALARP Control Measures				
Hierarchy	***Control/Barrier***	***SCE/Management System Reference***	***Type of Effect***	***Control Adopted***
Given the controls in place to prevent and control loss of containment events and mitigate their consequences, it is considered that MEE risk associated with loss of well containment is managed to ALARP.				

Demonstration of Acceptability

Acceptability Statement:

Loss of well containment has been evaluated as having a 'moderate' risk rating, based on a C consequence level and a 'highly unlikely' likelihood. As per Section 2.6.3, Woodside considers C+ consequence risks as acceptable if ALARP is demonstrated using good industry practice, consideration of company and societal values and risk based analysis, if legislative requirements are met and societal concerns are accounted for and the alternative control measures are grossly disproportionate to the benefit gained.

Acceptability is demonstrated with regard to the considerations below.

Principles of Ecologically Sustainable Development

Woodside is a proud Australian company that is here for the long term. Woodside has a strong history of exploration and development of oil and gas reserves in the north west of Western Australia with an excellent environmental record, while providing revenue to State and Commonwealth Governments, returns to shareholders, jobs and support to local communities. Titles for oil and gas exploration are released based on commitments to explore with the aim of uncovering and developing resources. It is under the lease agreement that Woodside has determined the potential to develop the hydrocarbon fields for which acceptance of this EP is sought under the Environment Regulations.

Woodside has established a number of research projects in order to understand the marine environments in which they operate, notably in the Exmouth Region and the Kimberley Region, including Rankin Bank, Glomar Shoal, Enfield Canyon and Scott Reef. Where scientific data does not exist, Woodside assumes a pristine natural environment exists, and therefore implements all practicable steps to prevent damage. Woodside's corporate values (Appendix A) require that we consider the environment and communities in which we operate when making decisions.

Woodside looks after the communities and environments in which it operates. Risks are inherent in petroleum activities; however, through sound management and systematic application of policies, standards, procedures and processes, Woodside considers that despite this risk, the extremely low likelihood of loss of well containment is acceptable.

Internal Context

The PAP is consistent with Woodside corporate policies, standards, procedures, processes and training requirements as outlined in the Demonstration of ALARP and EPOs, including:

- Woodside Environment and Biodiversity Policy (Appendix A)
- Woodside Risk Management Policy (Appendix A)
- the SCE Performance Standards developed and implemented for the facility.

Hydrocarbon spill preparedness and response strategies are considered applicable to the nature and scale of the risk, and associated impacts of the response are reduced to ALARP (Section 2.8.1).

Woodside corporate values include working sustainably with respect to the environment and communities in which we operate, listening to internal and external stakeholders and considering HSE when making decisions. Consultation, outlined below, has been undertaken prior to the Petroleum Activities Program.

External Context – Societal Values

Woodside recognises that its licence to operate from a regulatory and societal perspective is based on historical performance, complying with appropriate policies, standards and procedures, and understanding the expectations of external stakeholders. External stakeholder consultation, outlined below, has been undertaken prior to the Petroleum Activities Program:

- Woodside has consulted with AMSA and WA DoT on spill response strategies. A copy of the Oil Pollution First Strike Plan was provided to AMSA and DoT.
- Other relevant persons were consulted (Section 5) and their feedback incorporated into this EP where appropriate.
- By providing hydrocarbon spill response measures that are commensurate with the risk rating, location and sensitivity of the receiving environment (including social and aesthetic values), Woodside believes this addresses societal concerns to an acceptable level.

Other Requirements (includes Laws, Policies, Standards and Conventions)

The PAP is consistent with laws, policies, standards and conventions, including:

- accepted Safety Case (as per the requirements of the OPGGS (Safety) Regulations 2009
- Mutual Aid MoU for relief well drilling is in place
- accepted WOMP as per the requirements of the OPPGS (Resource Management and Administration) Regulations 2011
- notification of reportable and recordable incidents to NOPSEMA, if required, in accordance with Section 7.13.5.

The PAP is consistent with the objectives in the Ningaloo management plans (Management Plan for Ningaloo Marine Park and Muiron Islands Marine Management Areas, Ningaloo Marine Park Management Plan) in relation to water quality, coral, shoreline and intertidal, macroalgal, seagrass, mangroves, seabirds and social and economic values.

EPOs, EPSs and MC for Pluto Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 13 No release of hydrocarbons to the marine environment due to well loss of containment.	**C 13.1** Maintain well mechanical integrity to contain reservoir fluids within the well envelope to avoid an MEE.	**PS 13.1** Integrity will be managed in accordance with SCE Management Procedures (Section 7.4) and SCE Technical Performance Standard(s) to prevent environment risk related damage to SCEs for: • P10 – Wells, to ensure a well retains the mechanical integrity to contain reservoir fluids within the well envelope at all times to avoid an MEE, including operate phase environmentally critical equipment for pressure containment, structures, monitoring and isolating systems associated with the well.	**MC 1.16.1** Records demonstrate implementation of SCE Technical Performance Standard(s) and Management of Hardware Controls in the Operate Phase Procedure (Section 7.4.2), in order to achieve the functional objective of the control. Records may include implementation and maintain/assure and manage-change information summarised in Section 7.4.2
	C 13.2 Maintain availability of critical external and internal communication systems to facilitate response to accidents and emergencies.	**PS 13.2** Integrity will be managed in accordance with SCE Management Procedures (Section 7.4) and SCE Technical Performance Standard(s) to prevent environment risk related damage to SCEs for: • E04 – Safety Critical Communication Systems to allow effective Emergency Response (ER) communications in emergencies, including: – internal communications such as audible and visual warning systems, and voice communications during emergency events – external communications such as voice	**MC 1.16.1** Records demonstrate implementation of SCE Technical Performance Standard(s) and Management of Hardware Controls in the Operate Phase Procedure (Section 7.4.2), in order to achieve the functional objective of the control. Records may include implementation and maintain/assure and manage-change information summarised in Section 7.4.2

EPOs, EPSs and MC for Pluto Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
		communications to adjacent facilities, aircraft and vessels, and external incident control centres during emergency events.	
	C 13.3 Maintaining Safety Instrumented System (Safety Instrumented Functions and ESD actions) and valves to detect and respond to pre-defined initiating conditions, and/or initiating responses that put the process plant, equipment, and the wells in a safe condition to prevent or mitigate the effects of an MEE.	**PS 13.3** Integrity will be managed in accordance with SCE Management Procedures (Section 7.4) and SCE Technical Performance Standard(s) to prevent environment risk related Damage to SCEs for: • F06 – Safety Instrumented System • P10 – Wells, to together detect and respond to predefined initiating conditions and/or initiate responses that put the process plant, equipment, and the wells in a safe condition to prevent or mitigate the effects of an MEE.	**MC 1.16.1** Records demonstrate implementation of SCE Technical Performance Standard(s) and Management of Hardware Controls in the Operate Phase Procedure (Section 7.4.2), in order to achieve the functional objective of the control. Records may include implementation and maintain/assure and manage-change information summarised in Section 7.4.2.
	C 13.4 OPGGS (Resource Management and Administration) Regulations 2011: Accepted WOMP to demonstrate that the risks to well integrity are managed in accordance with sound engineering principles, standards, specifications, and good oilfield practice. It describes the systems that are in place to ensure well design and integrity is managed for the well lifecycle, thus contributing to management of associated potential environmental consequences of well integrity events.	**PS 13.4** An accepted WOMP is implemented, and well integrity notification and reporting are undertaken in accordance with the Regulations (as applicable).	**MC 13.4.1** Acceptance letter from NOPSEMA demonstrates acceptance of the WOMP. Records demonstrate applicable NOPSEMA notification and reporting.
	C 13.5 Incident reports are raised for unplanned releases within event reporting system.	**PS 13.5** Incident reports raised for unplanned releases and Recordable Incidents notified	**MC 13.5.1** Records demonstrate incident reports raised for unplanned releases, and applicable

EPOs, EPSs and MC for Pluto Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
			Recordable Incident notifications completed.
	Mitigation – Emergency and Hydrocarbon Spill Response.	Refer to Appendix H: Oil Spill Preparedness and Response Mitigation Assessment for discussion around the ALARP assessment of controls related to hydrocarbon spill response.	

6.8.4 Unplanned Hydrocarbon Release: Subsea Equipment Loss of Containment (MEE-02)

Context		
Flowline and Riser System – Section 3.4.3 Pipeline and 6-inch Chemical Supply Line – Section 3.4.5 Subsea Infrastructure – Section 3.4.6	Physical Environment – Section 4.4 Habitats and Biological Communities – Section 4.5 Protected Species – Section 4.6 Protected Places – Section 4.8 Socio-economic Environment – Section 4.9	Consultation – Section 5

Impacts and Risks Evaluation Summary

Source of Risk	***Environmental Value Potentially Impacted***							***Evaluation***						
	Soil and Groundwater	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/Habitat	Species	Socio-economic	Decision Type	Consequence	Likelihood	Risk Rating	ALARP Tool	Acceptability	Outcome
Surface or subsea release from flowline, pipeline and riser to the marine environment and atmosphere within PSZ and to mid-point of export pipeline		x	x	x	x	x	x	B	C	1	M	LCS GP PJ RBA CV SV	Acceptable if ALARP	EPO 14
Subsea release from export pipeline to the marine environment and atmosphere between mid-point of export pipeline to shore		x	x	x	x	x	x	B	B	1	M			

Description of Source of Risk

A loss of containment from subsea equipment, including the export pipeline may result in the release of large volumes of hydrocarbon inventory to the environment. The worst-case scenario is based on a release (such as a major rupture or failure) and assumes depressurisation and release of the pipeline inventory prior to and following activation of the emergency shut down systems. Due to the potential consequence of a worst-case subsea equipment loss of containment, this risk is considered to be an MEE (MEE-02).

The potential hazard sources that could instigate a loss of containment from the export pipeline are:

- internal corrosion
- external corrosion
- erosion (for flowlines)
- overpressure
- equipment fatigue and mechanical failures
- pipeline stability and freespans
- anchor impact/dragging

- loss of control of suspended load from supply/ support boat.

Escalation from other MEEs can cause subsea equipment loss of containment:

- loss of structural integrity (MEE-03)
- loss of marine vessel separation (MEE-04)
- loss of control of suspended load from facility lifting operations (MEE-05).

The potential for subsea loss of containment events within the PSZ to escalate due to fire and/or explosion events is considered in Section 6.8.5 Loss of Structural Integrity (MEE-03).

A number of common failure causes due to human error and SCC failures are presented in the generic Human Error and SCE Failure bowties in Section 6.8.8

Subsea Export Pipeline Loss of Containment – Credible Scenarios

The credible worst-case hydrocarbon release caused by subsea loss of containment is a release from the export pipeline.

Woodside evaluated three locations for a loss of containment of the export pipeline, as the location will influence the potential environmental consequence. These included:

- A seabed loss of containment of hydrocarbons from the export pipeline approximately 29 km shorewards along the pipeline from Pluto A. The approximate mid-point location was identified as the point closest to offshore sensitive environmental receptors (i.e., Montebello Islands).
- A seabed loss of containment of hydrocarbons from the export pipeline at the State waters 3nm boundary to consider potential near-shore impacts.
- A surface loss of containment of hydrocarbons from the export pipeline at the riser platform. However, based on the predicted annualised probability and previous modelling studies, the subsea scenario (1) was predicted to be the worst-case scenario within the PSZ, and therefore a surface scenario was not modelled.

The characteristics of the release scenarios modelled are summarised in Table 6-38.

Refer to Section 6.8.2 for additional information on modelling methods and environmental impact, thresholds and hydrocarbon characteristics.

Table 6-38: Summary of worst-case subsea pipeline loss of containment release scenarios

Scenario	Hydrocarbon	Duration (hrs)	Depth (m)	Latitude	Longitude	Total Condensate Release Volume (Sm^3)
Scenario 3: Loss of containment of the export pipeline 29 km from Pluto A	Pluto condensate	8	78	20° 3’ 55.1” S	115° 36’ 1.1” E	472
Scenario 4: Loss of containment of the export pipeline at the State Waters boundary	Pluto condensate	8	41	20° 21’ 0.81” S	116° 42’ 12.41” E	662

Decision Type, Risk Analysis and ALARP Tools

Woodside has a good history of implementing industry standard practice in subsea system design and construction. In the company’s recent history, it has not experienced any pipeline integrity events that have resulted in significant releases or significant environmental impacts. The facility has never experienced a worst-case loss of pipeline and riser containment in its operational history.

Prevention and Mitigation

The main measures in place to prevent and mitigate consequences of a subsea equipment loss of containment event are:

- pipeline design and integrity management
- sand management systems
- process control and emergency shutdown systems
- operating practices
- maintenance and inspection

- emergency and hydrocarbon spill response.

Decision Type

Decision Type B has been applied to this risk under the Guidance on Risk Related Decision Making (Oil and Gas UK, 2014). This reflects the complexity of the risk, the higher potential consequence and stakeholder implications should the event be realised. To align with this decision type, a further level of analysis has been applied using risk based tools, including the bowtie methodology (described in Section 2.7.3) and hydrocarbon spill trajectory modelling (described in Section 6.8.2). Company and societal values were also considered in the demonstration of ALARP and acceptability, considered through internal reviews and stakeholder consultation (Section 5).

The release of hydrocarbons as a result of subsea equipment loss of containment is considered a major environment event (MEE-02). The hazard associated with this MEE is hydrocarbons in subsea infrastructure tied to or originating from the facility.

Quantitative Spill Risk Assessment

Spill modelling of each of the subsea loss of containment credible spill scenarios was undertaken by RPS (2024c, 2024d), on behalf of Woodside, to determine the fate of hydrocarbon released in each scenario based on the assumptions outlined in Section 6.8.2. Modelling was undertaken over all seasons to address year-round operations. This is considered to provide a conservative estimate of the EMBA, and the potential impacts from the identified worst-case credible release volumes for all subsea loss containment scenarios.

Hydrocarbon Characteristics

Refer to Section 6.8.2 for a discussion of Pluto condensate characteristics.

Subsea Plume Dynamics

The loss of subsea containment scenarios will result in a buoyant plume of hydrocarbons, which has been modelled using the OILMAP-Deep numerical model for Scenarios 3A and 7 (summarised in Table 6-39 and Table 6-40, respectively).

Table 6-39: Near-field subsurface discharge model parameters, OILMAP deep model, for the loss of containment of the export pipeline at 29 km from Pluto A for hour 1

	Parameter	Scenario 3
Inputs	Release depth (m below sea level)	78
	Oil density (g/cm³) (at 15°C)	0.733
	Oil viscosity (cP) (at 15°C)	0.58
	Oil temperature (°C)	95
	Gas:oil ratio (m³/m³) [scf/bbl]	9264/52,016
	Oil flow rate (m³/hr)	2444
	Hole diameter (m) [in]	1.2 [47.2]
Outputs	Plume diameter (m)	10
	Plume height (m above seabed	78
	Plume initial rise velocity (m/s)	33
	Plume terminal rise velocity (m/s)	27
Predicted oil droplet size distribution	20% droplets of size (µm)	2586
	20% droplets of size (µm)	3776
	20% droplets of size (µm)	4908
	20% droplets of size (µm)	6380
	20% droplets of size (µm)	9316

Table 6-40: Near-field subsurface discharge model parameters, OILMAP deep model, for the loss of containment of export pipeline at State Waters boundary for 1 hour

	Parameter	Scenario 4
Inputs	Release depth (m below sea level)	41
	Oil density (g/cm³) (at 15°C)	0.733
	Oil viscosity (cP) (at 15°C)	0.58
	Oil temperature (°C)	95
	Gas:oil ratio (m³/m³) [scf/bbl]	7495/42,082
	Oil flow rate (m³/hr)	3063
	Hole diameter (m) [in]	1.2 [47.2]
Outputs	Plume diameter (m)	5.3
	Plume height (m above seabed	41
	Plume initial rise velocity (m/s)	50.9
	Plume terminal rise velocity (m/s)	41.8
Predicted Oil Droplet Size Distribution	20% droplets of size (µm)	2024
	20% droplets of size (µm)	2956
	20% droplets of size (µm)	3842
	20% droplets of size (µm)	4994
	20% droplets of size (µm)	7293

Likelihood

In accordance with the Woodside Risk Matrix, given prevention and mitigation measures in place, worst case subsea loss of containment likelihood has been assessed as 1 (Highly Unlikely).

Subsea loss of containment full bore export pipeline loss of containment events where the zone of contact potentially includes shoreline impact or impact on nearshore Marine Parks/Reserves with low associated probability: Formal safety studies indicate the frequency of this event is calculated to be 3.03E-05, or 1 in 33,000 years. This means with outcome mitigation factored in, the likelihood is considered 1 “Highly Unlikely”.

For full bore loss of containment releases from the export riser or pipeline at any point within the platform PSZ, consequences for the worst-case credible spill where the zone of contact does not include predicted shoreline impact or impact on nearshore Marine Parks/Reserves; Likelihood is estimated to be 3.6E-05 per year, or 1 in 27,470 years.

Similarly, for releases at the platform location from the production flowlines or risers; the frequency of this event is estimated to be 9.8E-05, or 1 in 10,200 years. Therefore, both scenarios have consequences and likelihood considered as 1 “Highly Unlikely”.

Consequence

The spatial extent and fate (including weathering) of the spilled hydrocarbon were considered during the impact assessment for a worst-case subsea or riser loss of containment (presented in the following section). These considerations were informed primarily by the outputs from the numerical modelling studies undertaken by RPS (2024c, 2024d), available information on environmental sensitivities that may credibly be impacted in the event of a worst-case spill and relevant literature and studies considering the effects of hydrocarbon exposure.

Consequence Assessment

Environment that May Be Affected

Scenario 3 – Loss of Containment of the Export Pipeline at 29 km from Pluto A

Surface Hydrocarbons

The hydrocarbon spill modelling indicated that concentrations of floating hydrocarbons equal to or greater than the 10 g/m² threshold could potentially be found, in the form of slicks, approximately 10 km north-west, from the release location. The only receptor modelled with a probability of contact at the ecological threshold (10 g/m²) was Montebello AMP (90%).

Dissolved Hydrocarbons

Dissolved aromatic hydrocarbon concentrations equal to or greater than the 50 ppb threshold are predicted to be found up to around 10 km south-west from the release location. The only receptor modelled with a probability of contact at the ecological threshold (50 ppb) was Montebello AMP (2%).

Entrained Hydrocarbons

Entrained oil concentrations equal to or greater than the 100 ppb threshold are predicted to be found up to 110 km south-west from the release location. The only receptors modelled with a probability of contact at the ecological threshold (100 ppb) was Montebello AMP (47%) and Tryal Rocks (1%).

Accumulated Hydrocarbons

No shoreline accumulation at the ecological threshold, at or above 100 g/m², was predicted.

Scenario 4 – Loss of Containment of the Export Pipeline at the State Waters 3 nm Boundary

Surface Hydrocarbons

The hydrocarbon spill modelling indicated that concentrations of floating hydrocarbons equal to or greater than the 10 g/m² threshold could potentially be found, in the form of slicks, up to 12 km south-west from the release location. However, no receptors are predicted to be contacted by surface hydrocarbons at or above ecological thresholds.

Dissolved Hydrocarbons

Dissolved aromatic hydrocarbon concentrations equal to or greater than the 50 ppb threshold are predicted to be found up to around 10 km south-west from the release location. However, no receptors are predicted to be contacted by dissolved hydrocarbons at ecological thresholds.

Entrained Hydrocarbons

Entrained oil concentrations equal to or greater than the 100 ppb threshold are predicted to be found up to 80 km south-west from the release location.

Receptors with the highest probability of contact at the ecological threshold (100 ppb) include Dampier AMP (23%), Cape Bruguieres (3%), Dampier Archipelago (16%), Cohen Island (7%), Enderby Island (1%), Gidley Island (1%), Goodwyn Island (1%), Keast Island (5%), Kendrew Island (6%), Legendre Island (13%), Malus Island (1%), Rosemary Island (7%), Courtenay Shoal (1%), Hammersley Shoal (8%) and the Madeline Shoals (25%).

Accumulated Hydrocarbons

Shoreline accumulation was predicted at or above 100 g/m² was predicted for Cape Bruguieres (1%), Dampier Archipelago (2%), Cohen Island (2%), Keast Island (1%), Legendre Island (1%), and Rosemary Island (1%)

Any impacts to biological and physical receptors within this area are addressed within the impact discussion for MEE-01 (Section 6.8.3).

Summary of Potential Impacts to Environmental Values

The credible worst-case hydrocarbon spill scenario that may arise from MEE-02 may impact upon a range of environmental receptors. Potential impacts of a hydrocarbon spill to the open water environment and receptors have been assessed within the worst-case spill scenario, MEE-01; refer to Section 6.8.3 for a description of potential impacts.

However, the spill scenario that may arise from MEE-02 is the only scenario predicted to impact the shorelines at or above relevant thresholds. Therefore, potential impacts to nearshore waters (including mainlands and islands) have been assessed below.

Table 6-41: Environment that may be affected – key receptor locations and sensitivities potentially contacted above impact thresholds by the export pipeline and riser loss of containment scenarios with summary hydrocarbon spill contact ≥ 1% probability

Environmental Setting	Receptor	Environmental, Social, Cultural, Heritage and Economic Aspects Presented as per the Environmental Risk Definitions (Woodside's Risk Management Procedure)																												Probability of Hydrocarbon Contact and Fate (%)					
		Physical		*Biological*																			*Socio-economic and Cultural*								*Socio-cultural EMBA*		*EMBA*			
		Water Quality	*Sediment Quality*	*Marine Primary Producers*			*Other Communities/Habitats*								*Protected Species*								*Other Species*													
		Open Water (Pristine)	Marine Sediment (Pristine)	Coral Reef	Seagrass Beds/Macroalgae	Mangroves	Spawning /Nursery Areas	Open water – Productivity/Upwelling	Non-biogenic Reefs	Offshore Filter feeders and/or Deepwater Benthic Communities	Nearshore Filter Feeders	Sandy Shores	Estuaries/Tributaries/Creeks/Lagoons (including mudflats)	Rocky Shores	Cetaceans – Migratory Whales	Cetaceans – Dolphins and Porpoises	Dugongs	Pinnipeds (Sea Lions/Fur Seals)	Marine Turtles (Foraging and Internesting Areas and Significant Nesting Beaches)	Sea Snakes	Whale Sharks	Sharks and Rays	Seabirds and Migratory Shorebirds	Pelagic Fish Populations	Demersal Fish Populations	Fisheries – Commercial	Fisheries – Traditional	Tourism and Recreation	Protected Areas/Heritage – European and Indigenous/Underwater Cultural Heritage	Offshore Oil and Gas Infrastructure (Topside and Subsea)	Surface hydrocarbon (1–10 g/m²)	Accumulated hydrocarbons (10–100 g/m²)	Surface Hydrocarbons (≥ 10 g/m²)	Entrained Hydrocarbons (≥ 100 ppb)	Dissolved Hydrocarbons (≥50 ppb)	Accumulated Hydrocarbons (≥ 100 g/m²)
Offshore	Dampier MP	✓	✓					✓							✓	✓			✓			✓	✓	✓		✓			✓					23		
	Montebello MP	✓	✓	✓			✓	✓							✓	✓			✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		95		90	47	2	
Islands	Legendre Island	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		1	3		13		1
	Rosemary Island	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		1	1		7		1
	Cohen Island	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓			3		7		2
	Gidley Island	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓			1		1		
	Keast Island	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓			2		5		1
	Kendrew Island	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓			1		6		
	Enderby Island	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓					1		
	Goodwyn Island	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓					1		
	Malus Island	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓					1		
Submerged Banks	Madeleine Shoals	✓	✓	✓			✓	✓		✓		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		1			25		

Environmental Setting	Receptor	Environmental, Social, Cultural, Heritage and Economic Aspects Presented as per the Environmental Risk Definitions (Woodside's Risk Management Procedure)																															Probability of Hydrocarbon Contact and Fate (%)					
		Physical		Biological																						Socio-economic and Cultural					Socio-cultural EMBA		EMBA			
		Water Quality	Sediment Quality	Marine Primary Producers			Other Communities/Habitats								Protected Species										Other Species													
		Open Water (Pristine)	Marine Sediment (Pristine)	Coral Reef	Seagrass Beds/Macroalgae	Mangroves	Spawning /Nursery Areas	Open water – Productivity/Upwelling	Non-biogenic Reefs	Offshore Filter feeders and/or Deepwater Benthic Communities	Nearshore Filter Feeders	Sandy Shores	Estuaries/Tributaries/Creeks/Lagoons (including mudflats)	Rocky Shores	Cetaceans – Migratory Whales	Cetaceans – Dolphins and Porpoises	Dugongs	Pinnipeds (Sea Lions/Fur Seals)	Marine Turtles (Foraging and Internesting Areas and Significant Nesting Beaches)	Sea Snakes	Whale Sharks	Sharks and Rays	Seabirds and Migratory Shorebirds	Pelagic Fish Populations	Demersal Fish Populations	Fisheries – Commercial	Fisheries – Traditional	Tourism and Recreation	Protected Areas/Heritage – European and Indigenous/Underwater Cultural Heritage	Offshore Oil and Gas Infrastructure (Topside and Subsea)	Surface hydrocarbon (1–10 g/m²)	Accumulated hydrocarbons (10–100 g/m²)	Surface Hydrocarbons (≥ 10 g/m²)	Entrained Hydrocarbons (≥ 100 ppb)	Dissolved Hydrocarbons (≥50 ppb)	Accumulated Hydrocarbons (≥ 100 g/m²)
Coastlines	Courtenay Shoal	✓	✓	✓			✓	✓		✓		✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓					1		
	Hammersley Shoal	✓	✓	✓			✓	✓		✓		✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓					8		
	Tryal Rocks	✓	✓	✓			✓	✓		✓		✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓					1		
	Dampier Archipelago	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		1	3		16		2
	Cape Bruguieres	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓			2		3		1

Nearshore Waters (Mainland and Islands)

Marine Sediment Quality

The EMBA modelled for MEE-02 scenarios (RPS, 2024c, 2024d) overlapped the nearshore waters of a few shorelines and islands. Specifically, the modelling for the export pipeline release near State Waters 3 nm boundary was the only scenario to predict hydrocarbon accumulation above the ecological threshold at any shoreline. Low probabilities (<2%) of hydrocarbon accumulation were predicted at a few nearshore receptors, such as the Dampier Archipelago, Cape Bruguieres, Keast Island, Cohen Island, Legendre Island, and Rosemary Island. Therefore, hydrocarbon contact from this scenario may lead to reduced marine sediment quality by several processes, such as adherence to sediment and deposition on shores or seabed habitat.

Protected Species

Cetaceans

Evaluation of the extent of the spill EMBA modelled for MEE-02 demonstrated an overlap with areas where cetaceans are known to occur, including the BIAs for a number of species. The potential impacts of hydrocarbon exposure upon cetaceans have already been assessed within the offshore environment evaluation above.

No additional BIAs beyond those already assessed were identified within the EMBA modelled for MEE-02.

Marine Turtles

Marine turtles are known to utilise nearshore waters and shorelines for foraging and breeding activities (including internesting), with significant nesting beaches along the WA mainland coast and nearshore islands in locations (such as the Dampier Archipelago and Montebello Island).

The combined EMBA overlaps a number of marine turtle BIAs. The modelling for the LOC from the export pipeline scenario in MEE-02 predicted low probabilities of contact by shoreline hydrocarbons above the ecological threshold at a number of these nearshore shorelines; including Dampier Archipelago (2%), Legendre Island (1%) and Rosemary Island (1%).

In addition, a number of islands and the nearshore waters of these marine turtle habitat areas are also shown to be exposed to entrained hydrocarbons exceeding the threshold concentrations modelled for MEE-02.

Seasonal timings for breeding, nesting and hatchling dispersal for each marine turtle species is provided in Section 4.6.5, as are the known BIAs and habitat critical areas.

The potential impacts of exposure within the offshore environment have been previously discussed within Section 6.8.3. In the nearshore environment, turtles can ingest hydrocarbons when feeding and/or can be indirectly affected by loss of a food source (e.g., seagrass due to dieback from hydrocarbon exposure) (Gagnon and Rawson, 2010). In addition, hydrocarbon exposure can impact on turtles during the breeding season at nesting beaches. Contact with gravid adult females or with hatchlings may occur on nesting beaches (accumulated hydrocarbons) or in nearshore waters (entrained hydrocarbons) where hydrocarbons are predicted to make shoreline contact. Males waiting in nearshore areas to mate with adult females may also be impacted by entrained hydrocarbons.

Marine turtles aggregating near nesting beaches within the spill EMBA during the mating and nesting seasons are most vulnerable to hydrocarbons, due to greater turtle densities and the possible disruption to important life cycle behaviours. Potential impacts may occur at the population level due to the presence of a high number of breeding individuals and hatchlings (during hatchling dispersal) and may impact on overall population viability of marine turtle species. However, given the volatile nature of the hydrocarbons, population level impacts are not anticipated to occur.

Sea Snakes

Impacts to sea snakes for the mainland and island nearshore waters from direct contact with hydrocarbons may occur and may include potential damage to the dermis and irritation to mucous membranes of the eyes, nose and throat (ITOPF, 2011a). Due to the time to impact in the nearshore environment, the hydrocarbons are considered to be weathered and less likely to result in toxic effects in comparison to fresh hydrocarbons (i.e., typically in the vicinity of the release location).

Sharks and Rays

Whale sharks and manta rays generally transit along the nearshore coastline in these areas and are vulnerable to surface, entrained and dissolved aromatic hydrocarbon spill impacts, with both taxa having similar modes of feeding. Whale sharks and manta rays (reef manta ray and giant manta ray) are known to frequent Ningaloo Reef (forming feeding aggregations from March through July) and the nearshore waters of the Muiron Islands (located 228 km south-west of the PAA).

Impacts from hydrocarbon exposure occurring within the nearshore waters of their main foraging areas, such as Ningaloo Reef, has been assessed in more detail below as the spill EMBA for MEE-04 is more relevant for this assessment.

Seabirds

There is the potential for seabirds, and resident/non-breeding overwintering shorebirds that use the nearshore waters for foraging and resting to be exposed to hydrocarbons above ecological impact thresholds within the EMBA modelled for MEE-02. Impacts may include both lethal or sub-lethal effects, as discussed below and above in the offshore environment assessment.

Although breeding oceanic seabird species can travel long distances to forage in offshore waters, most breeding seabirds tend to forage in nearshore waters near to their breeding colony, resulting in intensive feeding by higher seabird densities in these areas during the breeding season and making these areas particularly sensitive in the event of a spill.

Migratory shorebirds may be exposed to stranded hydrocarbons when foraging or resting in intertidal habitats, however, direct oiling is typically restricted to relatively small portion of birds, and such oiling is typically restricted to the birds' feet. Unlike seabirds, shorebird mortality due to hypothermia from matted feathers is relatively uncommon (Henkel et al., 2012). Indirect impacts, such as reduced prey availability, may occur (Henkel et al., 2012).

As mentioned, predicted surface hydrocarbons are relatively restricted to the release location, with only low probabilities of sporadic shoreline contact at certain locations. Shoreline hydrocarbon contact above ecological thresholds may occur at the Dampier Archipelago, Cape Bruguieres and a number of islands, including Cohen Island, Keast Island, Legendre and Rosemary Island during a MEE-02 scenario. Impacts may, therefore, occur at the population level for species breeding at these locations should a spill occur during the relevant species breeding seasons.

Impacts are likely to occur through the ingestion of contaminated fish (nearshore waters) or invertebrates (intertidal foraging grounds such as beaches, mudflats and reefs) which have been exposed to surface, shoreline, entrained or dissolved hydrocarbons within the combined EMBA. Ingestion of contaminated prey can also lead to internal injury to sensitive membranes and organs (International Petroleum Industry Environmental Conservation Association, 2004). Whether the toxicity of ingested hydrocarbons is lethal or sub-lethal will depend on the weathering stage and its inherent toxicity. Exposure to hydrocarbons may have longer term effects, with impacts to population numbers due to decline in reproductive performance and malformed eggs and chicks, affecting survivorship and loss of adult birds. Seabirds also typically nest above the high-water mark, meaning nesting areas would not be expected to be directly impacted.

Notably, the nearest receptor to the release location that is predicted to receive shoreline hydrocarbons above threshold concentrations is the Dampier Archipelago. Shoreline hydrocarbons were modelled to take a minimum of 21 hours to arrive at this location (RPS, 2024d). Hydrocarbons will be weathered after this period and toxic impacts unlikely to occur. Birds utilising the nearshore waters and intertidal areas for foraging and resting at locations of shoreline contact may, therefore, suffer sub-lethal and less likely, lethal impacts.

Submerged Shoals and Banks

Protected Species

Marine Turtles

While there are no shoal, bank or reef features within the PAA, there is the potential for marine turtles to be present at submerged shoals and banks within the spill EMBA modelled for MEE-02; with modelling predicted relatively low probabilities of contact by entrained hydrocarbons at Madeleine Shoals (25%), Courtenay Shoal (1%), Hammersley Shoal (8%) and Tryal Rocks (1%). Shoals and banks may, at times, be foraging habitat for marine turtles, given the coral and filter feeding biota associated with these areas.

Notably, there are no known key aggregation areas (i.e., BIAs or habitat critical areas) for marine turtles associated with these submerged receptors (see Section 4.6.2 for further details on key areas).

Impacts to marine turtles at submerged shoals and banks in offshore marine environments have been discussed above. Marine turtles would be expected to be foraging, resting and breathing at the surface at these geomorphic features. Ingestion of hydrocarbons while foraging through prey is also possible.

Marine turtles that may be present at these submerged shoals and banks within the EMBA may be impacted by entrained hydrocarbons present at concentrations greater than the relevant thresholds. Impacts would be expected to be limited to the individuals that may be transiting these areas. Subsequently, impacts at the population level are not anticipated for any of the five marine turtle species that may frequent shoals and banks within the EMBA.

Sea Snakes

It is likely that sea snakes will be present at submerged shoals and banks within the EMBA modelled for MEE-2. While there are no known areas of aggregation for sea snakes within the extended combined EMBA (see Section 4.6.2), individual sea snakes may be impacted by hydrocarbons predicted at and near to their habitat preferences (see Section 4.6.2).

The potential impacts to sea snakes following exposure to hydrocarbons have been discussed above.

Sea snake species in Australia generally show strong habitat preferences (Heatwole and Cogger, 1993); species that have preferred habitats associated with submerged shoals and oceanic atolls may be disproportionately affected by a hydrocarbon spill affecting such habitat. However, population level impacts are not anticipated.

Sharks and Rays

Pelagic sharks and rays may frequent submerged shoals and banks to feed within the EMBA modelled for MEE-02. Some species may also exhibit site fidelity to these geomorphic features. There is the potential for resident shark and ray populations to be impacted directly from hydrocarbon contact or indirectly through contaminated prey or loss of habitat.

Species which are resident to or exhibit site-fidelity to impacted shoals or banks may experience sub-lethal impacts and/or become displaced. Indirect impacts through ingestion of prey that has been exposed to hydrocarbons and/or the loss of marine flora habitats may also impact sharks and rays.

Pelagic sharks and rays are expected to move away from areas affected by spilled hydrocarbons. Impacts to such species are expected to be limited to behavioural responses/displacement. Shark and ray species that have associations with submerged shoals and banks may or may not be displaced/exhibit behavioural avoidance in response to such habitat being contacted by spilled hydrocarbons. Such species may be more susceptible to a reduction in habitat quality resulting from a hydrocarbon spill. It is expected that there will be no impacts at the population level

All Settings

Coral

Modelling for the pipeline export scenario (MEE-02) was predicted to contact known coral reef habitats above the ecological threshold. The modelling predicted low probability of entrained hydrocarbons to contact the Dampier Archipelago (16%).

Impacts

Exposure to entrained hydrocarbons (≥100 ppb) or dissolved aromatic hydrocarbons (≥50 ppb) has the potential to result in lethal or sub-lethal toxic effects to corals and other sensitive sessile benthos within the upper water column, including upper reef slopes (subtidal corals), reef flat (intertidal corals) and lagoonal (back reef) coral communities. Mortality in a number of coral species is possible and this would result in the reduction of coral cover and change in the composition of coral communities. Sub-lethal effects to corals may include polyp retraction, changes in feeding, bleaching (loss of zooxanthellae), increased mucous production resulting in reduced growth rates and impaired reproduction (Negri and Heyward, 2000).

This could result in impacts to the shallow water fringing coral communities/reefs of the nearshore islands.

Shoreline Accumulation

A very low probability of shoreline contact (<2%) above the ecological threshold was predicted at a few receptors for the MEE-02 scenario at the State Waters 3 nm boundary, including Cape Bruguieres, Dampier Archipelago, Cohen Island, Rosemary Island, Keast Island, Legendre Island.

Shallow coral habitats (i.e. nearshore and intertidal waters) are most vulnerable to hydrocarbons through coating by direct contact with surface slicks during periods when corals are tidally-exposed at spring low tides. Water soluble hydrocarbon fractions associated with surface slicks are known to cause high coral mortality (Shigenaka, 2001) via direct physical contact of hydrocarbon droplets to sensitive coral species (such as the branching coral species).

There is, therefore, potential for lethal impacts due to the physical hydrocarbon coating of sessile benthos (including by entrained hydrocarbons), with likely significant mortality of corals (adults, juveniles and established recruits) at the small spill affected areas. These impacts are particularly applicable to branching corals which are reported to be more sensitive than massive corals (Shigenaka, 2001).

Recruitment/Spawning

In the unlikely event of a spill occurring at the time of coral spawning at potentially affected coral locations or in the general peak period of biological productivity, there is the potential for a significant reduction in successful fertilisation and coral larval survival due to the sensitivity of coral early life stages to hydrocarbons (Negri and Heyward, 2000). Such impacts are likely to result in the failure of recruitment and settlement of new population cohorts. In addition, some non-coral species may be affected via direct contact with entrained and dissolved aromatic hydrocarbons, resulting in sub-lethal impacts and in some cases mortality. This is with particular reference to the early life-stages of coral reef animals (reef attached fishes and reef invertebrates), which can be relatively sensitive to hydrocarbon exposure. Coral reef fish are site attached, have small home ranges and as reef residents they are at higher risk from hydrocarbon exposure than non-resident, more wide-ranging fish species. The exact impact on resident coral communities (which may include fringing reefs of the offshore islands) will be entirely dependent on actual hydrocarbon concentration, duration of exposure and water depth of the affected communities. Coral cover, structure and composition may be reduced in hydrocarbon impacted areas, manifested by loss of corals and associated sessile biota.

Recovery of impacted reef areas from a range of stressors typically relies on coral larvae from neighbouring coral communities that have either not been affected or only partially impacted. For example, there is evidence that Ningaloo Reef corals and fish are partly self-seeding (Underwood, 2009) with the supply of larvae from locations within Ningaloo Reef of critical importance to the healthy maintenance of the coral communities. Recovery at other coral reef areas, may not be aided by a large supply of larvae from other reefs, with levels of recruits after a

disturbance event only returning to previous levels after the numbers of reproductive corals had also recovered (Gilmour et al., 2013).

The hydrocarbon modelling for the MEE-02 scenarios predicted only low probability of contact from entrained hydrocarbons at the Dampier Archipelago, Outtrim Patches, Submerged Shoals, and Tryal Rocks. Therefore, a worst-case scenario of an export pipeline release near the State Waters boundary may cause impacts to coral reefs with the EMBA, with the potential to cause long-term effects.

Productivity

The potential impacts to plankton and offshore productivity following exposure to entrained hydrocarbons have been discussed above.

Filter Feeders

Nearshore filter feeders that are present in shallower water <20 m may potentially be impacted by entrained hydrocarbon based on the predicted modelling.

However, the released hydrocarbons are predicted to be weathered and less likely to result in toxic effects in comparison to fresh hydrocarbons (i.e., typically in the vicinity of the release location) before they reach any potential filter feeder community. Therefore, impacts such as localised, long-term effects to community structure and habitat, are not predicted.

Seagrass Beds, Macroalgae and Mangroves

The primary macroalgal/seagrass communities identified within the combined EMBA including those along the Ningaloo Coast (patchy and low cover associated with the shallow limestone lagoonal platforms), Muiron Islands (associated with limestone pavements), and the Barrow and Montebello Island groups are not predicted to be exposed to hydrocarbons above the ecological threshold based on the modelling.

The seagrass and macroalgal beds that may be found at other areas of lower coverage, such as the Dampier Archipelago, may be susceptible to impacts from entrained hydrocarbons from a worst-case release near the State Water boundary (MEE-02). Toxicity effects can also occur due to absorption of soluble fractions of hydrocarbons into tissues (Runcie et al., 2010). The potential for toxicity effects of entrained hydrocarbons may be reduced by weathering processes that should serve to lower the content of soluble aromatic components before contact occurs. Furthermore, given the non-persistent nature of the hydrocarbons, however, no significant effects to seagrass and macroalgal habitats are expected to occur.

Mangrove habitats and associated mud flats and salt marsh at Ningaloo Coast (small habitat areas) and the Montebello Islands were not predicted to be exposed to entrained hydrocarbons. Therefore, impacts are not expected to occur.

Summary of Potential Impacts to Socio-economic Values	
Setting	***Receptor Group***
Nearshore Island and Mainland Coastal Areas (Nearshore Waters)	***Fisheries – Commercial*** A few State-managed fisheries have been identified to overlap with the EMBA. Any impacts to these fisheries would include possible direct mortality or sub-lethal impacts to the target species, as well as indirect financial and reputational impacts from possible fishing exclusion zones and perceived health impacts by the community/consumers as a result of the spill event. Impacts to fish stocks would depend on the time of the year the spill event was to occur, and the maturity of the fishery. Impacts are, however, expected to be restricted to mid-term for both direct and indirect impacts. Fishing activities may be hampered if fisheries are restricted from entry to an affected area, however the area potentially affected represents a very small part of available fishery zones and the short duration that diesel would persist limits the potential for significant impacts.
	Fisheries – Traditional Although no designated traditional fisheries have been identified within the PAA or EMBA, it is recognised that Indigenous communities' fish in the shallow coastal and nearshore waters of Ningaloo Reef and, therefore, may be impacted if a worst-case hydrocarbon spill were to occur. Impacts would be similar to those identified for commercial fishing, in the form of a potential fishing exclusion zone and possible contamination/tainting of fish stocks.

	Tourism and Recreation Tourism would likely be adversely affected if a visible surface slick entered areas of tourism activity. Spill modelling predicted low probability of hydrocarbon contact to the closest tourism area, such as the Montebello MP and Dampier AMP and archipelago. These areas have some seasonal charter boat operators and fishing activities, mainly concentrated around the islands. The Dampier Archipelago was predicted to have low probability of shoreline contact by MEE-02 scenario. This area experiences seasonal charter boats and recreational fishing. In the event of an export pipeline release near the State Waters 3 nm boundary, there could be restricted access to this area for a period of days to weeks, until natural weathering or tides and currents remove the hydrocarbon.

MEE-02 Subsea Equipment Loss of Well Containment – Risk Analysis
A bowtie risk analysis was undertaken to assess MEE-02; refer to the below figures for bowtie diagrams which were an output of Woodside's risk analysis process.

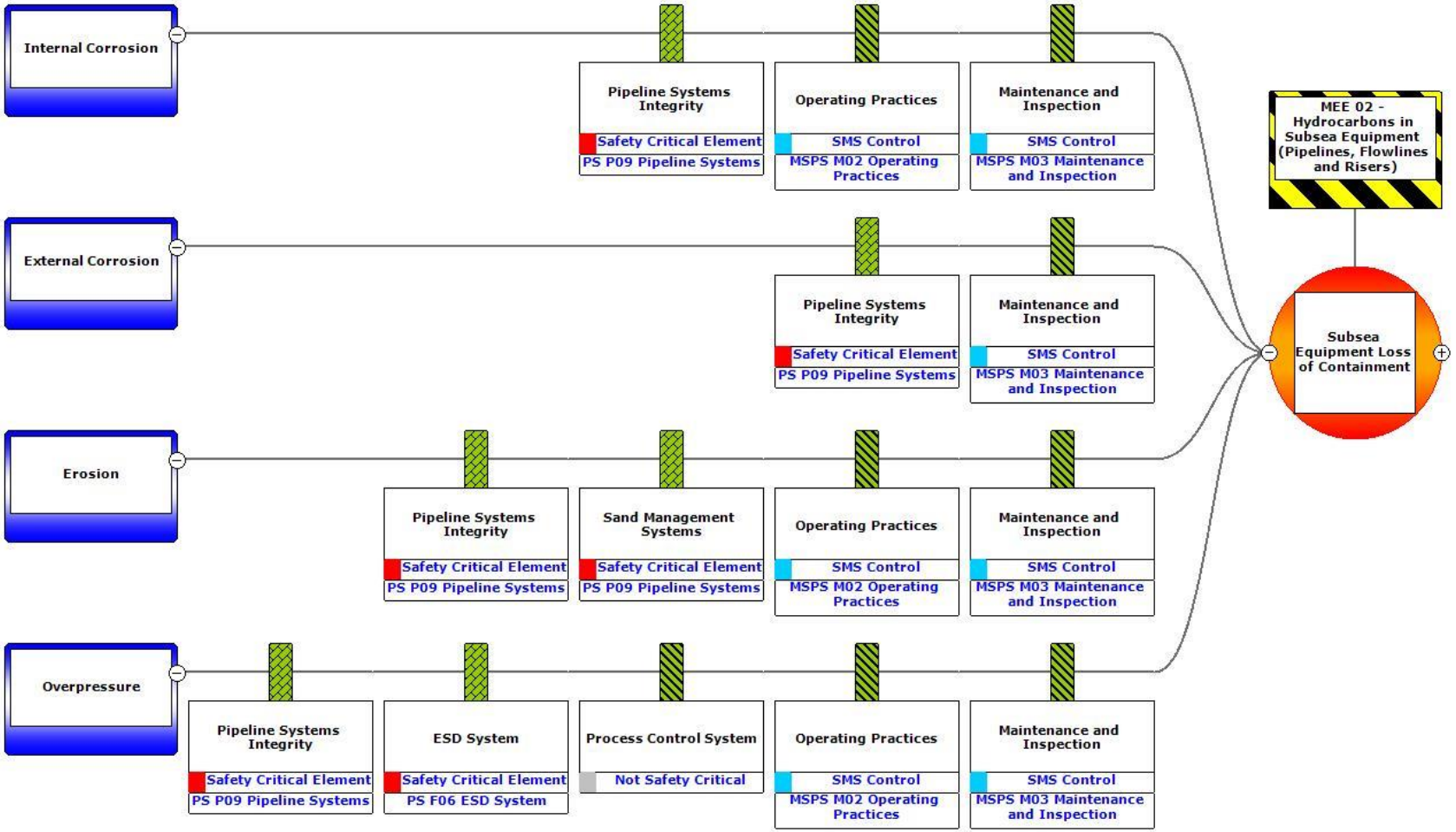

Figure 6-19: MEE-02 Subsea equipment loss of containment (Causes 1–4)

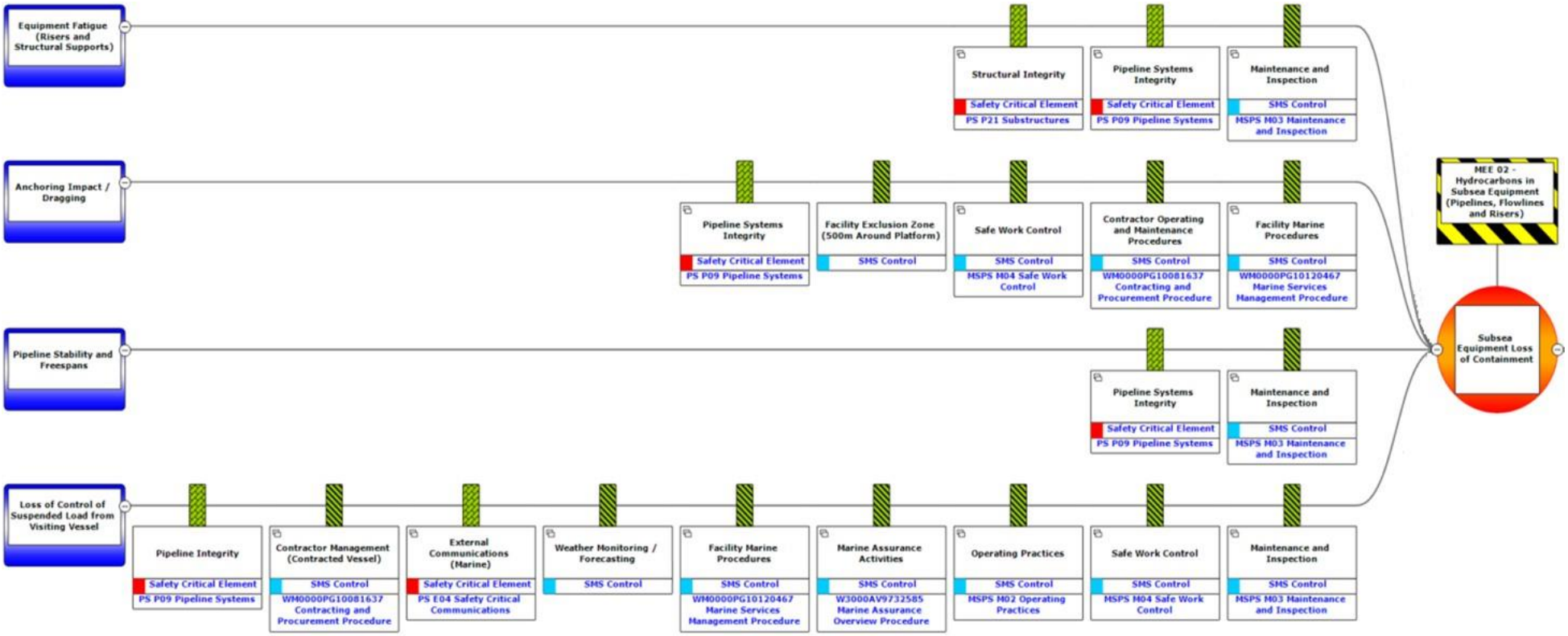

Figure 6-20: MEE-02 Subsea equipment loss of containment (Causes 5–8)

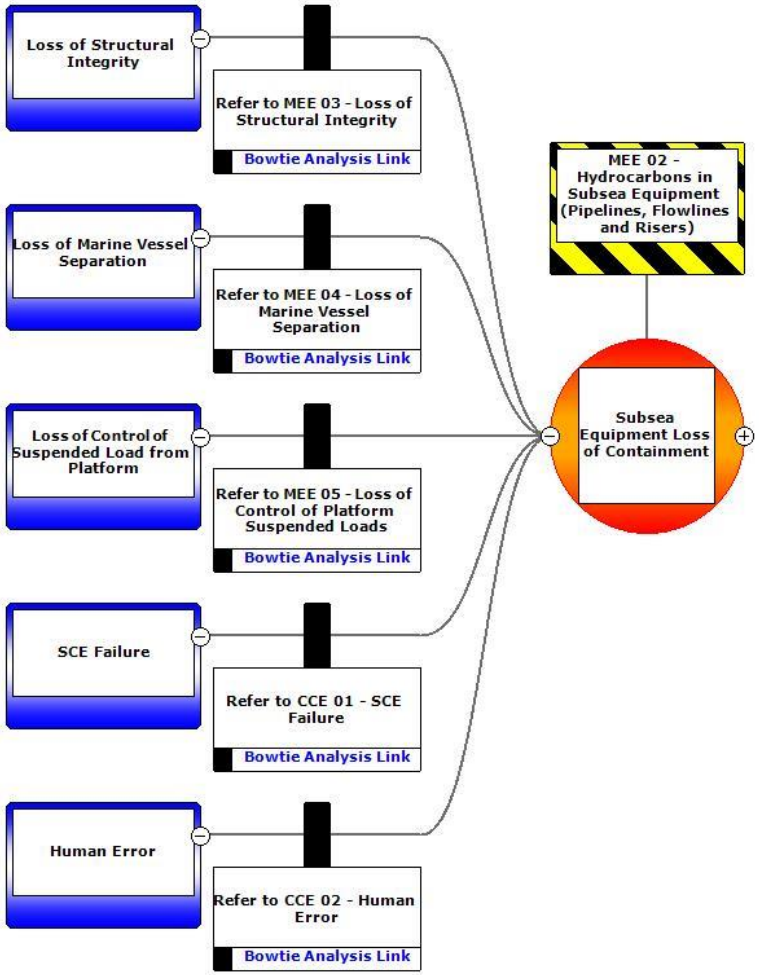

Figure 6-21: MEE-02 Subsea equipment loss of containment (Causes 9–13)

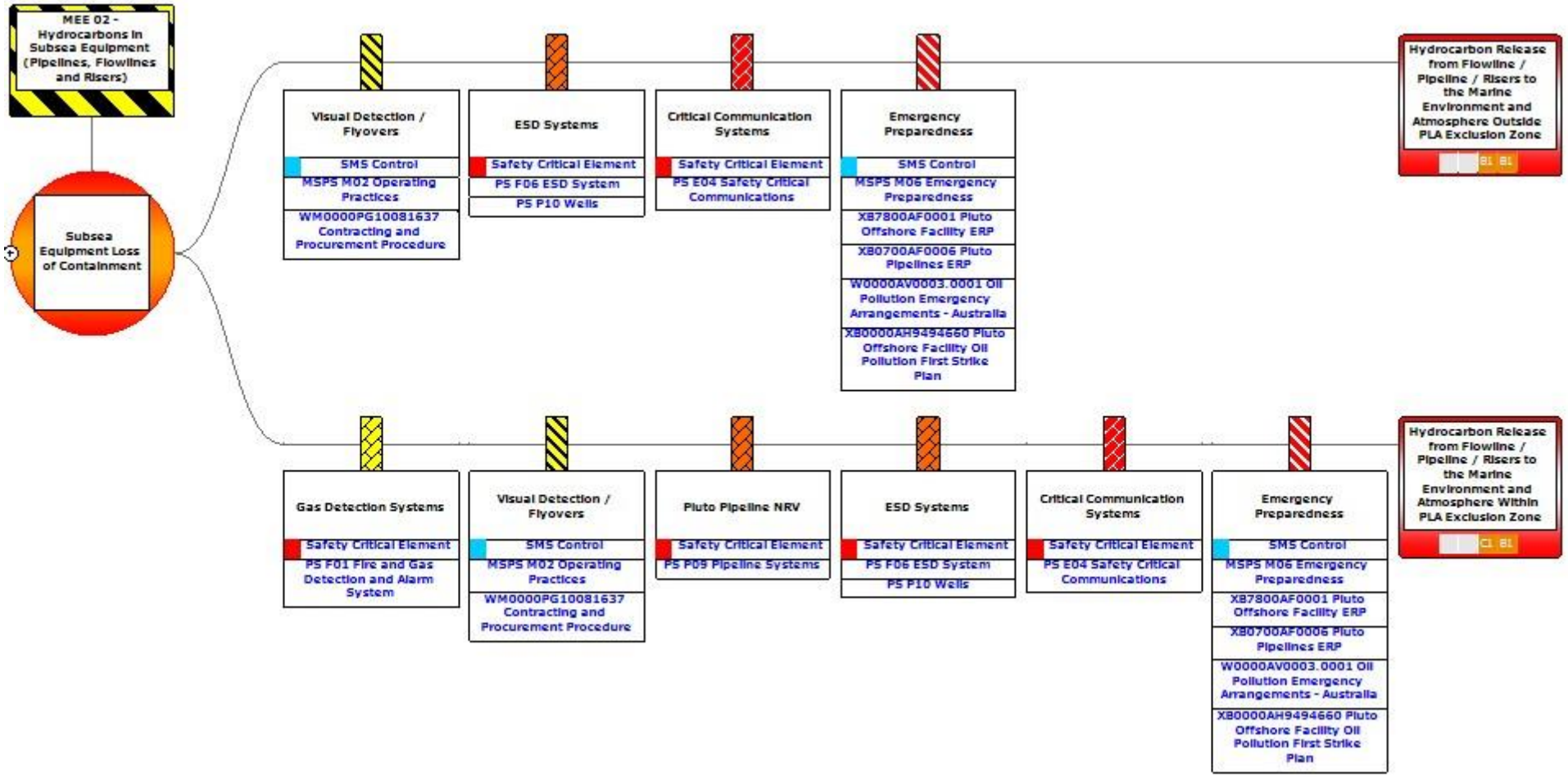

Figure 6-22: MEE-02 Subsea equipment loss of containment (outcomes)

MEE-02 Subsea Equipment Loss of Well Containment – Demonstration of ALARP ALARP Control Measures				
Hierarchy	***Control/Barrier***	***SCE/Management System Reference***	***Type of Effect***	***Control Adopted***
Preventative Barriers – Safety and Environmental Critical Elements				
Elimination	N/A.	No elimination or substitution controls were identified beyond those incorporated in design.		
Substitution				
Engineering Controls	Maintaining pipeline, riser and hydrocarbon-containing infrastructure integrity to prevent, or mitigate the effects of an MEE.	P09 – Pipeline Systems P21 – Substructures F06 – Safety Instrumented System E04 – Safety Critical Communications	Prevention (Technical)	Yes C 14.1
Mitigating Barrier – Safety and Environmental Critical Elements				
Engineering Controls	Maintaining fire and gas detection and alarm systems on the Pluto facility to facilitate prevention and response to fire or gas hazards (as applicable for potential detection of subsea riser LOC).	F01 – Fire and Gas Detection and Alarm Systems	Detection (Technical)	Yes C 14.2
Engineering Controls	Maintain availability of critical external and internal communication systems to facilitate response to accidents and emergencies.	E04 – Safety Critical Communications	Mitigation (Technical)	Yes C 13.2
Engineering Controls	Maintaining Safety Instrumented System (Safety Instrumented Functions and ESD actions) and valves to detect and respond to pre-defined initiating conditions, and/or initiating responses that put the process plant, equipment, and the wells in a safe condition to prevent or mitigate the effects of an MEE.	F06 – Safety Instrumented System P10 – Wells (for subsea/flowlines LOC controls)	Reduction/ Control (Technical)	Yes C 13.3
Engineering Controls	Pluto pipeline NRV in place as emergency barrier to prevent significant liquid backflow loss of containment to the environment in the event of riser rupture/ topsides catastrophic failure.	P09 – Pipeline Systems	Reduction/ Control (Technical)	Yes C 14.1

MEE-02 Subsea Equipment Loss of Well Containment – Demonstration of ALARP ALARP Control Measures				
Hierarchy	***Control/Barrier***	***SCE/Management System Reference***	***Type of Effect***	***Control Adopted***
Legislation Codes and Standards				
Procedures and Administration	OPGGS (Resource Management and Administration) Regulations 2011: Accepted WOMP to demonstrate that the risks to well integrity are managed in accordance with sound engineering principles, standards, specifications, and good oilfield practice. It describes the systems that are in place to ensure well design and integrity is managed for the well lifecycle, thus contributing to management of associated potential environmental consequences of well integrity events – including reservoir isolations applicable in subsea system risk management.	Pluto Well Operations Management Plan	Prevention/ Mitigation (Administration)	Yes C 13.4 Control based on legislative requirements – must be adopted
Procedures and Administration	OPGGS (Safety) Regulations 2009: Accepted Safety Case for the Pluto facility to: • identify hazards that have the potential to cause an MAE • detail assessment of MAE risks • describe the physical barrier SCEs and the safety management systems identified as being required to reduce the risk to personnel associated with an MAE to ALARP. thus contributing to management of associated potential environmental consequences of MAEs.	Pluto A Operations Safety Case	Prevention/ Mitigation (Administration)	Yes C 14.4 Control based on legislative requirements – must be adopted

MEE-02 Subsea Equipment Loss of Well Containment – Demonstration of ALARP ALARP Control Measures				
Hierarchy	***Control/Barrier***	***SCE/Management System Reference***	***Type of Effect***	***Control Adopted***
Procedures and Administration	Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations 2009: Accepted Safety Case for the Export Pipeline to: • identify hazards associated with pipeline operations that have the potential to cause an MAE • provide a detailed description for the pipeline • detail assessment of MAE risks • describe the physical barriers SCEs and the safety management systems identified as being required to reduce the risk to personnel associated with an MAE to ALARP, thus contributing to management of associated potential environmental consequences of pipeline-related MAEs.	Pluto Export Pipeline Safety Case	Prevention/ Mitigation (Administration)	Yes C 14.5 Control based on legislative requirements – must be adopted
Procedures and Administration	Incident reports are raised for unplanned releases within event reporting system.	Woodside Health, Safety and Environment Event Reporting and Investigation Procedure	Prevention/ Mitigation (Administration)	Yes C 13.5 Control based on Woodside Standards
Management System Specific Measures: Key Standards or Procedures				
Procedures and Administration	Implementing management systems to maintain: • M02 – Operating practices • M03 – Maintenance and inspections • M04 – Safe work control • Marine Services Management Procedure • Marine Assurance Overview Procedure • Contracting and Procurement Procedure.	MSPS M02 – Operating practices MSPS M03 – Maintenance and inspections MSPS M04 – Safe work control Marine Services Management Procedure Marine Assurance Overview Procedure Contracting and Procurement Procedure	Prevention (Administration)	Yes – See Section 7 Implementation Strategy

MEE-02 Subsea Equipment Loss of Well Containment – Demonstration of ALARP ALARP Control Measures				
Hierarchy	***Control/Barrier***	***SCE/Management System Reference***	***Type of Effect***	***Control Adopted***
Emergency Response and Contingency Planning	Implement management systems to maintain: • M02 – Operating Practices • M06 – Emergency preparedness • Pluto Offshore Facility Emergency Response Plan • Pluto Pipelines ERP • Pluto Offshore Facility Oil Pollution First Strike Plan • Oil Pollution Emergency Arrangements – Australia.	MSPS-02 Operating Practices MSPS M06 – Emergency preparedness Pluto Offshore Facility Emergency Response Plan Pluto Pipelines Emergency Response Plan Pluto Offshore Facility Oil Pollution First Strike Plan Oil Pollution Emergency Arrangements – Australia	Mitigation (Administration)	Yes – See Section 7 Refer to Appendix H: Oil Spill Preparedness and Response Mitigation Assessment for discussion around the ALARP assessment of controls related to hydrocarbon spill response

Risk Based Analysis

For risks identified as MEEs, a detailed risk-based Bowtie Analysis (as outlined in Section 2.7.3) has been used to identify, analyse and demonstrate that controls in place reduce the risk associated with each MEE to ALARP. Controls have been selected following hierarchy of control principles and consider independence of each barrier and their type of effect in controlling the hazardous event.

Application of Woodside's Risk Management Procedures and implementation of the Pluto A Operations Safety Case and Pluto Export Pipeline Safety Case ensures the continuous identification of hazards, systematic assessment of risks and ongoing assessment of alternative control measures to reduce risk to ALARP, which includes:

ongoing hazard identification, risk assessment and the identification of control measures

ongoing integrity management of hardware control measures in accordance with the operational performance standards which define requirements to be suitably maintained, such that they retain effectiveness, functionality, availability and survivability.

For each SCE, detailed requirements for equipment functionality, availability, reliability and survivability are incorporated into SCE Performance Standards which also include the relevant assurance tasks (e.g., inspection, maintenance, testing and monitoring requirements) to ensure technical integrity.

Bowtie analysis was undertaken to assess MEE-02, with review of formal safety assessments and subsea system design studies.

Company Values

Corporate values require all personnel at Woodside to comply with appropriate policies, standards, procedures and processes while being accountable for their actions and holding others to account in line with Our Values. As detailed above, the PAP is undertaken in line with these policies, standards and procedures that include suitable controls to prevent subsea flowline and riser loss of containment, and response should a loss of containment occur.

Societal Values

Due to the Petroleum Activities Program's proximity to sensitive receptors (e.g., Montebello Islands) and the potential extent of the wider EMBA, the pipeline and riser loss of containment risk rating presents a Decision Type B in accordance with the decision support framework described in Section 2.6.1. Consultation was undertaken for this program to identify the views and concerns of relevant persons, as described in Section 5.

Woodside has sent an Activity Factsheet to all identified relevant persons regarding the PAP (Section 5). Woodside has consulted with AMSA and WA DoT on spill response strategies. A copy of the Oil Pollution First Strike Plan was provided to AMSA and DoT.

MEE-02 Subsea Equipment Loss of Well Containment – Demonstration of ALARP ALARP Control Measures				
Hierarchy	***Control/Barrier***	***SCE/Management System Reference***	***Type of Effect***	***Control Adopted***

ALARP Statement:

On the basis of the environmental risk assessment outcomes and use of the relevant tools appropriate to the decision type, Woodside considers the adopted controls appropriate to manage the impacts and risks of a very low likelihood unplanned hydrocarbon release as a result of a pipeline and riser loss of containment.

The principle of inherent safety and environmental protection is based on the prevention of the MEE through design of pipelines and risers, ensuring the export pipeline and risers are operated within their design envelope through operating practices, and assurance through maintenance and inspection. If hydrocarbon loss of containment occurs, mitigation measures are in place to minimise the consequence by limiting the inventory which can be released and implementing remediation.

The controls in place for prevention and mitigation of MEEs are specified and assured through implementing the Safety Cases and SCE management procedures, including performance standards for SCEs and MSPSs for Safety Critical Management System Controls.

The application of Woodside's Risk Management Procedures ensures the continuous identification of hazards, systematic assessment of risks and ongoing assessment of alternative control measures to reduce risk to ALARP, which includes:

- ongoing hazard identification, risk assessment and the identification of control measures
- ongoing integrity management of hardware control measures in accordance with the technical performance standards which define requirements to be suitably maintained, such that they retain effectiveness, functionality, availability and survivability.

Given the controls in place to prevent and control loss of containment events and mitigate their consequences, it is considered that MEE risk associated with a pipeline and riser loss of containment is managed to ALARP.

Demonstration of Acceptability

Acceptability Statement

Subsea equipment loss of containment has been evaluated as having a 'moderate' level of risk rating.

Subsea loss of containment events are risk assessed as Highly Unlikely, potential "C – Moderate" consequence for offshore events.

Export pipeline mid-point to shore section loss of containment events are risk assessed as Highly Unlikely, potential "B – Major" consequence.

As per Section 2.6.3, Woodside considers 'moderate' risk ratings as broadly acceptable if the adopted controls are implemented. Due to the consequence associated with MEE-02, Decision Type B has been applied, and ALARP is demonstrated using good industry practice, consideration of company and societal values and risk-based analysis, if legislative requirements are met and societal concerns are accounted for and the alternative control measures are grossly disproportionate to the benefit gained.

Acceptability is demonstrated with regard to the oil spill risk considerations as described in Section 6.8.3 (MEE-01) (the considerations include principles of Ecologically Sustainable Development, internal context, external context and other requirements (includes laws, policies, standards and conventions)).

On the basis of the environmental impact assessment outcomes and Woodside's criteria for acceptability outlined in Section 2.8.2, this is considered an acceptable level of risk.

EPOs, EPSs and MC for Pluto Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 14 No release of hydrocarbons to the marine environment due to loss of containment from subsea equipment.	**C 14.1** Maintaining pipeline, riser and hydrocarbon-containing infrastructure integrity to prevent, or mitigate the effects of an MEE.	**PS 14.1** Integrity will be managed in accordance with SCE Management Procedures (Section 7.4) and SCE Technical Performance Standard(s) to prevent environment risk related damage to SCEs for: • E04 – Critical Communications	**MC 1.16.1** Records demonstrate implementation of SCE Technical Performance Standard(s) and Management of Controls in the

EPOs, EPSs and MC for Pluto Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
		• F06 – Safety Instrumented System • P09 – Pipeline Systems (including sand management) • P21 – Substructures, to together: • maintain the minimum required mechanical and structural integrity to prevent loss of containment that may result in an MEE • detect and respond to pre-defined initiating conditions to protect mechanical integrity. and; • P09 – Pipeline Systems Pluto pipeline NRV in place as emergency barrier to prevent significant liquid backflow loss of containment to the environment in the event of riser rupture/topsides catastrophic failure.	Operate Phase Procedure (Section 7.4.2), in order to achieve the functional objective of the control. Records may include implementation and maintain/assure and manage-change information summarised in Section 7.4.2
	C 14.2 Maintaining fire and gas detection and alarm systems on the Pluto facility to facilitate prevention and response to fire or gas hazards (as applicable for potential detection of subsea riser LOC).	**PS 14.2** Integrity will be managed in accordance with SCE Management Procedures (Section 7.4) and SCE Technical Performance Standard(s) to prevent environment risk related damage to SCEs for: • F01 – Fire and Gas Detection and Alarm Systems (as applicable for potential detection of subsea riser LOC), to continuously monitor and alert for fire events and significant gas accumulations, initiate actions to minimise event escalation, and support Emergency Response by providing status of situation.	**MC 1.16.1** Records demonstrate implementation of SCE Technical Performance Standard(s) and Management of Hardware Controls in the Operate Phase Procedure (Section 7.4.2), in order to achieve the functional objective of the control. Records may include implementation and maintain/assure and manage-change information summarised in Section 7.4.2
	C 13.2 Maintain availability of critical external and internal communication systems to facilitate response to accidents and emergencies.	**PS 13.2** Integrity will be managed in accordance with SCE Management Procedures (Section 7.4) and SCE Technical Performance Standard(s) to prevent environment risk related damage to SCEs for: • E04 – Safety Critical Communication Systems, to allow effective Emergency Response (ER) communications in emergencies, including:	**MC 1.16.1** Records demonstrate implementation of SCE Technical Performance Standard(s) and Management of Hardware Controls in the Operate Phase Procedure (Section 7.4.2), in order to achieve

EPOs, EPSs and MC for Pluto Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
		• internal communications such as audible and visual warning systems, and voice communications during emergency events • external communications such as voice communications to adjacent facilities, aircraft and vessels, and external incident control centres during emergency events.	the functional objective of the control. Records may include implementation and maintain/assure and manage-change information summarised in Section 7.4.2
	C 13.3 Maintain Safety Instrumented System (Safety Instrumented Functions and ESD actions) and valves to detect and respond to pre-defined initiating conditions, and/or initiating responses that put the process plant, equipment, and the wells in a safe condition to prevent or mitigate the effects of an MEE.	**PS 13.3** Integrity will be managed in accordance with SCE Management Procedures (Section 7.4) and SCE Technical Performance Standard(s) to prevent environment risk related damage to SCEs for: • F06 – Safety Instrumented System • P10 – Wells (for subsea/flowline LOC controls), to together detect and respond to pre-defined initiating conditions and/or initiate responses that put the process plant, equipment, and the wells in a safe condition so as to prevent or mitigate the effects of an MEE.	**MC 1.16.1** Records demonstrate implementation of SCE Technical Performance Standard(s) and Management of Hardware Controls in the Operate Phase Procedure (Section 7.4.2), in order to achieve the functional objective of the control. Records may include implementation and maintain/assure and manage-change information summarised in Section 7.4.2
	C 13.4 OPGGS (Resource Management and Administration) Regulations 2011: Accepted WOMP to demonstrate that the risks to well integrity are managed in accordance with sound engineering principles, standards, specifications, and good oilfield practice. It describes the systems that are in place to ensure well design and integrity is managed for the well lifecycle, thus contributing to management of associated potential	**PS 13.4** An accepted WOMP is implemented, and well integrity notification and reporting are undertaken in accordance with the Regulations (as applicable).	**MC 13.4.1** Acceptance letter from NOPSEMA demonstrates acceptance of the WOMP. Records demonstrate applicable NOPSEMA notification and reporting.

EPOs, EPSs and MC for Pluto Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	environmental consequences of well integrity events – including reservoir isolations applicable in subsea system risk management.		
	C 14.4 OPGGS (Safety) Regulations 2009: Accepted Safety Case for the Pluto facility.	**PS 14.4** An accepted Safety Case is implemented, and safety notification and reporting is undertaken in accordance with the Regulations (as applicable).	**MC 14.4.1** Acceptance letter from NOPSEMA demonstrates acceptance of the Safety Case. Records demonstrate applicable NOPSEMA notification and reporting.
	C 14.5 OPGGS (Safety) Regulations 2009: Accepted Safety Case for the Export Pipeline.	**PS 14.5** An accepted Safety Case is implemented, and safety notification and reporting is undertaken in accordance with the Regulations (as applicable).	**MC 14.5.1** Acceptance letter from NOPSEMA demonstrates acceptance of the Safety Case. Records demonstrate applicable NOPSEMA notification and reporting.
	C 13.5 Incident reports are raised for unplanned releases within event reporting system.	**PS 13.5** Incident reports raised for unplanned releases and Recordable Incidents notified	**MC 13.5.1** Records demonstrate incident reports raised for unplanned releases, and applicable Recordable Incident notifications completed.
	Mitigation – Emergency and Hydrocarbon Spill Response.	Refer to Appendix H: Oil Spill Preparedness and Response Mitigation Assessment for discussion around the ALARP assessment of controls related to hydrocarbon spill response.	

6.8.5 Unplanned Hydrocarbon Release: Loss of Structural Integrity (MEE-03)

Context		
Topsides – Section 3.4.1 Process Description – Section 3.5.4 Hydrocarbon and Chemical Inventories and Selection – Section 3.9	Physical Environment – Section 4.4 Habitats and Biological Communities – Section 4.5 Protected Species – Section 4.6 Protected Places – Section 4.8 Socio-economic Environment – Section 4.9	Consultation – Section 5

Impacts and Risks Evaluation Summary

Source of Risk	***Environmental Value Potentially Impacted***							***Evaluation***						
	Soil and Groundwater	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/Habitat	Species	Socio-economic	Decision Type	Consequence	Likelihood	Risk Rating	ALARP Tool	Acceptability	Outcome
Marine environment footprint and associated hydrocarbon and chemical release associated with structural collapse of riser platform		x	x	x	x	x	x	B	C	1	M	LCS GP PJ RBA	Acceptable if ALARP	EPO 15
Surface or subsea release from flowline, pipeline and riser to the marine environment and atmosphere within PSZ (MEE-02) – caused by loss of structural integrity		x	x	x	x	x	x	B	C	1	M			

Description of Source of Risk

Extreme environmental conditions or other causes which result in an exceedance of the design criteria and a catastrophic failure of the facility and individual equipment (e.g., cranes, flare tower) has been identified as a potential MEE (MEE-03). Catastrophic structural failure of the facility could lead to the release of hydrocarbons to the environment.

The identified causes, including escalation from other MEEs, include:

- internal corrosion
- external corrosion
- equipment failure
- extreme weather (cyclone, high waves)
- seismic events/seabed instability
- fire/overpressure event (escalation of loss of containment event).

Escalation from other MEEs can also cause loss of structural integrity:

- loss of marine vessel separation (refer to MEE-04, Section 6.8.6)
- loss of control of suspended load from facility lifting operations (refer to MEE-05).

A number of common failure causes due to human error and SCC failures are presented in the generic Human Error and generic SCE Failure bowties in Section 6.8.8.

There is a possibility of riser platform collapse ('slow' or 'rapid') caused by the extreme loads induced by strong winds and extreme waves. Extreme weather may induce fracture of pipework due to vibration/fatigue and loosen/dislodge objects/projectiles causing impact to equipment/pipework and subsequently, resulting in a loss of containment.

Structural damage to the platform resulting from the causes listed above could be minor or could in the most extreme situation result in total loss of the platform. The type of structural failure considered is restricted to major structural damage (e.g., catastrophic collapse of the jacket or release of hydrocarbons on or adjacent to the platform). Such events are beyond the design basis for the platform.

Loss of Structural Integrity – Credible Scenarios

A loss of structural integrity could result in a significant release of hydrocarbons. A loss of structural integrity may result in credible hydrocarbon spill scenarios consistent with:

- subsea equipment loss of containment (MEE-02)
- loss of marine vessel separation (MEE-04)
- topsides loss of containment (one or more storage inventories) through to total loss of platform hydrocarbon/chemical inventory (bound by MEE-04 impact assessment) (Section 6.8.4).

The worst-case credible spill scenarios associated with these MEEs/sources of risk are discussed in the relevant sections above, with impacts dependent on the extent of structural damage, volume of hydrocarbons released (including cumulative volumes from tanks/vessels), the associated weather conditions, and effectiveness of mitigation and response measures.

Decision Type, Risk Analysis and ALARP Tools

Woodside has a good history of implementing industry standard practice in structural design, construction and operation. In the company's 60-year history, it has not experienced any loss of structural integrity events that have resulted in significant releases or significant environmental impacts.

Decision Type

Decision Type B has been applied to this risk under the Guidance on Risk Related Decision Making (Oil and Gas UK, 2014). This reflects the complexity of the risk, the higher potential consequence and stakeholder implications should the event be realised. To align with this decision type, a further level of analysis has been applied using risk-based tools including the bowtie methodology (described in Section 2.7.3) and hydrocarbon spill trajectory modelling. Company and societal values were also considered in the demonstration of ALARP and acceptability, considered through internal reviews, and stakeholder consultation (Section 5).

The potential release of hydrocarbons from a loss of structural integrity is considered an MEE (MEE-03). The hazard associated with this MEE is hydrocarbons in pipelines, risers, process and non-process hydrocarbon and chemical inventories and potentially the physical riser platform/jacket structure itself.

Quantitative Spill Risk Assessment

Credible worst-case stochastic spill modelling for the scenarios associated with MEE-02 Subsea system loss of containment and MEE-04 Loss of marine vessel separation (diesel loss of containment) has been undertaken. Results of these modelling studies have been used to inform the consequence assessment for these MEEs; these assessments are applicable to bounding the worst-case consequence assessment for a loss of structural integrity event. A "C" Moderate consequence is assigned to worst-case releases from the riser platform location for both MEE-02 subsea system loss of containment, and a conservatively assessed MEE-04 diesel loss of containment scenario, which bounds the worst-case impact potential for cumulative topsides hydrocarbon, chemicals and marine vessel loss of containment in case of a structural collapse.

Likelihood

Formal safety studies inform an assessed frequency of total platform collapse estimated to be 1.08E-04 per year, or 1 in 9285 years considering seismic factors, weather events and vessel collision risk. Once the low likelihood of cumulative instantaneous release to result in worst-case environmental consequence is considered, together with prevention and mitigation factors – the likelihood is assessed as "Highly Unlikely" in accordance with the Woodside Risk Matrix.

Consequence

The spatial extent and fate (including weathering) of the spilled hydrocarbon was considered during the impact assessment for a loss of structural integrity. These considerations were informed primarily by the outputs from the stochastic modelling studies undertaken by RPS (2024c, 2024e), available information on environmental sensitivities that may credibly be impacted in the event of a worst-case spill, and relevant literature and studies considering the effects of hydrocarbon exposure.

Consequence Assessment

Environment that May Be Affected

As discussed above, the potential impacts from hydrocarbon release caused by a loss of structural integrity are analogous to those which would result from:

- loss of containment from subsea equipment (within PSZ) (MEE-02)
- loss of marine vessel separation (MEE-04)
- topsides loss of containment (one or more storage inventories) through to total loss of platform hydrocarbon/chemical inventory (bound by MEE-04 impact assessment) (Section 6.8.4).

The potential impacts associated with these impacts are therefore discussed in the above-mentioned sections.

Seabed Disturbance

In the event of loss of structural integrity, there is the potential for collapse of the riser platform leading to an incremental increase of the facility's footprint on the seabed. The potential area that would be affected can conservatively be defined as the existing facility footprint plus 100 m in all directions, that is approximately 300 m by 350 m (0.105 km^2). The benthic habitats surrounding the riser platform have been subject to historical disturbance (e.g., facility construction and operation) and are considered to be of low ecological value (although it is acknowledged the facility provides artificial hard substrate which has formed the basis of relatively high biodiversity communities at this location when compared to the surrounding seabed). Subsequently, the physical disturbance to the seabed resulting from the collapse of the riser platform would be localised but may result in long-term disturbance to benthic communities.

The riser platform could also act as a source of environmental contaminants due to material on board the platform (e.g., chemical/hydrocarbon inventories, corrosion of structural materials, debris). The potential for contamination would diminish over time, as the structure degrades. Depending on the nature of the loss of structural integrity, complete or partial salvage of the riser platform may not be feasible. These structures are expected to be colonised by marine organisms, and a reef habitat will develop over time on the structures.

While the PAA overlaps the Continental Slope Demersal Fish Communities KEF and Ancient Coastline at 125 m Depth Contour KEF, neither of these are in close proximity to the riser platform.

MEE-03 Loss of Structural Integrity – Risk Analysis

A bowtie risk analysis was undertaken to assess MEE-03; refer to the below figures for bowtie diagrams that were an output of Woodside's risk analysis process.

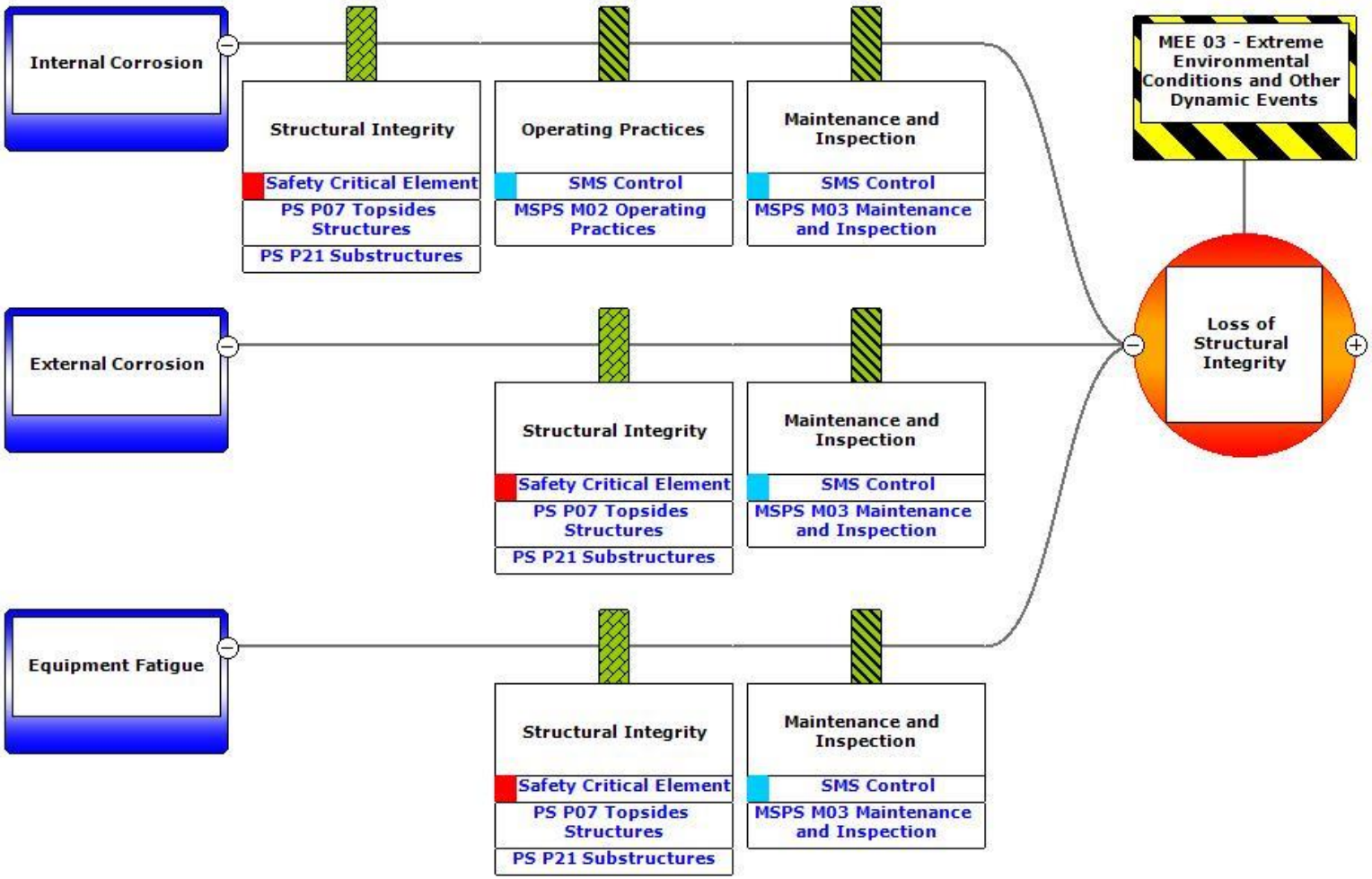

Figure 6-23; MEE-03 Loss of structural integrity (Causes 1–3)

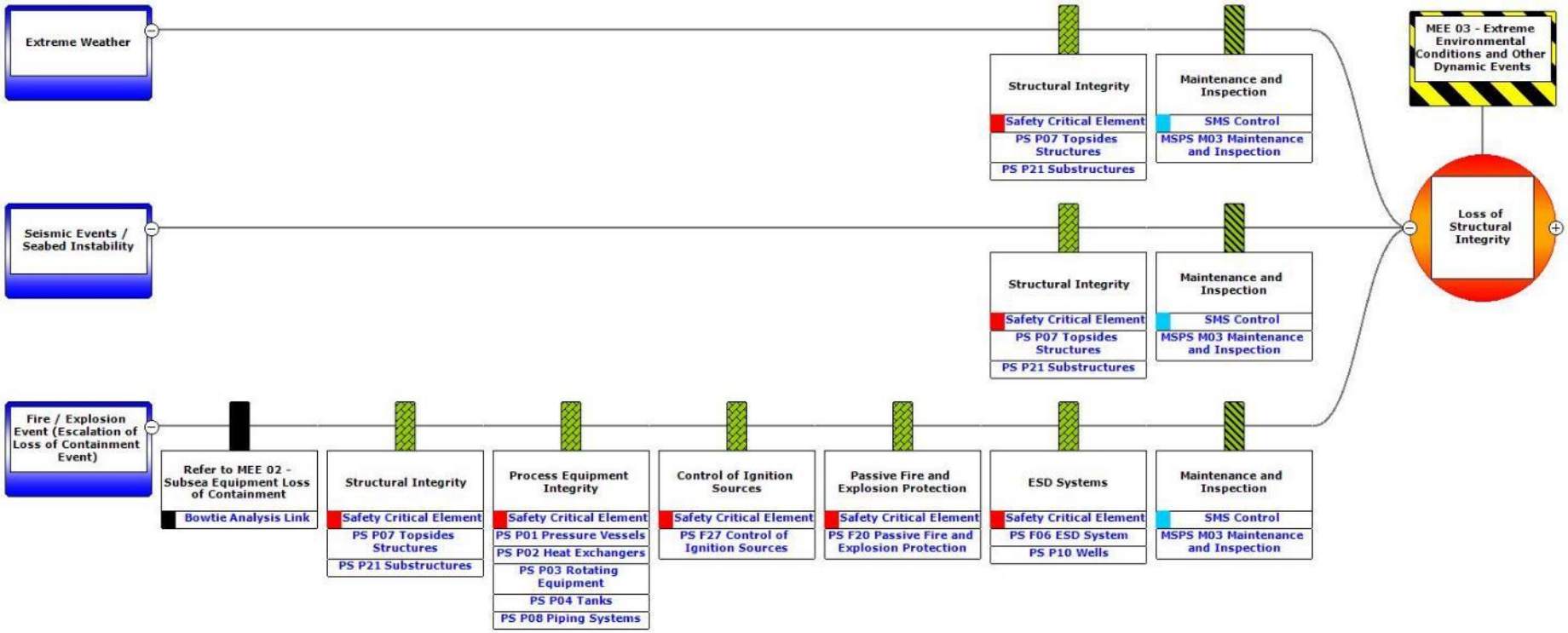

Figure 6-24: MEE-03 Loss of structural integrity (Causes 4–6)

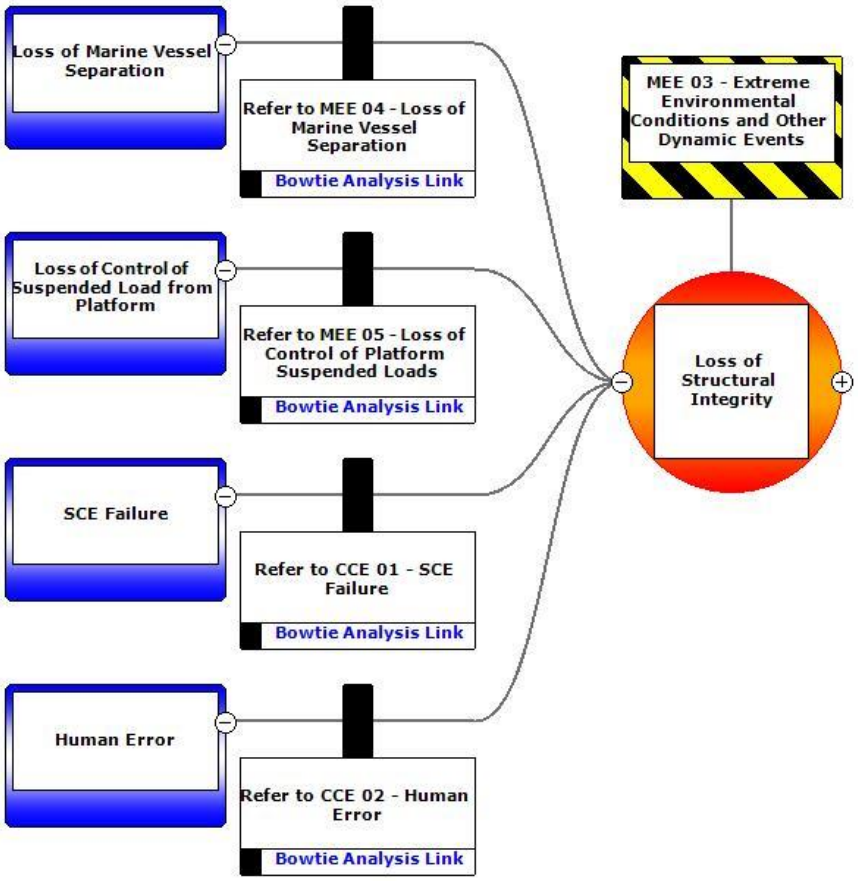

Figure 6-25: MEE 03 Loss of structural integrity (Causes 7–10)

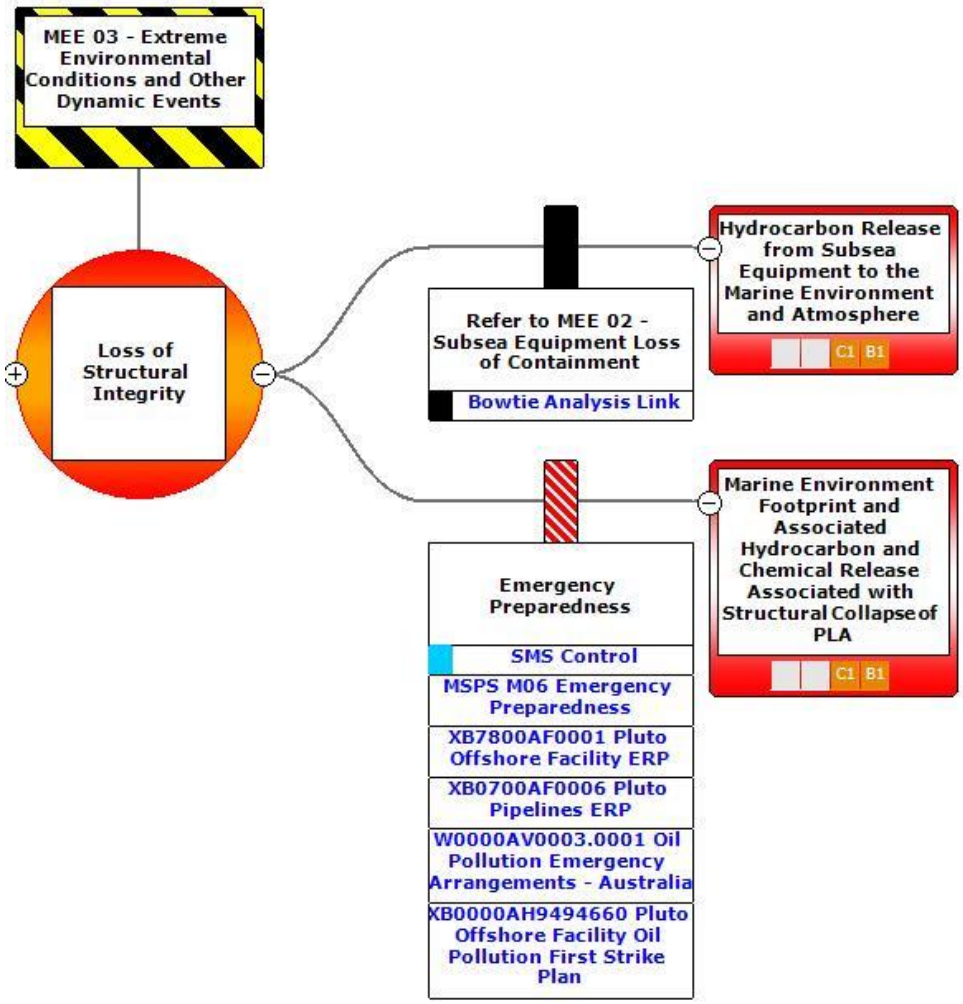

Figure 6-26: MEE-03 Loss of structural integrity (outcomes)

MEE-03 Loss of Structural Integrity – Demonstration of ALARP ALARP Control Measures				
Hierarchy	***Control/Barrier***	***SCE/Management System Reference***	***Type of Effect (Refer to Table 6-32)***	***Control Adopted***
Preventative Barriers – Safety and Environmental Critical Elements				
Elimination	N/A.	No elimination or substitution controls were identified beyond those incorporated in design.		
Substitution				
Engineering Controls	Maintaining structural integrity to ensure availability of critical systems during a major accident or environment event, and prevent structural failures from contributing to escalation of an MEE.	P07 – Topsides Structures P21 – Substructures	Prevention (Technical)	Yes C 15.1
Engineering Controls	Maintaining control of ignition sources and fire protection to prevent loss of structural integrity.	F27 – Control of Ignition Sources F20 – Passive Fire and Explosion Protection	Prevention (Technical)	Yes C 15.2
Engineering Controls	Maintain topsides hydrocarbon-containing infrastructure integrity to prevent loss of structural integrity.	P01 – Pressure Vessels P02 – Heat Exchangers P03 – Rotating Equipment P04 – Tanks P08 – Piping Systems	Prevention (Technical)	Yes C 15.3
Engineering Controls	Maintaining Safety Instrumented System (Safety Instrumented Functions and ESD actions) and valves to detect and respond to pre-defined initiating conditions, and/or initiating responses that put the process plant, equipment, and the wells in a safe condition to prevent or mitigate the effects of an MEE.	F06 – Safety Instrumented System P10 – Wells	Prevention (Technical)	Yes C 13.3
Mitigating Barrier – Safety and Environmental Critical Elements				
None identified with respect to structural failure. Subsea system SCE mitigations as per MEE-02.				

MEE-03 Loss of Structural Integrity – Demonstration of ALARP ALARP Control Measures				
Hierarchy	***Control/Barrier***	***SCE/Management System Reference***	***Type of Effect (Refer to Table 6-32)***	***Control Adopted***
Legislation Codes and Standards				
Procedures and Administration	Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations 2009: Accepted Safety Case for the Pluto Facility to: • identify hazards that have the potential to cause an MAE • detail assessment of MAE risks • describe the physical barrier SCEs and the safety management systems identified as being required to reduce the risk to personnel associated with an MAE to ALARP, thus contributing to management of associated potential environmental consequences of MAEs.	Pluto Safety Case	Prevention (Administration) Control based on legislative requirement – must be adopted	Yes C 14.4
Procedures and Administration	Incident reports are raised for unplanned releases within event reporting system.	Woodside Health, Safety and Environment Event Reporting and Investigation Procedure	Prevention/ Mitigation (Administration) Control based on Woodside Standards and regulatory requirements	Yes C 13.5
Management System Specific Measures: Key Standards or Procedures				
Procedures and Administration	Implementing management systems to maintain: • M02 – Operating practices • M03 – Maintenance and inspections.	MSPS M02 – Operating Practices MSPS M03 – Maintenance and Inspections	Prevention (Administration)	Yes – See Section 7 Implementation Strategy
Emergency Response and Contingency Planning	Implement management systems to maintain: • M06 – Emergency preparedness • Pluto Offshore Facility Emergency Response Plan • Pluto Offshore Facility Oil Pollution First Strike Plan • Oil Pollution Emergency Arrangements – Australia. • Pluto Pipelines Emergency Response Plan.	MSPS M06 – Emergency Preparedness Pluto Offshore Facility Emergency Response Plan Pluto Offshore Facility Oil Pollution First Strike Plan Oil Pollution Emergency Arrangements – Australia Pluto Pipelines Emergency Response Plan	Mitigation (Administration)	Yes – See Section 7 Refer to Appendix H: Oil Spill Preparedness and Response Mitigation Assessment for discussion around the ALARP assessment of controls related to hydrocarbon spill response

MEE-03 Loss of Structural Integrity – Demonstration of ALARP ALARP Control Measures				
Hierarchy	***Control/Barrier***	***SCE/Management System Reference***	***Type of Effect (Refer to Table 6-32)***	***Control Adopted***
Risk Based Analysis				

For risks identified as MEEs, a detailed risk-based Bowtie Analysis (as outlined in Section 2.7.3) has been used to identify, analyse and demonstrate that controls in place reduce the risk associated with each MEE to ALARP. Controls have been selected following hierarchy of control principles and consider independence of each barrier and their type of effect in controlling the hazardous event.

Application of Woodside's Risk Management Procedures and implementation of the Pluto-A Operations Safety Case ensures the continuous identification of hazards, systematic assessment of risks and ongoing assessment of alternative control measures to reduce risk to ALARP, which includes:

- ongoing hazard identification, risk assessment and the identification of control measures
- ongoing integrity management of hardware control measures in accordance with the operational performance standards which define requirements to be suitably maintained, such that they retain effectiveness, functionality, availability and survivability.

For each SCE, detailed requirements for equipment functionality, availability, reliability and survivability are incorporated into SCE Performance Standards which also include the relevant assurance tasks (e.g., inspection, maintenance, testing and monitoring requirements) to ensure technical integrity.

Bowtie analysis was undertaken to assess MEE-03, with review of formal safety assessment studies.

ALARP Statement:

On the basis of the environmental risk assessment outcomes and use of the relevant tools appropriate to the decision type, Woodside considers the adopted controls appropriate to manage the impacts and risks of a very low likelihood of a loss of structural integrity.

The principle of inherent safety and environmental protection is based on the prevention of the MEE through design of the facility, ensuring the equipment is operated within the design envelope through operating practices, and assurance through maintenance and inspection. If a loss of structural integrity occurs, mitigation measures are in place to minimise the consequence by limiting the inventory which can be released and implementing remediation.

The controls in place for prevention and mitigation of MEEs are specified and assured through implementing the Pluto A Operations Safety Case, SCE management procedures including performance standards for SCEs, and MSPSs for Safety Critical Management System Controls.

The application of Woodside Risk Management Procedures and implementation of the Pluto A Operations Safety Case ensures the continuous identification of hazards, systematic assessment of risks and ongoing assessment of alternative control measures to reduce risk to ALARP.

Given the controls in place to prevent and control loss of containment events and mitigate their consequences, alongside procedural control of facility operations, it is considered that MEE risk associated a loss of structural integrity is managed to ALARP.

Demonstration of Acceptability

Acceptability Statement:

A loss of structural integrity has been evaluated as having a 'Moderate' risk rating (including the consideration of applicable MEEs). As per Section 2.6.1, Woodside considers 'Moderate' (B0) risk ratings as acceptable if managed to ALARP. Due to the consequence associated with MEE-03, Decision Type B has been applied, and ALARP is demonstrated using good industry practice and risk-based analysis, if legislative requirements are met and societal concerns are accounted for, and the alternative control measures are grossly disproportionate to the benefit gained.

Acceptability is demonstrated with regard to the oil spill risk considerations as described in Section 6.8.3 (MEE-01) (the considerations include principles of Ecologically Sustainable Development, internal context, external context and other requirements (includes laws, policies, standards and conventions)).

On the basis of the environmental impact assessment outcomes and Woodside's criteria for acceptability outlined in Section 2.8.2, this is considered an acceptable level of risk.

EPOs, EPSs and MC for Pluto Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 15 No release of hydrocarbons to the marine environment from loss of structural integrity.	**C 15.1** Maintaining structural integrity to ensure availability of critical systems during a major accident or environment event, and prevent structural failures from contributing to escalation of an MEE.	**PS 15.1** Integrity will be managed in accordance with SCE Management Procedures (Section 7.4) and SCE Technical Performance Standard(s) to prevent environment risk related damage to SCEs for: • P21 – Substructures • P07 – Topsides/Surface Structures, to together: • provide and maintain structural integrity to support SCE systems under all design conditions through service life • prevent structural failure from contributing to the escalation of an MEE by providing support/ protection of SCE systems during an emergency event, and/or support containment of environmentally hazardous material.	**MC 2.11.1** Records demonstrate implementation of SCE Technical Performance Standard(s) and Management of Hardware Controls in the Operate Phase Procedure (Section 7.4.2), in order to achieve the functional objective of the control. Records may include implementation and maintain/assure and manage-change information summarised in Section 7.4.2
	C 15.2 Maintaining control of ignition sources and fire protection to prevent loss of structural integrity.	**PS 15.2** Integrity will be managed in accordance with SCE Management Procedures (Section 7.4) and SCE Technical Performance Standard(s) to prevent environment risk related Damage to SCEs for: • F27 – Control of Ignition Sources • F20 – Passive Fire and Explosion Protection, to together prevent ignition of flammable or explosive atmospheres within identified Hazardous Areas and/or prevent a fires and explosions from contributing to escalation of an MEE.	**MC 2.11.1** Records demonstrate implementation of SCE Technical Performance Standard(s) and Management of Hardware Controls in the Operate Phase Procedure (Section 7.4.2), in order to achieve the functional objective of the control. Records may include implementation and maintain/assure and manage-change information summarised in Section 7.4.2
	C 15.3 Maintain topsides hydrocarbon-containing infrastructure integrity.	**PS 14.3** Integrity will be managed in accordance with SCE Management Procedures (Section 7.4) and SCE Technical Performance Standard(s) to prevent environment risk related Damage to SCEs for: • P01 – Pressure Vessels • P02 – Heat Exchangers • P03 – Rotating Equipment • P04 – Tanks	**MC 2.11.1** Records demonstrate implementation of SCE Technical Performance Standard(s) and Management of Hardware Controls in the Operate Phase Procedure (Section 7.4.2), in

EPOs, EPSs and MC for Pluto Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
		• P08 – Piping Systems, to together provide minimum required mechanical integrity for identified SCE systems (piping, heat exchangers, rotating equipment and pressure vessels) for operation within defined integrity limits to prevent a loss of containment that may result in an MEE.	order to achieve the functional objective of the control. Records may include implementation and maintain/assure and manage-change information summarised in Section 7.4.2
	C 13.3 Maintaining Safety Instrumented System (Safety Instrumented Functions and ESD actions) and valves to detect and respond to pre-defined initiating conditions, and/or initiating responses that put the process plant, equipment, and the wells in a safe condition to prevent or mitigate the effects of an MEE.	**PS 13.3** Integrity will be managed in accordance with SCE Management Procedures (Section 7.4) and SCE Technical Performance Standard(s) to prevent environment risk related damage to SCEs for: • F06 – Safety Instrumented System • P10 – Wells (for subsea/flowline LOC controls), to together detect and respond to pre-defined initiating conditions and/or initiate responses that put the process plant, equipment, and the wells in a safe condition so as to prevent or mitigate the effects of an MEE.	**MC 1.16.1** Records demonstrate implementation of SCE Technical Performance Standard(s) and Management of Hardware Controls in the Operate Phase Procedure (Section 7.4.2), in order to achieve the functional objective of the control. Records may include implementation and maintain/assure and manage-change information summarised in Section 7.4.2
	C 14.4 OPGGS (Safety) Regulations 2009: Accepted Safety Case for the Pluto facility.	**PS 14.4** An accepted Safety Case is implemented, and safety notification and reporting is undertaken in accordance with the Regulations (as applicable).	**MC 14.4.1** Acceptance letter from NOPSEMA demonstrates acceptance of the Safety Case. Records demonstrate applicable NOPSEMA notification and reporting.
	C 13.5 Incident reports are raised for unplanned releases within event reporting system.	**PS 13.5** Incident reports raised for unplanned releases and Recordable Incidents notified	**MC 13.5.1** Records demonstrate incident reports raised for unplanned releases, and applicable Recordable Incident

EPOs, EPSs and MC for Pluto Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
			notifications completed.
	Mitigation – Emergency and Hydrocarbon Spill Response.	Refer to Appendix H: Oil Spill Preparedness and Response Mitigation Assessment for discussion around the ALARP assessment of controls related to hydrocarbon spill response.	

6.8.6 Unplanned Hydrocarbon Release: Loss of Marine Vessel Separation (MEE-04)

Context		
Topsides – Section 3.4.1 Pipeline and 6-inch Chemical Supply Line – Section 3.4.5 Hydrocarbon Inventories–Section 3.9 Support Vessel Operations -Section 3.8 Vessel-based Activities for the Xena-3 Tie-back – Section 3.12	Physical Environment – Section 4.4 Habitats and Biological Communities – Section 4.5 Protected Species – Section 4.6 Protected Places – Section 4.8 Socio-economic Environment – Section 4.9	Consultation – Section 5

Impacts and Risks Evaluation Summary														
Source of Risk	***Environmental Value Potentially Impacted***							***Evaluation***						
	Soil and Groundwater	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/Habitat	Species	Socio-economic	Decision Type	Consequence	Likelihood	Risk Rating	ALARP Tool	Acceptability	Outcome
Hydrocarbon release of marine diesel to the marine environment from vessel due to collision within the PSZ		x	x	x	x	x	x	B	C	1	M	LCS GP PJ RBA CV SV	Acceptable if ALARP	EPO 16
Hydrocarbon release from pipeline, flowline(s) and riser(s) to the marine environment and atmosphere (MEE-02/03) caused by collision and structural integrity failures		x	x	x	x	x	x	B	C	1	M			

Marine environment footprint and associated hydrocarbon and chemical release associated with platform loss of structural integrity (MEE-03) caused by collision		x	x	x	x	x	x	B	C	1	M			

Description of Source of Risk

A loss of marine vessel separation between a vessel and the facility, or between vessels may result in a loss of hydrocarbon containment from the facility and/or the release of fuel from the vessel. A loss of marine vessel separation with PLA has been identified as a potential MEE (MEE-04). Loss of marine vessel separations can arise from:

- visiting vessel collisions associated with platform support vessels, IMMR and accommodation vessels – ships that are visiting the riser platform can accidentally collide with the platform or each other during approach to, or manoeuvring alongside, the platform
- errant passing vessel collision – ships that are not visiting the riser platform (i.e., passing vessels) can, for one reason or another, move off-course and collide with the platform
- vessel operations during adverse weather.

The different collision hazards involve significantly different sized vessels and collision speeds; hence, differing impact energies and consequences have been assessed.

Visiting Vessels

Visiting vessels are defined as those which are routinely used to service the facility. Operating procedures dictate how vessels are operated, loaded and unloaded, but it will generally occur so that the prevailing winds move the vessel away from the facility. The primary causes of visiting vessel collisions are failure to follow safe procedures and communication errors between the marine vessels and riser platform operations. These errors could be worsened by:

- vessel station keeping failures
- vessel operations in adverse weather conditions.

A number of common failure causes due to human error and SCC failures are presented in the generic Human Error and SCE Failure bowties in Section 6.8.8.

Errant Passing Vessels

Errant passing vessels are defined as third party vessels that enter the riser platform's 500 m PSZ, but do not call at the riser platform (i.e., not support vessels). The collision can be powered or drifting. Either has the potential to cause significant damage to the riser platform.

The causes of errant passing vessel collisions include:

- failure of propulsion or steering systems
- adverse weather conditions resulting in poor visibility
- rough seas
- human error.

Woodside implements a range of control measures to mitigate the risk of errant vessel collision. In addition to the potential for large hydrocarbon releases following impact by a vessel with the riser platform, powered collisions from large passing vessels or tankers could have sufficient impact energy to breach both skins of the vessel to the extent that there is a loss of containment of cargo or fuel oil with the potential for significant loss of inventory and consequent environmental impact. This is not within the control of Woodside so is not assessed further.

Loss of Vessel Separation – Credible Hydrocarbon Spill Scenario

The loss of marine vessel separation is considered a Major Environment Event (MEE-04). The hazards associated with this MEE is loss of containment of hydrocarbons in subsea equipment, process and non-process hydrocarbon inventories and potentially fuel stored in vessels (such as platform support/IMMR vessels).

A loss of marine vessel separation could result in a significant release of process hydrocarbons. Hydrocarbon releases may result in a spill to the marine environment as described in Section 6.8.4 (MEE-02 Subsea equipment loss of containment, surface scenario) caused due to mechanical integrity impacts to structures, which include flowline/export pipeline riser systems. Escalation events could interact with MEE-03 Loss of structural integrity (Section 6.8.5) topsides inventories. In addition, vessel cargo, including diesel inventory, could be spilled if the cause of the loss of platform integrity was a collision from a support vessel or other in-field vessel.

Worst case hydrocarbon release scenarios for a subsea equipment loss of containment (MEE-02) that could result from loss of marine vessel separation in the PSZ is discussed in Section 6.8.4. Relevant trajectory modelling as applicable to these scenarios is also discussed above.

A loss of vessel separation may lead to the accidental release of marine diesel from the fuel tanks on the vessel(s) involved. For a vessel collision to result in the worst-case scenario of a hydrocarbon spill potentially impacting an environmental receptor, several factors must align as follows:

- Vessel interaction must result in a collision.
- The collision must have enough force to penetrate the vessel hull.
- The collision must be in the exact location of the fuel tank.
- The fuel tank must be full, or at least of volume that is higher than the point of penetration.

The probability of the chain of events described above aligning, to result in a breach of fuel tanks resulting in a spill that could potentially affect the marine environment is considered highly unlikely. Given the offshore location of the PAA, vessel grounding in relation to the PAP is not considered a credible risk.

A collision between a platform, subsea support vessel or ASV with a third-party vessel (i.e. commercial shipping, other petroleum related vessels and commercial fishing vessels) was considered the only credible event that could release a significant quantity of marine diesel to the environment. This was assessed as being credible but highly unlikely, given the platform support vessels typically operate in the Operational Area, the presence of vessels within the Operational Area is typically temporary (e.g., while undertaking IMMR activities), vessels undertaking the PAP typically operate of low speeds or are stationary, the standard vessel operations and equipment in place to prevent collision at sea, and the construction and placement of storage tanks. For marine vessels, credible spill volume assumptions are taken as the volume of the largest fuel tank in line with AMSA guidelines [Technical Guidelines for Preparing Contingency Plans for Marine and Coastal Facilities]. The largest tank of a platform support or subsea support vessel is unlikely to exceed 105 m^3. However, non-routine vessel activities may be required with larger tank inventories such as ASV with segregated tank inventories of ~300 m^3, with combined capacity of ~1800 m^3. For the purposes of understanding the characteristics of a marine diesel release from a large vessel, a loss of 1000 m^3 of marine diesel to sea-surface within the PSZ has been selected as being representative of a worst-case spill scenario.

Decision Type, Risk Analysis and ALARP Tools

Woodside has not experienced any loss of marine vessel separation events that have resulted in significant environmental impacts. The facility has never experienced a worst-case loss of containment due to loss of vessel separation in its operational history.

Decision Type

Decision Type B has been applied to this risk under the Guidance on Risk Related Decision Making (Oil and Gas UK, 2014). This reflects the complexity of the risk, the higher potential consequence and stakeholder implications should the event be realised. To align with this decision type, a further level of analysis has been applied using risk-based tools, including the Bowtie Methodology (described in Section 2.7.3) and hydrocarbon spill trajectory modelling. Company and societal values were also considered in the demonstration of ALARP and acceptability, considered through internal reviews, and stakeholder consultation (Section 5).

Quantitative Spill Risk Assessment

Credible worst-case hydrocarbon spill scenarios: subsea equipment loss of containment (MEE-02) applies to a loss of vessel separation (MEE-04) causing structural failures, with PLA facility location noted to be further away (offshore) from key receptors modelled in a mid-point export pipeline loss of containment scenario. Refer to the Section 6.8.4 for a discussion of this credible worst-case spill scenario.

Spill modelling of the worst-case credible loss of marine diesel from a vessel spill scenario was undertaken by RPS (2024e) on behalf of Woodside. Modelling of a diesel fuel tank loss of containment described in Table 6-42 was undertaken over all seasons to address possible year-round vessel operations. This is considered to provide a conservative estimate of the EMBA and the potential impacts from the identified worst-case credible release volumes for marine diesel loss of containment scenarios.

Table 6-42: Summary of worst-case vessel fuel tank loss of containment during operations scenario

Scenario	Hydrocarbon	Duration (minutes)	Depth (m)	Latitude	Longitude	Total Hydrocarbon Release Volume (m^3)
Scenario 5: Vessel fuel tank loss of containment	Marine gas oil	60	Surface	19° 59’ 46.5” S	115° 22’ 5.6” E	1000

Hydrocarbon Characteristics

See Section 6.8.2 for a description of marine diesel.

Likelihood

In accordance with the Woodside Risk Matrix, a likelihood of 'highly unlikely' event as it 'has occurred once or twice in the industry' (experience-based likelihood) and aligns with a frequency of '1 in 10,000 to 1 in 100,000 years' has been assigned to the events of:

- hydrocarbon release from subsea equipment to the marine environment and atmosphere
- marine environment footprint and associated hydrocarbon and chemical release associated with structural collapse of riser platform.
- surface release from vessel fuel tank.

Consequence

The spatial extent and fate (including weathering) of the spilled hydrocarbon was considered during the impact assessment for MEE-02 (Section 6.8.4), and separate diesel modelling scenario. These considerations were informed primarily by the outputs from the stochastic modelling studies undertaken by RPS (2024c, 2024e), available information on environmental sensitivities that may credibly be impacted in the event of a worst-case spill (Sections 6.8.3 and 6.8.4), and relevant literature and studies considering the effects of hydrocarbon exposure.

Consequence Assessment

Environment that May Be Affected

As discussed above, the potential impacts from a hydrocarbon release caused by a loss of vessel separation include those which would result from:

- subsea equipment loss of containment (MEE-02 – Scenario 3)
- loss of structural integrity
- Scenario 5 – loss of containment of the marine diesel within the PSZ.

The potential impacts are –discussed in the above-mentioned sections and below.

Scenario 5 – Loss of Containment of the Marine Diesel Within the PSZ

Surface Hydrocarbons

The hydrocarbon spill modelling indicated that concentrations of floating hydrocarbons equal to or greater than the 10 g/m2 threshold could potentially be found, in the form of slicks, up to 50 km north and north-east from the release location. Receptors with the highest probability of contact at the ecological threshold include Montebello AMP with a 24% probability.

Entrained Hydrocarbons

Entrained oil concentrations equal to or greater than the 100 ppb threshold are predicted to be found up to 400 km south-west from the release location.

Receptors with the highest probability of contact at the ecological threshold (>100 ppb) include Gascoyne AMP (4%), Montebello AMP (57.5%) and Tryal Rocks (1.5%). Several other sensitive receptors are predicted to be contacted at concentrations equal to or greater than 100 ppb with probabilities of 0.5–2% (Table 6-43).

Dissolved Hydrocarbons

Dissolved aromatic hydrocarbon concentrations equal to or greater than the 50 ppb threshold are predicted to be found up to around 26 km south-west from the release location. Receptors with the highest probability of contact at the ecological threshold (>50 ppb) include Montebello AMP (19.5%).

Accumulated Hydrocarbons

The modelling predicted no shoreline hydrocarbon accumulated at any receptor above the ecological threshold.

Summary of Potential Impacts to Environmental Values

The credible worst-case hydrocarbon spill scenario that may arise from MEE-04 may impact upon a range of environmental receptors; refer to Table 6-43 for a summary of receptors identified by the stochastic spill modelling studies. Potential impacts of a hydrocarbon spill to the open water environment and receptors have been assessed within the worst-case spill scenario, MEE-01; refer to Section 6.8.3 for a description of potential impacts.

The modelling for the spill scenario that may arise from MEE-04 predicted some low-probability entrained hydrocarbons that may also impact the environment and receptors within the nearshore waters above the relevant thresholds that were not located within the EMBAs modelled for either the worst-case spill scenario; MEE-01 or MEE-02 assessed above. Therefore, the potential impacts have been assessed further below.

Table 6-43: Environment that may be affected – key receptor locations and sensitivities potentially contacted above impact thresholds by loss of vessel marine diesel inventory at the Pluto Alpha Petroleum Safety Zone for threshold ≥0.5%

Environmental Setting	Receptor	Environmental, Social, Cultural, Heritage and Economic Aspects presented as per the Environmental Risk Definitions (Woodside's Risk Management Procedure)																													Probability of Hydrocarbon Contact and Fate (%)					
		Physical		*Biological*																			*Socio-economic and Cultural*									*Socio-cultural EMBA*		*EMBA*			
		Water Quality	*Sediment Quality*	*Marine Primary Producers*			*Other Communities/Habitats*								*Protected Species*										*Other Species*													
		Open Water (Pristine)	Marine Sediment (Pristine)	Coral Reef	Seagrass Beds/Macroalgae	Mangroves	Spawning/Nursery Areas	Open Water – Productivity/Upwelling	Non-biogenic Reefs	Offshore Filter Feeders and/or Deepwater Benthic Communities	Nearshore Filter Feeders	Sandy Shores	Estuaries/Tributaries/Creeks/Lagoons (including Mudflats)	Rocky Shores	Cetaceans – Migratory Whales	Cetaceans – Dolphins and Porpoises	Dugongs	Pinnipeds (Sea Lions/Fur Seals)	Marine Turtles (Foraging and Internesting Areas and Significant Nesting Beaches)	Sea Snakes	Whale Sharks	Sharks and Rays	Seabirds and Migratory Shorebirds	Pelagic Fish Populations	Demersal Fish Populations	Fisheries – Commercial	Fisheries – Traditional	Tourism and Recreation	Protected Areas/Heritage – European and Indigenous/Underwater Cultural Heritage	Offshore Oil and Gas Infrastructure (Topside and Subsea)	Surface Hydrocarbon (1–10 g/m²)	Accumulated Hydrocarbons (10–100 g/m²)	Surface Hydrocarbons (≥ 10 g/m²)	Entrained Hydrocarbons (≥ 100 ppb)	Dissolved Hydrocarbons (≥50 ppb)	Accumulated Hydrocarbons (≥ 100 g/m²)
Offshore	Montebello MP	✓	✓	✓	✓	✓	✓	✓				✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		29.5		24	57.5	19.5	
	Gascoyne MP	✓	✓												✓	✓			✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓				4		
	Ningaloo MP										✓	✓	✓	✓					✓					✓				✓	✓					0.5		
Islands	Southern Pilbara Islands	✓	✓	✓	✓		✓	✓	✓	✓		✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓					1		
	Barrow Island	✓	✓	✓	✓	✓	✓	✓	·		·	✓	·	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	·	✓	✓	✓				0.5		
	Flat Island	✓	✓	✓	✓	·	✓	✓	·	✓	·	✓	·	✓	✓	✓	✓	·	✓	✓	✓	✓	✓	✓	✓	·	·	✓	✓					1		
	Hermite Island	✓	✓	✓	✓	✓	✓	✓	·		·	✓	·	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	·	✓	✓	✓				0.5		
	Montebello Islands	✓	✓	✓	✓	✓	✓	✓	·		·	✓	·	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	·	✓	✓	✓				0.5		
	Muiron Islands	✓	✓	✓	✓	·	✓	✓	·	✓	·	✓	·	✓	✓	✓	✓	·	✓	✓	✓	✓	✓	✓	✓	·	·	✓	✓					1.5		
	Peak Island	✓	✓	✓	✓	·	✓	✓	·	✓	·	✓	·	✓	✓	✓	✓	·	✓	✓	✓	✓	✓	✓	✓	·	·	✓	✓					1		
	Serrurier Island	✓	✓	✓	✓	·	✓	✓	·	✓	·	✓	·	✓	✓	✓	✓	·	✓	✓	✓	✓	✓	✓	✓	·	·	✓	✓					0.5		
State Marine Parks and Nature Reserves	Barrow Island MP	✓	✓	✓	✓	✓	✓	✓	·		·	✓	·	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	·	✓	✓	✓				0.5		
	Barrow Island MMA	✓	✓	✓	✓	✓	✓	✓	·		·	✓	·	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	·	✓	✓	✓				0.5		
	Montebello Island MP	✓	✓	✓	✓	✓	✓				✓	·	✓	✓	✓	✓	·	✓	✓	✓	✓	✓	✓	✓	✓	✓	·	✓	✓					1		

Environmental Setting	Receptor	Environmental, Social, Cultural, Heritage and Economic Aspects presented as per the Environmental Risk Definitions (Woodside's Risk Management Procedure)																													Probability of Hydrocarbon Contact and Fate (%)					
		Physical		*Biological*																					*Socio-economic and Cultural*					Socio-cultural EMBA		EMBA			
		Water Quality	*Sediment Quality*	*Marine Primary Producers*			*Other Communities/Habitats*							*Protected Species*										*Other Species*												
		Open Water (Pristine)	Marine Sediment (Pristine)	Coral Reef	Seagrass Beds/Macroalgae	Mangroves	Spawning/Nursery Areas	Open Water – Productivity/Upwelling	Non-biogenic Reefs	Offshore Filter Feeders and/or Deepwater Benthic Communities	Nearshore Filter Feeders	Sandy Shores	Estuaries/Tributaries/Creeks/Lagoons (including Mudflats)	Rocky Shores	Cetaceans – Migratory Whales	Cetaceans – Dolphins and Porpoises	Dugongs	Pinnipeds (Sea Lions/Fur Seals)	Marine Turtles (Foraging and Internesting Areas and Significant Nesting Beaches)	Sea Snakes	Whale Sharks	Sharks and Rays	Seabirds and Migratory Shorebirds	Pelagic Fish Populations	Demersal Fish Populations	Fisheries – Commercial	Fisheries – Traditional	Tourism and Recreation	Protected Areas/Heritage – European and Indigenous/Underwater Cultural Heritage	Offshore Oil and Gas Infrastructure (Topside and Subsea)	Surface Hydrocarbon (1–10 g/m²)	Accumulated Hydrocarbons (10–100 g/m²)	Surface Hydrocarbons (≥ 10 g/m²)	Entrained Hydrocarbons (≥ 100 ppb)	Dissolved Hydrocarbons (≥50 ppb)	Accumulated Hydrocarbons (≥ 100 g/m²)
	Muiron Islands MMA	✓	✓	✓	✓	·	✓	✓	·	✓	·	✓	·	✓	✓	✓	✓	·	✓	✓	✓	✓	✓	✓	✓	·	·	✓	✓					1.5		
	Ningaloo Coast WH								·	·	✓	✓	✓	✓				·	✓				✓			·	✓	✓	·				0.5		
	Ningaloo MP (State)								·	·	✓	✓	✓	✓				·	✓				✓			·	✓	✓					0.5		
Submerged Banks and Shoals	Montebello Shoals	✓	✓	✓	✓	✓	✓	✓		✓	·	✓	✓	✓	✓	✓	✓	·	✓	✓	✓	✓	✓	✓	✓	✓	·	✓	✓					0.5		
	Outtrim Patches	✓	✓	✓	✓	·	✓	✓	·	✓	·	✓	·	✓	✓	✓	✓	·	✓	✓	✓	✓	✓	✓	✓	·	·	✓	✓					1		
	Tryal Rocks	✓	✓	✓	✓	✓	✓	✓	·		·	✓	·	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	·	✓	✓					1.5		

Nearshore Waters (Mainland and Islands)

Marine Sediment Quality

The EMBA modelled for MEE-04 scenario overlaps the nearshore waters of a few shorelines and islands (RPS, 2024e).

Low probabilities (<2%) of entrained hydrocarbons were predicted to contact a few nearshore receptors, such as the Ningaloo Coast, Montebello Islands and Shoals, Barrow Island and Muiron Island. Therefore, hydrocarbon contact from this scenario may lead to reduced marine sediment quality by several processes, such as adherence to sediment and deposition seabed habitat.

No shorelines were predicted to be exposed to either shoreline accumulation or floating surface hydrocarbons at any threshold (RPS, 2024e).

Protected Species

Cetaceans and Dugongs

Coastal populations of small cetaceans (e.g., the spotted dolphin) and dugongs are known to reside or frequent nearshore waters along the WA coastline and nearshore islands, including the Exmouth Gulf, Ningaloo Coast and at the Muiron Islands, Montebello and Barrow Island groups, and the Pilbara Southern Island Groups. The general impacts of hydrocarbons on cetaceans have been assessed above.

Evaluation of the extent of the spill EMBA modelled for MEE-04 demonstrated an overlap with areas where cetaceans are known to occur, including the BIAs for a number of species. In addition to the BIAs that overlap the PAA, the EMBA overlaps with the dugong calving, breeding, foraging (high density seagrass beds) and nursing BIAs, the OIE pygmy blue whale foraging BIA (see Section 4.6).

OIE Pygmy Blue Whale

The pygmy blue whale foraging area in the Ningaloo Coast is within the EMBA modelled for the vessel separation scenario (due to contact with entrained hydrocarbons at 100 ppb); however, it is about 232 km south-west of the PAA and the EMBA is not representative of any one hydrocarbon spill. The likelihood of impacts occurring within this BIA are, therefore, considered low.

Dugong

Impacts (in addition to those noted above) include ingestion of hydrocarbons by dugongs that feed on oiled seagrass and indirect impacts to dugongs should seagrass habitats be damaged by a hydrocarbon spill. As noted for the pygmy blue whale foraging BIA, the spill EMBA modelled for MEE-04 scenario only overlaps a small northern portion of the Exmouth Gulf and it is considered a low likelihood that the dugong BIAs (and associated seagrass meadows) located there and along the Ningaloo Coast (BIAs for calving, nursing, breeding and foraging) would be impacted by a hydrocarbon spill. No surface or shoreline hydrocarbons are predicted within the Exmouth Gulf or associated dugong BIAs within this EMBA.

Summary

A hydrocarbon spill following a vessel separation may impact coastal cetaceans through site displacement and damage to food source, however, due to the non-persistent nature of the hydrocarbon, it is not predicted to result in impacts on overall population viability of either dugongs or coastal cetaceans.

Marine Turtles

Marine turtles are known to use nearshore waters and shorelines for foraging and breeding activities (including internesting), with significant nesting beaches along the WA mainland coast and nearshore islands in locations (such as the Dampier Archipelago and Montebello Island).

The combined EMBA overlaps a number of marine turtle BIAs. The modelling for MEE-04 scenario predicted exposure by to entrained hydrocarbons exceeding the relevant exposure thresholds at a number of islands and the nearshore waters of these marine turtle habitat areas.

The modelling for MEE-04 predicted no hydrocarbon exposure to any shorelines at any threshold. Therefore, impacts to nesting individuals are not expected following a release of hydrocarbons in the event of a vessel separation.

The potential impacts of hydrocarbon exposure within the nearshore environment have been assessed above. Marine turtles aggregating near nesting beaches within the EMBA for MEE-04 during the mating and nesting seasons are most vulnerable to hydrocarbons, due to greater turtle densities and the possible disruption to important life cycle behaviours.

Potential impacts may occur at the population level due to the presence of a high number of breeding individuals and hatchlings (during hatchling dispersal) and may impact on overall population viability of marine turtle species. However, given the volatile nature of the hydrocarbons population level impacts are not anticipated to occur.

Sea Snakes

The potential impacts of hydrocarbon exposure within the nearshore environment upon sea snakes has been assessed above.

Sharks and Rays

Whale sharks and manta rays (reef manta ray and giant manta ray) are known to frequent Ningaloo Reef (forming feeding aggregations March through July) and the nearshore waters of the Muiron Islands (located 228 km south-west of the PAA). Whale sharks and manta rays generally transit along the nearshore coastline in these areas and are vulnerable to surface, entrained and dissolved aromatic hydrocarbon spill impacts, with both taxa having similar modes of feeding.

Whale sharks are versatile feeders, filtering large amounts of water over their gills, catching planktonic and nektonic organisms (Jarman and Wilson, 2004). Whale sharks at Ningaloo Reef have been observed using two different feeding strategies, including passive sub-surface ram-feeding and active surface feeding (Taylor, 2007). Passive feeding consists of swimming slowly at the surface with the mouth wide open. During active feeding, sharks swim high in the water with the upper part of the body above the surface with the mouth partially open (Taylor, 2007). These feeding methods would result in the potential for individuals that are present in worse affected spill areas to ingest potentially toxic amounts of entrained or dissolved aromatic hydrocarbons into their body. Large amounts of ingested hydrocarbons may affect their endocrine and immune system in the longer term.

The presence of hydrocarbons may also cause displacement of whale sharks from important feeding and resting areas at Ningaloo Reef, potentially disrupt migration and aggregations to these areas in subsequent seasons. Whale sharks may also be affected indirectly by entrained or dissolved aromatic hydrocarbons through the contamination of their prey. The preferred food of whale sharks are planktonic organisms which are abundant in the coastal waters of Ningaloo Reef in late summer/autumn, driving the annual arrival and aggregation of whale sharks in this area. If a worse-case spill event were to occur during the spawning season, this important food supply (in worse spill affected areas of the reef) may be diminished or contaminated. The contamination of their food supply and the subsequent ingestion of this prey by the whale shark may also result in long term impacts as a result of bioaccumulation.

There is the potential for other coastal shark species (e.g., dwarf, narrow and/or green sawfish) to be impacted directly from hydrocarbon contact and/or indirectly through contaminated prey or loss of habitat. Excluding sawfish, which may exhibit high site fidelity, it is most likely that shark species (as mobile animals) will move away from spill affected areas and suffer minimal direct impact.

A spill reaching the Ningaloo coastline during key aggregation periods and impacting important whale shark foraging areas may have severe impacts to the local whale shark population, including possible mortality of individuals and impacts to life cycle habitats such as migration patterns. Most species of shark and ray (including whale sharks) are, however, expected to move away from spill affected areas with minimal impacts.

Seabirds

The potential impacts of hydrocarbon exposure within the nearshore environment upon seabirds has been assessed above. The modelling for the EMBA for MEE-04 predicted no shoreline accumulation of hydrocarbons at any thresholds. As mentioned above, the area exposed to surface hydrocarbons is also relatively restricted to the release site, therefore impacts to rafting or foraging individuals are anticipated to be low.

Submerged Shoals and Banks

Protected Species

Marine Turtles

Modelling for the MEE-04 spill scenario predicted a very low probability of overlap of submerged shoals and banks by the EMBA, including Montebello Shoals (0.5%), Outtrim Patches (1%), and Tryal Rocks (1.5%). Shoals and banks may, at times, be foraging habitat for marine turtles, given the coral and filter feeding biota associated with these areas.

Notably, there are no known key aggregation areas (i.e., BIAs or habitat critical areas) for marine turtles associated with these submerged receptors (see Section 4.6.2 for further details on key areas).

Impacts to marine turtles at submerged shoals and banks in offshore marine environments have been discussed above in Section 6.8.3. Marine turtles would be expected to be foraging, resting and breathing at the surface at these geomorphic features. Ingestion of hydrocarbons while foraging through prey is also possible.

Marine turtles that may be present at these submerged shoals and banks within the EMBA may be impacted by entrained hydrocarbons present at concentrations greater than the relevant thresholds. Impacts would be expected to be limited to the individuals that may be transiting these areas. Subsequently, impacts at the population level are not anticipated for any of the five marine turtle species that may frequent shoals and banks within the EMBA.

Sea Snakes

It is likely that sea snakes will be present at submerged shoals and banks within the EMBA modelled for MEE-2. While there are no known areas of aggregation for sea snakes within the extended combined EMBA (see Section 4.6.2), individual sea snakes may be impacted by hydrocarbons predicted at and near to their habitat preferences (see Section 4.6.2).

The potential impacts to sea snakes following exposure to hydrocarbons have been discussed above.

Sharks and Rays
Pelagic sharks and rays may frequent submerged shoals and banks to feed within the EMBA modelled for MEE-04. The potential impacts to sharks and rays following exposure to entrained hydrocarbons have been discussed above.
All Settings
Coral
The potential impacts to coral and coral recruitment / spawning following exposure to entrained hydrocarbons have been discussed above.
Productivity
The potential impacts to plankton and offshore productivity following exposure to entrained hydrocarbons have been discussed above.
Seagrass Beds, Macroalgae and Mangroves
The potential impacts to seagrass beds, macroalgae and mangroves following exposure to entrained hydrocarbons have been discussed above.

Summary of Potential Impacts to Socio-economic Values	
Setting	***Receptor Group***
Nearshore Island and Mainland Coastal Areas (Nearshore Waters)	***Fisheries – Commercial*** The potential impacts to commercial fisheries following exposure to hydrocarbons have been discussed above.
	Fisheries – Traditional Although no designated traditional fisheries have been identified within the PAA or EMBA, it is recognised that Indigenous communities' fish in the shallow coastal and nearshore waters of Ningaloo Reef and therefore may be impacted if a worst-case hydrocarbon spill were to occur. Impacts would be similar to those identified for commercial fishing, in the form of a potential fishing exclusion zone and possible contamination/tainting of fish stocks.
	Tourism and Recreation Tourism would likely be adversely affected if a visible surface slick entered areas of tourism activity. Spill modelling predicted low probability of hydrocarbon contact to the closest tourism area, such as the Montebello MP and Dampier AMP and archipelago. These areas have some seasonal charter boat operators and fishing activities, mainly concentrated around the islands. Modelling also predicted low probabilities of entrained hydrocarbon exposure at areas such as the Ningaloo Coast located over 200 km south of the PAA. These areas experience high levels of seasonal tourism and recreational activities. Impacts would be temporary exclusion of these activities within the exposed areas. No long-term impacts are expected due to the distance and weathering and fate of the hydrocarbons exposed to prior to reaching these areas.

MEE-04 Loss of Marine Vessel Separation – Risk Analysis
A bowtie risk analysis was undertaken to assess MEE-04; refer to the below figures for bowtie diagrams which were an output of Woodside's risk analysis process.

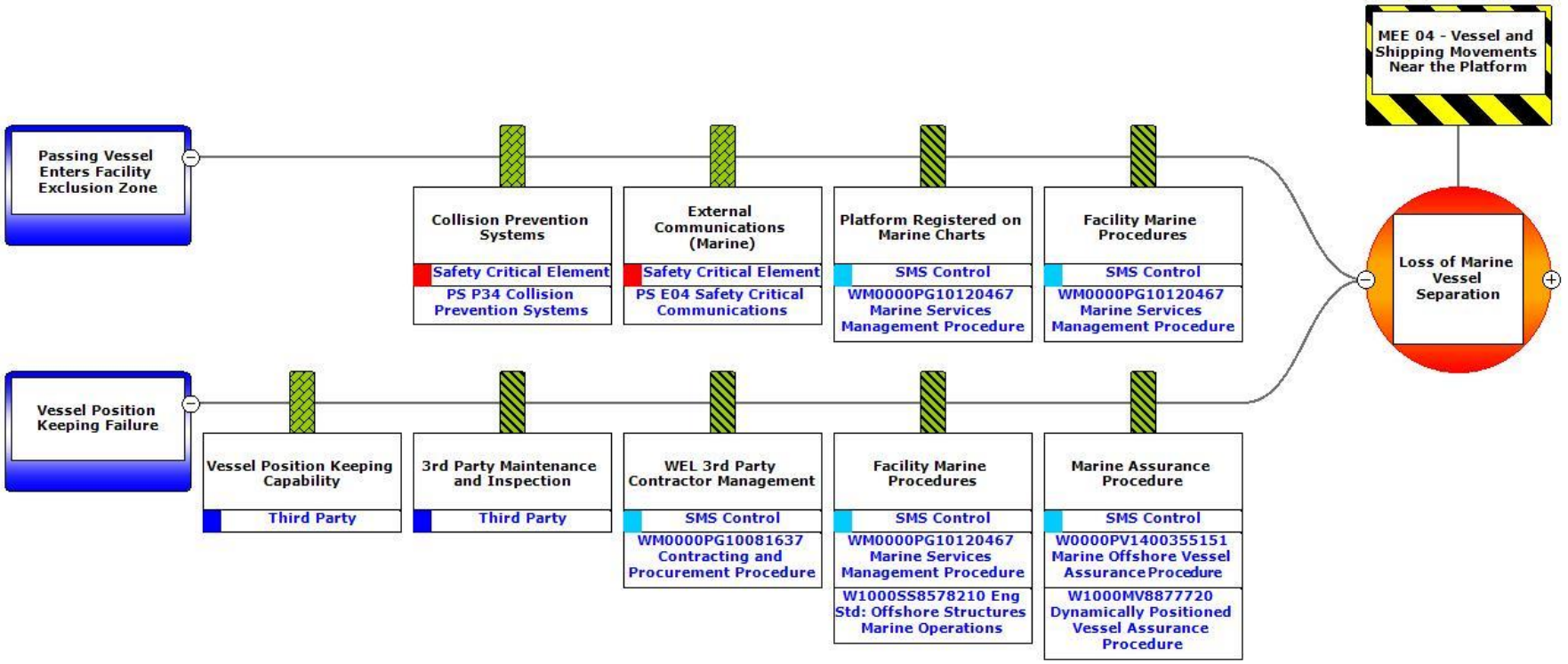

Figure 6-27: MEE-04 Loss of vessel separation (Causes 1–2)

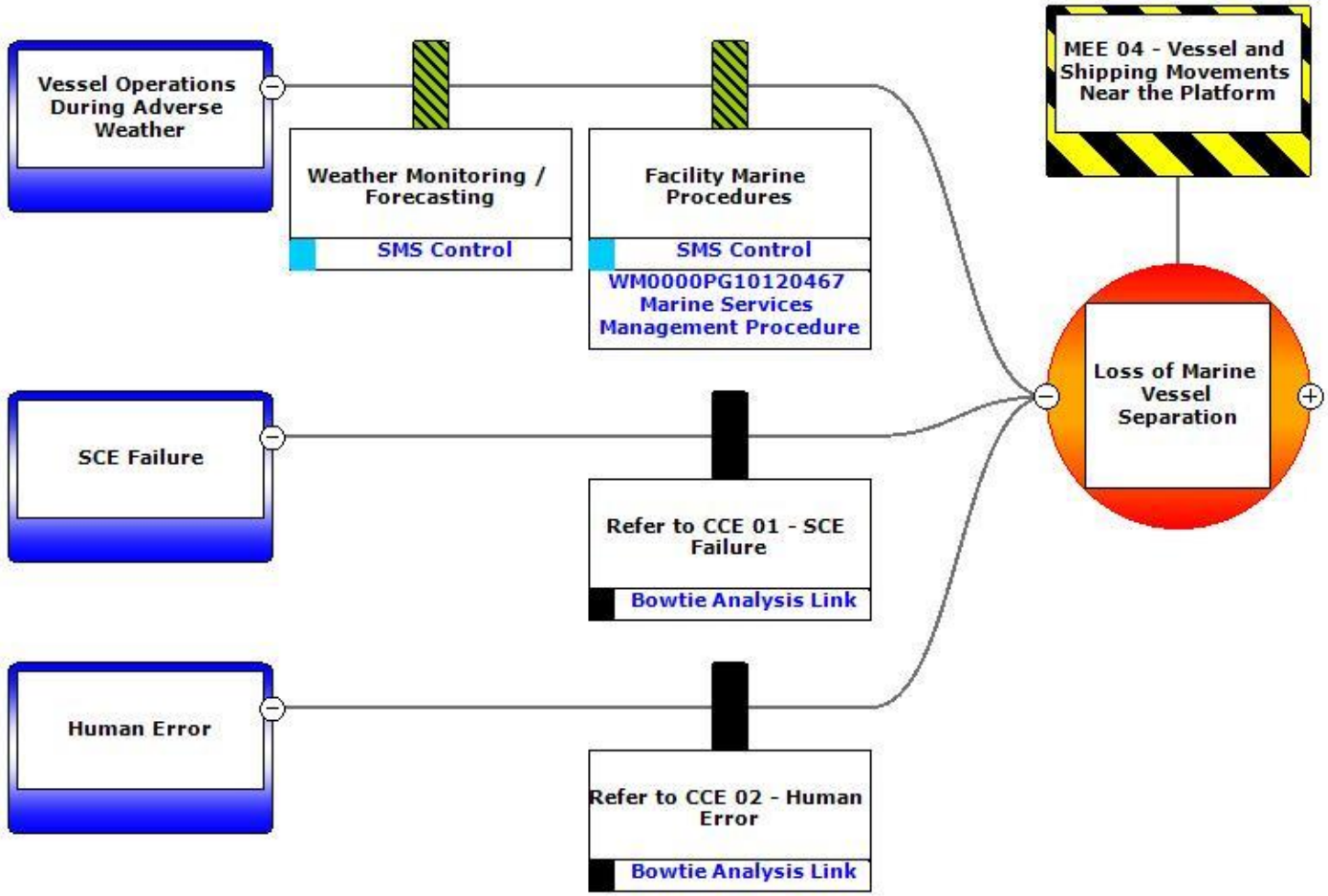

Figure 6-28: MEE 04 Loss of marine vessel separation (Causes 3–5)

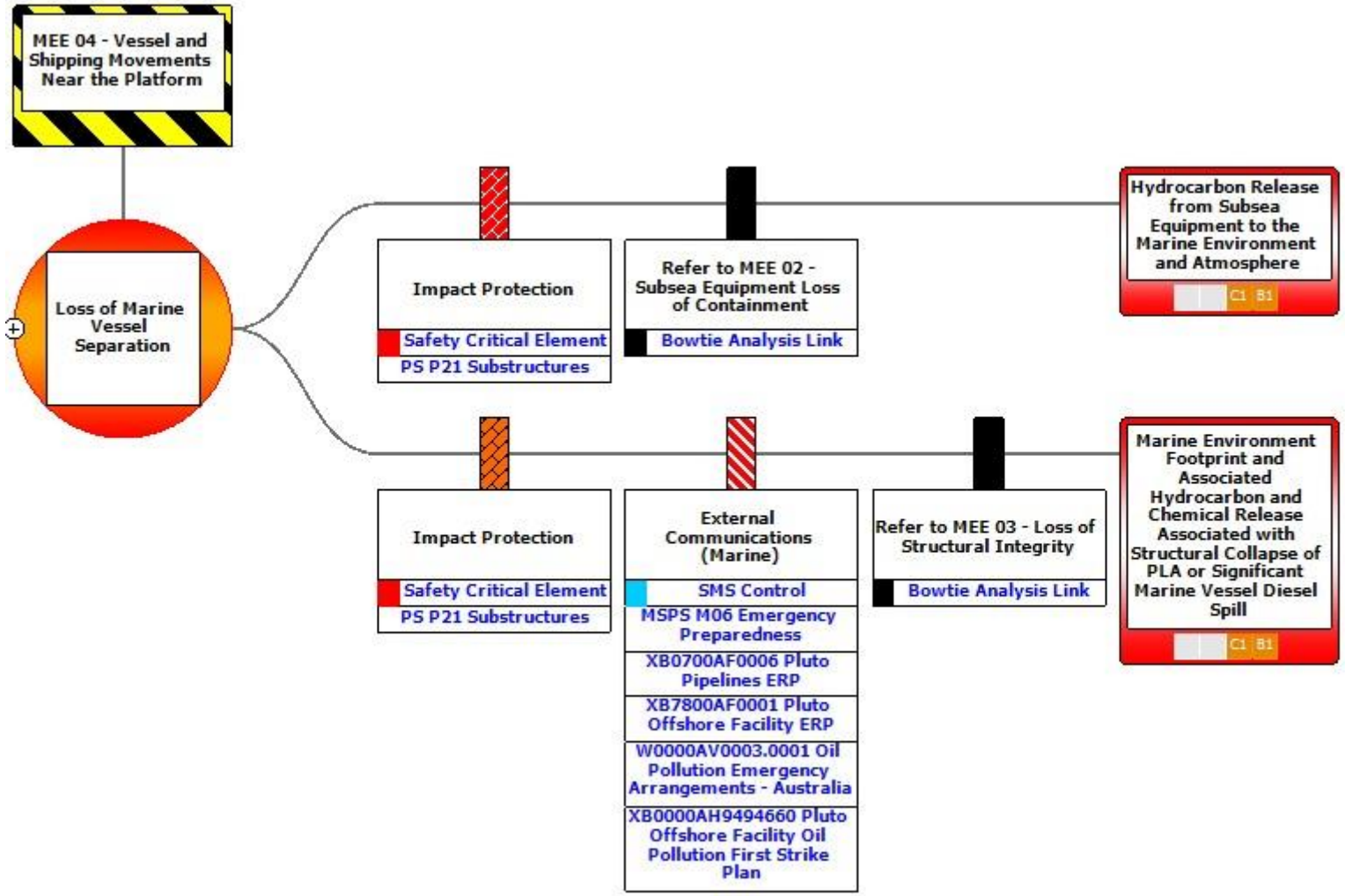

Figure 6-29: MEE-04 Loss of vessel separation (outcomes)

MEE-04 Loss of Marine Vessel Separation – Demonstration of ALARP ALARP Control Measures				
Hierarchy	***Control/Barrier***	***SCE/Management System Reference***	***Type of Effect***	***Control Adopted***
Preventative Barriers – Safety and Environmental Critical Elements				
Elimination	N/A.	No elimination or substitution controls were identified beyond those incorporated in design.		
Substitution				
Engineering Controls	Maintaining collision warning systems and navigational aids to alert facility of a potential collision with marine vessels, and to alert marine vessels of facility location so that they may take timely action to avoid the facility and hence reduce likelihood of collision.	P34 – Ship Intrusion Detection System	Detection (Technical)	Yes C 16.1
Engineering Controls	Maintaining availability of critical external and internal communication systems to facilitate prevention and response to accidents and emergencies.	E04 – Safety Critical Communications Systems	Prevention (Technical)	Yes C 13.2
Mitigating Barrier – Safety and Environmental Critical Elements				
Engineering Controls	Maintaining structural integrity to ensure availability of critical systems during a major accident or environment event, and prevent loss of marine vessel separation from contributing to escalation of an MEE.	P21 – Substructures	Mitigation (Technical)	Yes C 15.1
Legislation Codes and Standards				
Procedures and Administration	OPGGS (Safety) Regulations 2009: Accepted Safety Case for the Pluto facility to: • identify hazards that have the potential to cause an MAE • detail assessment of MAE risks • describe the physical barrier SCEs and the safety management systems identified as being required to reduce the risk to personnel associated with an MAE to ALARP, thus contributing to management of associated potential environmental consequences of MAEs.	Pluto Safety Case	Prevention (Administration) Control based on legislative requirements – must be adopted	Yes C 14.4

MEE-04 Loss of Marine Vessel Separation – Demonstration of ALARP ALARP Control Measures				
Hierarchy	***Control/Barrier***	***SCE/Management System Reference***	***Type of Effect***	***Control Adopted***
Procedures and Administration	Incident reports are raised for unplanned releases within event reporting system.	Woodside Health, Safety and Environment Event Reporting and Investigation Procedure	Prevention/ Mitigation (Administration) Control based on legislative requirements	Yes C 13.5
Management System Specific Measures: Key Standards or Procedures				
Procedures and Administration	Implementing management systems to maintain: • Contracting and Procurement Procedure • Marine Offshore Vessel Assurance Procedure • Marine Services Management Procedure • Dynamically Positioned Vessel Assurance Procedure • Engineering Standard: Offshore Structure Marine Operations.	Marine Services Management Procedure Marine Offshore Vessel Assurance Procedure Contracting and Procurement Procedure Dynamically Positioned Vessel Assurance Procedure Engineering Standard: Offshore Structures Marine Operations	Prevention (Administration)	Yes – See Section 7 Implementation Strategy
Emergency Response and Contingency Planning	Implementing management systems to maintain: • M06 – Emergency preparedness • Pluto Offshore Facility Emergency Response Plan • Pluto Pipelines Emergency Response Plan • Pluto Offshore Facility Oil Pollution First Strike Plan • Oil Pollution Emergency Arrangements – Australia.	MSPS M06 – Emergency Preparedness Pluto Offshore Facility Emergency Response Plan Pluto Pipelines Emergency Response Plan Pluto Offshore Facility Oil Pollution First Strike Plan Oil Pollution Emergency Arrangements – Australia	Mitigation (Administration)	Yes – See Section 7 Refer to Appendix H: Oil Spill Preparedness and Response Mitigation Assessment for discussion around the ALARP assessment of controls related to hydrocarbon spill response

MEE-04 Loss of Marine Vessel Separation – Demonstration of ALARP ALARP Control Measures				
Hierarchy	***Control/Barrier***	***SCE/Management System Reference***	***Type of Effect***	***Control Adopted***

Risk Based Analysis

For risks identified as MEEs, a detailed risk-based bowtie analysis (as outlined in Section 2.7.3) has been used to identify, analyse and demonstrate that controls in place reduce the risk associated with each MEE to ALARP. Controls have been selected following hierarchy of control principles and consider independence of each barrier and their type of effect in controlling the hazardous event.

Application of Woodside's Risk Management Procedures and implementation of the Pluto A Operations Safety Case and Pluto Export Pipeline Safety Case ensures the continuous identification of hazards, systematic assessment of risks and ongoing assessment of alternative control measures to reduce risk to ALARP, which includes:

- ongoing hazard identification, risk assessment and the identification of control measures
- ongoing integrity management of hardware control measures in accordance with the operational performance standards which define requirements to be suitably maintained, such that they retain effectiveness, functionality, availability and survivability.

For each SCE, detailed requirements for equipment functionality, availability, reliability and survivability are incorporated into SCE Performance Standards which also include the relevant assurance tasks (e.g., inspection, maintenance, testing and monitoring requirements) to ensure technical integrity.

Bowtie analysis was undertaken to assess MEE-04, with review of formal safety assessment studies.

ALARP Statement:

On the basis of the environmental risk assessment outcomes and use of the relevant tools appropriate to the decision type, Woodside considers the adopted controls appropriate to manage the impacts and risks of a remote likelihood unplanned hydrocarbon release as a result of a loss of marine vessel separation.

The principle of inherent safety and environmental protection is based on the prevention of the MEE through design of the facility jacket and pipeline, flowline and riser integrity and ensuring controls are assurance through maintenance and inspection, and safe operating practices applied. If hydrocarbon loss of containment occurs, mitigation measures are in place to minimise the consequence by limiting the inventory which can be released and implementing remediation.

The controls in place for prevention and mitigation of MEEs are specified and assured through implementing the Pluto A Operations Safety Case(s), SCE management procedures including technical performance standards for SCEs and MSPSs for Safety Critical Procedures.

The application of Woodside Risk Management Procedures, and implementation of the Pluto Subsea Pipeline and Pluto A Operations Safety Cases ensures the continuous identification of hazards, systematic assessment of risks and ongoing assessment of alternative control measures to reduce risk to ALARP, which includes:

- ongoing hazard identification, risk assessment and the identification of control measures
- ongoing integrity management of hardware control measures in accordance with SCE technical performance standards which define requirements to be suitably maintained, such that they retain effectiveness, functionality, availability and survivability.

Given the controls in place to prevent and control loss of containment events and mitigate their consequences, it is considered that MEE risk associated with Loss of Marine Vessel Separation at the riser platform is managed to ALARP.

Demonstration of Acceptability

Acceptability Statement

Loss of marine vessel separation has been evaluated as having a 'moderate' level of risk rating. Woodside considers 'moderate' risk ratings as broadly acceptable if the adopted controls are implemented. Due to the consequence associated with MEE-04, Decision Type B has been applied, and ALARP is demonstrated using good industry practice, consideration of company and societal values and risk-based analysis, if legislative requirements are met and societal concerns are accounted for and the alternative control measures are grossly disproportionate to the benefit gained.

Acceptability is demonstrated with regard to the oil spill risk considerations as described in Section 6.8.3 (MEE-01) (the considerations include principles of Ecologically Sustainable Development, internal context, external context and other requirements (includes laws, policies, standards and conventions)).

EPOs, EPSs and MC for Pluto Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 16 No release of hydrocarbons to the marine environment due to loss of marine vessel separation associated with the Petroleum Activities Program.	**C 16.1** Maintaining collision warning systems and navigational aids to alert facility of a potential collision with marine vessels, and to alert marine vessels of facility location so they may take timely action to avoid the facility and hence reduce likelihood of collision.	**PS 16.1** Integrity will be managed in accordance with SCE Management Procedures (Section 7.4) and SCE Technical Performance Standard(s) to prevent environment risk related damage to SCEs for: • P34 – Collision prevention systems, to: • alert facility of a potential collision with marine vessels • alert marine vessels of facility location so they may take timely action to avoid the facility and hence reduce likelihood of collision.	**MC 2.11.1** Records demonstrate implementation of SCE Technical Performance Standard(s) and Management of Hardware Controls in the Operate Phase Procedure (Section 7.4.2), in order to achieve the functional objective of the control. Records may include implementation and maintain/assure and manage-change information summarised in Section 7.4.2
	C 13.2 Maintaining availability of critical external and internal communication systems to facilitate response to accidents and emergencies.	**PS 13.2** Integrity will be managed in accordance with SCE Management Procedures (Section 7.4) and SCE Technical Performance Standard(s) to prevent environment risk related damage to SCEs for: • E04 – Safety Critical Communication Systems, to allow effective Emergency Response (ER) communications in emergencies, including: • internal communications such as audible and visual warning systems, and voice communications during emergency events • external communications such as voice communications to adjacent facilities, aircraft and vessels, and external incident control centres during emergency events.	**MC 1.16.1** Records demonstrate implementation of SCE Technical Performance Standard(s) and Management of Hardware Controls in the Operate Phase Procedure (Section 7.4.2), in order to achieve the functional objective of the control. Records may include implementation and maintain/assure and manage-change information summarised in Section 7.4.2
	C 15.1 Maintaining structural integrity to ensure availability of critical systems during a major accident or environment event, and prevent structural failures from contributing to escalation of an MEE.	**PS 15.1** Integrity will be managed in accordance with SCE Management Procedures (Section 7.4) and SCE Technical Performance Standard(s) to prevent environment risk related damage to SCEs for: • P21 – Substructures • P07 – Topsides/Surface Structures,	**MC 2.11.1** Records demonstrate implementation of SCE Technical Performance Standard(s) and Management of Hardware Controls in the Operate Phase Procedure (Section 7.4.2), in order to achieve the functional objective of the

EPOs, EPSs and MC for Pluto Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
		to together: • provide and maintain structural integrity to support SCE systems under all design conditions through service life • prevent structural failure from contributing to the escalation of an MEE by providing support/protection of SCE systems during an emergency event, and/or support containment of environmentally hazardous material.	control. Records may include implementation and maintain/assure and manage-change information summarised in Section 7.4.2
	C 14.4 OPGGS (Safety) Regulations 2009: Accepted Safety Case for the facility.	**PS 14.4** An accepted Safety Case is implemented, and safety notification and reporting is undertaken in accordance with the Regulations (as applicable).	**MC 14.4.1** Acceptance letter from NOPSEMA demonstrates acceptance of the Safety Case. Records demonstrate applicable NOPSEMA notification and reporting.
	C 13.5 Incident reports are raised for unplanned releases within event reporting system.	**PS 13.5** Incident reports raised for unplanned releases and Recordable Incidents notified	**MC 13.5.1** Records demonstrate incident reports raised for unplanned releases, and applicable Recordable Incident notifications completed.
	Mitigation – Emergency and Hydrocarbon Spill Response.	Refer to Appendix H: Oil Spill Preparedness and Response Mitigation Assessment for discussion around the ALARP assessment of controls related to hydrocarbon spill response.	

6.8.7 Unplanned Hydrocarbon Release: Loss of Control of Suspended Load from Platform (MEE-05)

Context		
Produced Water System – Section 3.5.5 Lifting Operations – Section 3.7.5 Project Vessels – Section 3.8	Physical Environment – Section 4.4 Habitats and Biological Communities – Section 4.5 Protected Species – Section 4.6 Protected Places – Section 4.8 Socio-economic Environment – Section 4.9	Consultation – Section 5

Impacts and Risks Evaluation Summary

Source of Risk	***Environmental Value Potentially Impacted***							***Evaluation***						
	Soil and Groundwater	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/Habitat	Species	Socio-economic	Decision Type	Consequence	Likelihood	Risk Rating	ALARP Tool	Acceptability	Outcome
Surface or subsea release from flowline, pipeline and riser to the marine environment and atmosphere within PSZ (MEE-02) – caused by loss of control of suspended load		x	x	x	x	x	x	B	C	1	M	LCS GP PJ RBA CV	Acceptable if ALARP	EPO 17
Hydrocarbon release from topsides equipment to the marine environment and atmosphere – caused by loss of control of suspended load		x	x	x		x		A	D	1	M			

Description of Source of Risk

Lifting activities on the riser platform can take place from the platform crane between supply vessels and laydown areas, or between laydown areas. Lifting operations performed using the platform or visiting vessel cranes could potentially lead to dropped objects, impacting assets (topsides equipment, subsea infrastructure) inside the riser platform 500 m PSZ, potentially leading to a hydrocarbon loss of containment from topsides and/or subsea infrastructure. Loss of suspended load has been identified as an MEE (MEE-05). A loss of suspended load may arise from:

- lifting equipment failure
- facility lifting operations
- adverse weather.

A number of common failure causes due to human error and SCC failures are presented in the generic Human Error and SCE Failure bowties in Section 6.8.8.

Loss of Control of Suspended Load – Credible Scenarios

The identified outcome of this MEE is a loss of containment of hydrocarbons due to impact of a dropped object on topsides equipment or subsea pipelines resulting in a release of the hydrocarbon inventory to the atmosphere or the marine environment.

Decision Type, Risk Analysis and ALARP Tools

Woodside has a good history of implementing industry standard practice in subsea system design and construction. In the company's recent history, it has not experienced any loss of suspended load events that have resulted in significant releases or significant environmental impacts.

Decision Type

Decision Type B has been applied to this risk under the Guidance on Risk Related Decision Making (Oil and Gas UK, 2014). This reflects the complexity of the risk, the higher potential consequence and stakeholder implications should the event be realised. To align with this decision type, a further level of analysis has been applied using risk-based tools including the bowtie methodology (described in Section 2.7.3) and hydrocarbon spill trajectory modelling. Company and societal values were also considered in the demonstration of ALARP and acceptability, considered through internal reviews, and stakeholder consultation (Section 5).

A loss of control of a suspended load is considered an MEE (MEE-05). The hazard associated with this MEE is the hydrocarbon inventory of flowlines and risers, or topsides process and non-process hydrocarbons.

Quantitative Spill Risk Assessment

The credible worst-case hydrocarbon scenario for MEE-02 is considered to apply to a loss of control of suspended load, as they may credibly arise from damage to hydrocarbon containing subsea infrastructure within the 500 m PSZ. A quantitative spill risk assessment was not conducted for the topsides loss of containment scenario due to the relatively small credible release volume. Potential escalation events are considered and previously discussed in Section 6.8.5 Loss of Structural Integrity.

Likelihood

In accordance with the Woodside Risk Matrix a likelihood rating of "Highly Unlikely" is assigned for potential environmental consequences from loss of containment events caused by dropped objects. Formal safety assessment studies considered the frequency of dropped objects from platform into sea with potential impaction to flowline or export pipeline being limited to 1.0E-05 per year, or 1 in 100,000 years. This aligns with an experience-based likelihood assessment as it 'has occurred once or twice in the industry' and is considered appropriate also for hydrocarbon release from topsides equipment to the marine environment and atmosphere, due to the nature of topsides infrastructure, containment storage design and locations, and lifting protocols in place.

Consequence

The spatial extent and fate (including weathering) of the spilled hydrocarbons were considered during the impact assessment for a loss of control of suspended load. These considerations were informed primarily by the outputs from the numerical modelling studies undertaken by RPS, available information on environmental sensitivities that may credibly be impacted in the event of a worst-case spill, and relevant literature and studies considering the effects of hydrocarbon exposure. Refer to Section 6.8.4 (MEE-02) and Section 6.9.2 for a description of the consequence potentially resulting from subsea and topsides loss of containment scenarios, respectively – as applicable worse-case outcomes from loss of control of suspended load events.

Benthic Disturbance

In the unlikely event of an object being dropped into the marine environment, potential environmental effects would be limited to slight physical impacts on benthic communities. In most cases, objects will be able to be recovered and therefore these impacts will also be temporary in nature. However, there may be instances where objects are unable to be recovered due to health and safety, operational constraints or other factors such as the difficulty of recovering dropped objects at depth. When dropped objects are unable to be recovered, the impact will continue to be slight but permanent.

MEE-05 Loss of Control of Suspended Load from Platform – Risk Analysis

A bowtie risk analysis was undertaken to assess MEE-05; refer to the below figures for bowtie diagrams that were an output of Woodside's risk analysis process.

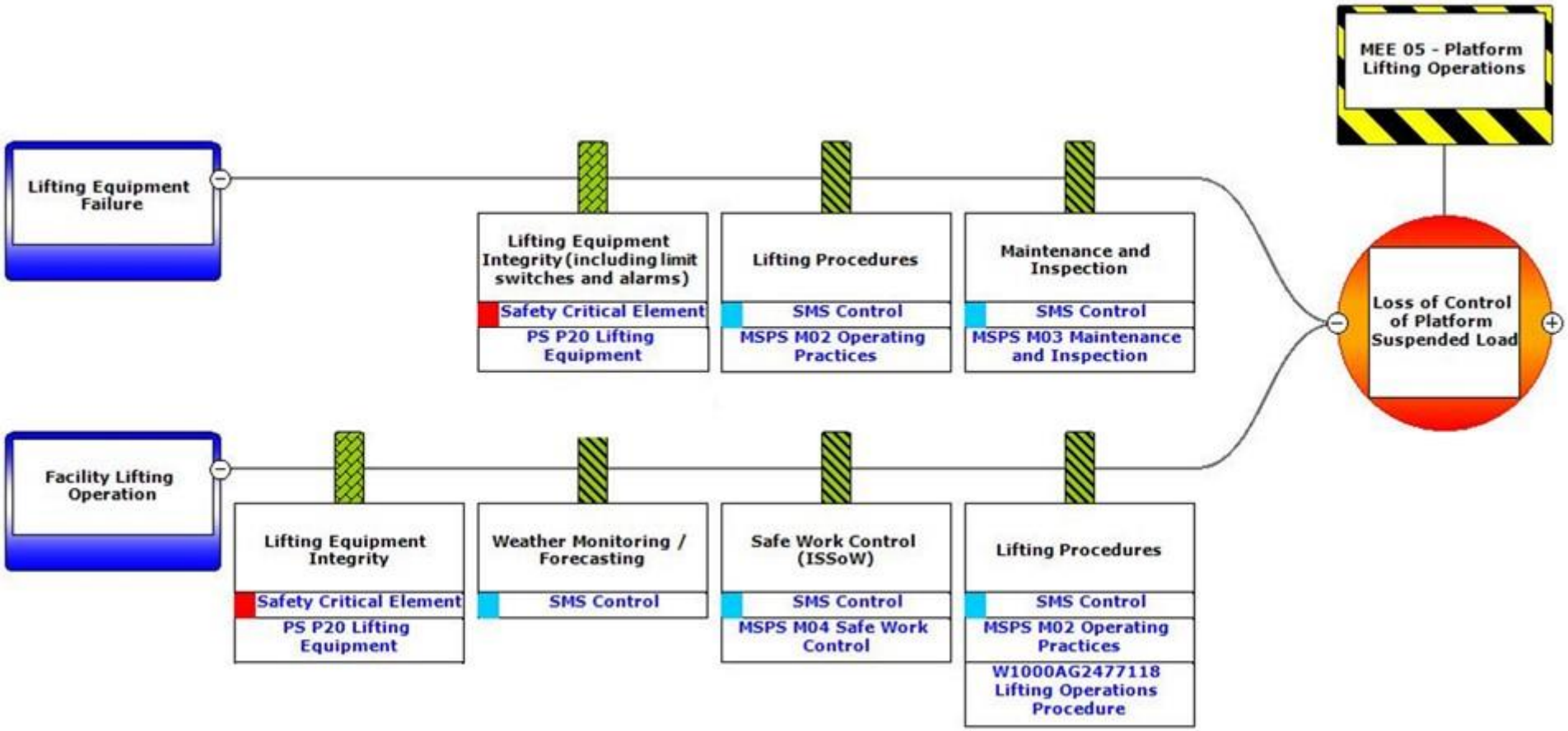

Figure 6-30: MEE 05 Loss of control of suspended load (Causes 1–2)

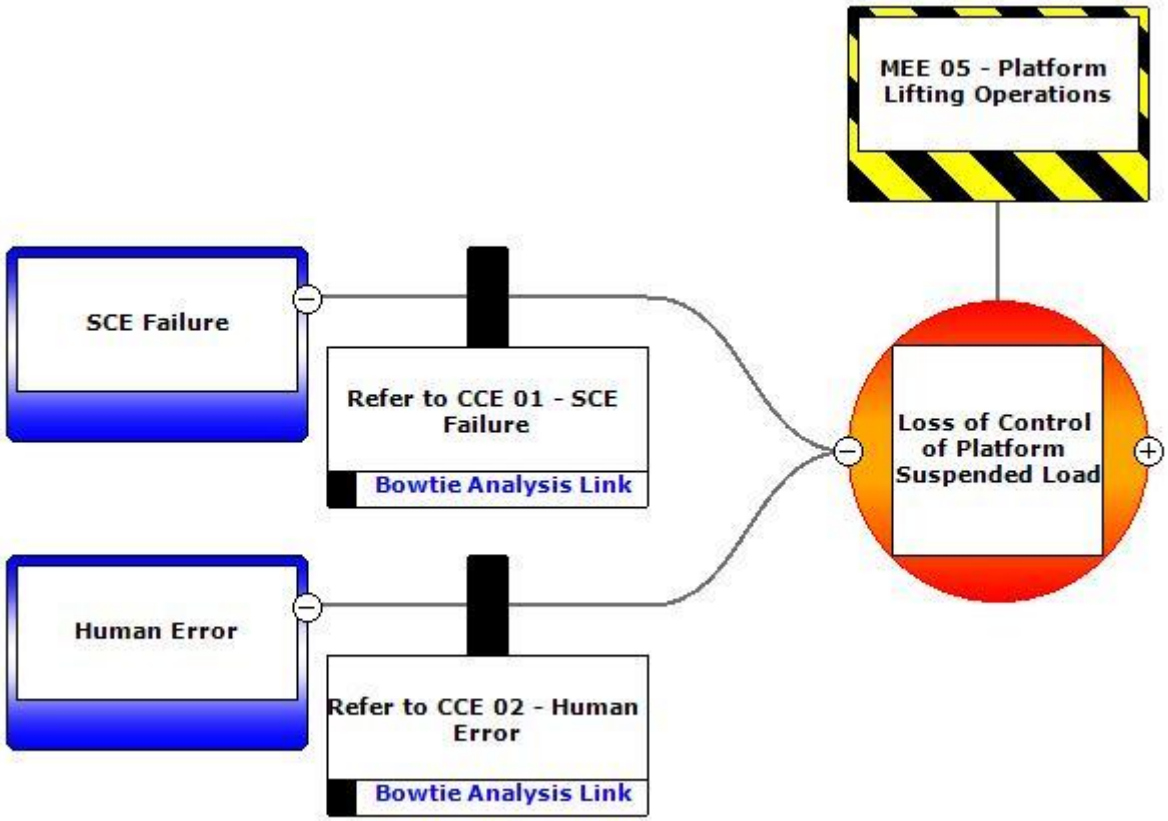

Figure 6-31: MEE 05 Loss of control of suspended load (Causes 3–4)

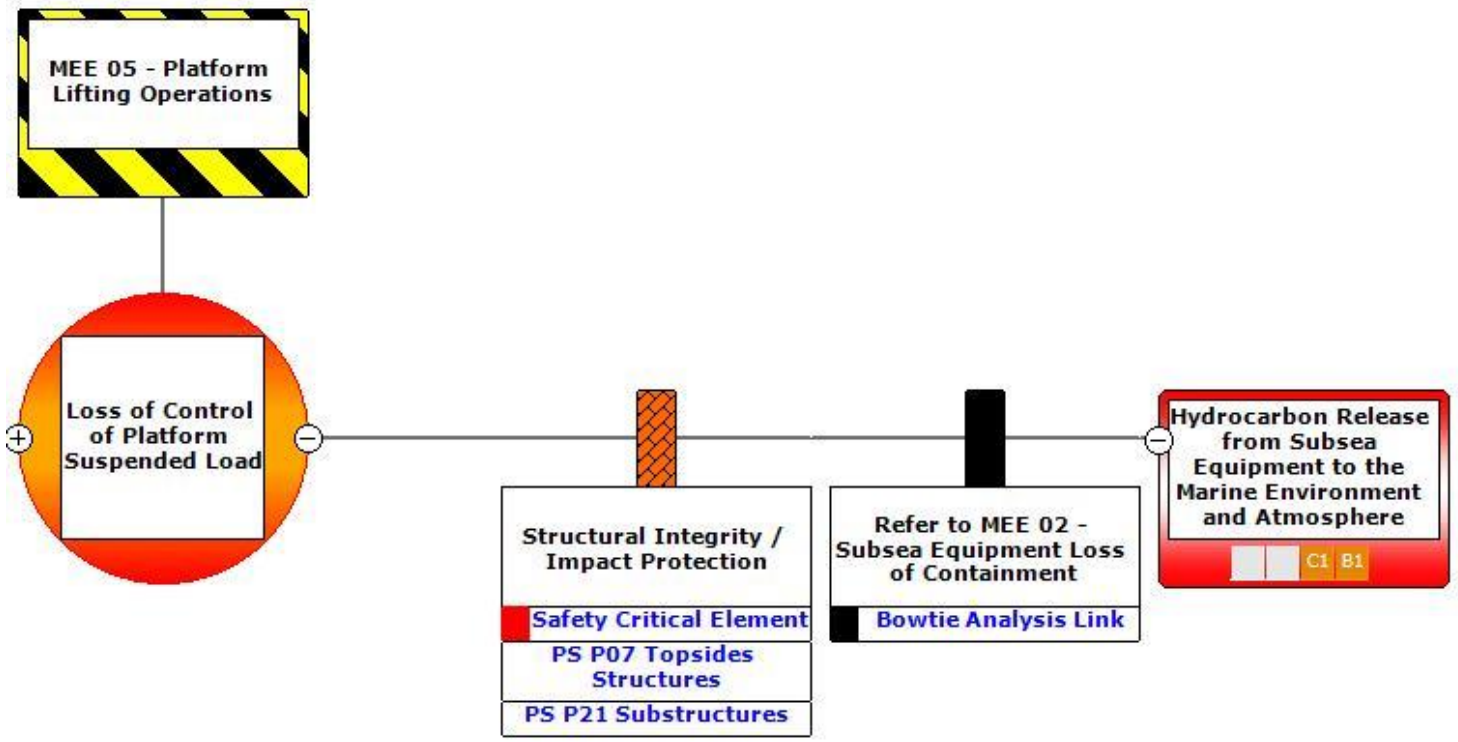

Figure 6-32: MEE-05 Loss of control of suspended load (outcomes)

MEE-05 Loss of Control of Suspended Load from Platform – Demonstration of ALARP ALARP Control Measures				
Hierarchy	***Control/Barrier***	***SCE/Management System Reference***	***Type of Effect***	***Control Adopted***
Preventative Barriers – Safety and Environmental Critical Elements				
Elimination	N/A	No elimination or substitution controls were identified beyond those incorporated in design.		
Substitution				
Engineering Controls	Maintaining platform lifting equipment to prevent platform lifting equipment failure or dropped/swinging loads that could result in an MEE.	P20 – Lifting Equipment (including cranes)	Prevention (Technical)	Yes C 17.1
Mitigating Barrier – Safety and Environmental Critical Elements				
Impact Protection	Maintaining structural integrity to ensure availability of critical systems during a major accident or environment event, and prevent structural failures from contributing to escalation of an MEE.	P07 – Topsides Structures P21 – Substructures	Reduction (Technical)	Yes C 15.1
Legislation Codes and Standards				
Procedures and Administration	OPGGS (Safety) Regulations 2009: Accepted Safety Case for the facility to: • identify hazards that have the potential to cause an MAE • detail assessment of MAE risks • describe the physical barriers SCEs and the safety management systems identified as being required to reduce the risk to personnel associated with an MAE to ALARP, thus contributing to management of associated potential environmental consequences of MAEs.	Pluto A Operations Safety Case	Prevention (Administration) Control based on legislative requirements – must be adopted	Yes C 14.4
Procedures and Administration	Incident reports are raised for unplanned releases within event reporting system.	Woodside Health, Safety and Environment Event Reporting and Investigation Procedure	Prevention/Mitigation (Administration) Control based on legislative requirements – must be adopted	Yes C 13.5
Management System Specific Measures: Key Standards or Procedures				
Procedures and Administration	Implement management systems to maintain: • MSPS 03 – Maintenance and inspections • MSPS 04 – Safe work control	MSPS M03 – Maintenance and inspections MSPS M04 – Safe work control Lifting Operations Procedure	Prevention (Administration)	Yes – See Section 7 Implementation Strategy

MEE-05 Loss of Control of Suspended Load from Platform – Demonstration of ALARP ALARP Control Measures				
Hierarchy	***Control/Barrier***	***SCE/Management System Reference***	***Type of Effect***	***Control Adopted***
	• Procedures – Lifting Operations.			

Risk Based Analysis

For risks identified as MEEs, a detailed risk-based Bowtie Analysis (as outlined in Section 2.7.3) has been used to identify, analyse and demonstrate that controls in place reduce the risk associated with each MEE to ALARP. Controls have been selected following hierarchy of control principles and consider independence of each barrier and their type of effect in controlling the hazardous event.

Application of Woodside's Risk Management Procedures and implementation of the Pluto A Operations Safety Case and Pluto Export Pipeline Safety Case ensures the continuous identification of hazards, systematic assessment of risks and ongoing assessment of alternative control measures to reduce risk to ALARP, which includes:

- ongoing hazard identification, risk assessment and the identification of control measures
- ongoing integrity management of hardware control measures in accordance with the operational performance standards which define requirements to be suitably maintained, such that they retain effectiveness, functionality, availability and survivability.

For each SCE, detailed requirements for equipment functionality, availability, reliability and survivability are incorporated into SCE Performance Standards which also include the relevant assurance tasks (e.g., inspection, maintenance, testing and monitoring requirements) to ensure technical integrity.

A bowtie analysis quantitative spill risk assessment was undertaken to assess MEE-05.

Company Values

Refer to Section 6.8.4 for a discussion of company values in relation to the pipeline and riser loss of containment scenario.

Societal Values

Refer to Section 6.8.4 for a discussion of societal values in relation to the pipeline and riser loss of containment scenario.

ALARP Statement:

On the basis of the environmental risk assessment outcomes and use of the relevant tools appropriate to the decision type, Woodside considers the adopted controls appropriate to manage the impacts and risks of a highly unlikely likelihood unplanned hydrocarbon release as a result of a loss of control of suspended load.

The principle of inherent safety and environmental protection is based on the prevention of the MEE through design of structural integrity and impact protection, and lifting equipment and standards ensuring the systems are operated within their design envelope through operating practices and assurance through maintenance and inspection. If hydrocarbon loss of containment occurs, mitigation measures are in place to minimise the consequence by limiting the inventory which can be released and implementing remediation.

The controls in place for prevention and mitigation of MEEs are specified and assured through implementing the Safety Case(s) and SCE management procedures, including technical performance standards for SCEs and MSPSs for Safety Critical Procedures.

The application of Woodside Risk Management Procedures, and implementation of the Pluto Export Pipeline and Pluto A Operations Safety Cases ensures the continuous identification of hazards, systematic assessment of risks and ongoing assessment of alternative control measures to reduce risk to ALARP, which includes:

- ongoing hazard identification, risk assessment and the identification of control measures
- ongoing integrity management of hardware control measures in accordance with the SCE technical performance standards which define requirements to be suitably maintained, such that they retain effectiveness, functionality, availability and survivability.

Given the controls in place to prevent and control loss of containment events and mitigate their consequences, alongside procedural control of facility operations, it is considered that MEE risk associated with a loss of control of suspended load is managed to ALARP.

MEE-05 Loss of Control of Suspended Load from Platform – Demonstration of ALARP ALARP Control Measures				
Hierarchy	***Control/Barrier***	***SCE/Management System Reference***	***Type of Effect***	***Control Adopted***
Demonstration of Acceptability				
Acceptability Statement: Loss of suspended load has been evaluated as having a 'moderate' level of risk rating. As per Section 2.2.1., Woodside considers 'moderate' risk ratings as broadly acceptable if the adopted controls are implemented. Due to the consequence associated with MEE-05, Decision Type B has been applied, and ALARP is demonstrated using good industry practice, consideration of company and societal values and risk-based analysis, if legislative requirements are met and societal concerns are accounted for and the alternative control measures are grossly disproportionate to the benefit gained. Acceptability is demonstrated with regard to the oil spill risk considerations as described in Section 6.8.3 (MEE-01) (the considerations include principles of Ecologically Sustainable Development, internal context, external context and other requirements (includes laws, policies, standards and conventions).				

EPOs, EPSs and MC for Pluto Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 17 No release of hydrocarbons to the marine environment due to loss of control of suspended load from platform associated with the Petroleum Activities Program.	**C 17.1** Maintaining platform lifting equipment to prevent platform lifting equipment failure or dropped/swinging loads that could result in an MEE.	**PS 17.1** Integrity will be managed in accordance with SCE Management Procedures (Section 7.4) and SCE Technical Performance Standard(s) to prevent environment risk related damage to SCEs for: • P20 – Lifting equipment (including cranes), to prevent platform lifting equipment failure or dropped/swinging loads that could result in an MEE by maintaining lifting equipment integrity.	**MC 1.16.1** Records demonstrate implementation of SCE Technical Performance Standard(s) and Management of Hardware Controls in the Operate Phase Procedure (Section 7.4.2), in order to achieve the functional objective of the control. Records may include implementation and maintain/assure and manage-change information summarised in Section 7.4.2
	C 15.1 Maintaining structural integrity to ensure availability of critical systems during a major accident or environment event, and prevent structural failures from contributing to escalation of an MEE.	**PS 15.1** Integrity will be managed in accordance with SCE Management Procedures (Section 7.4) and SCE Technical Performance Standard(s) to prevent environment risk related damage to SCEs for: • P21 – Substructures • P07 – Topsides/Surface Structures, to together: • provide and maintain structural integrity to support SCE systems under all design conditions through service life	**MC 2.11.1** Records demonstrate implementation of SCE Technical Performance Standard(s) and Management of Hardware Controls in the Operate Phase Procedure (Section 7.4.2), in order to achieve the functional objective of the control. Records may include implementation and maintain/assure and manage-change

EPOs, EPSs and MC for Pluto Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
		• prevent structural failure from contributing to the escalation of an MEE by providing support/ protection of SCE systems during an emergency event, and/or support containment of environmentally hazardous material.	information summarised in Section 7.4.2
	C 13.5 Incident reports are raised for unplanned releases within event reporting system.	**PS 13.5** Incident reports raised for unplanned releases	**MC 13.5.1** Records demonstrate incident reports raised for unplanned releases
	Mitigation – Emergency and Hydrocarbon Spill Response.	Refer to Appendix H: Oil Spill Preparedness and Response Mitigation Assessment for discussion around the ALARP assessment of controls related to hydrocarbon spill response.	

6.8.8 Major Environmental Events Common Cause Event Failure Mechanisms: Safety and Environmental Critical Element Failure CCE-01 and Human Error CCE-02

This section presents common mode failure causes and controls applicable across MEEs, which are also observed within the bowties of the MEEs discussed within sections above. Controls, EPSs and MCs presented within this section are also considered relevant to MEE 01 to MEE-05.

Pluto: Major Environment Event Datasheet	
MEE Number	All
Hazard Description	Generic SCE Failure
Hazard Description	
Hazard Overview and Scope	
There are a number of causes that contribute to failures of SCEs and other systems that might protect against an MEE. These include: • maintenance errors • defects • electrical supply failure • hydraulic supply failure • adverse environmental conditions. The generic SCE Failure bowtie (Figure 6-33 and Figure 6-34) illustrates the causes, outcomes and the controls in place to manage these failure mechanisms.	
Hazard Management (Bowtie Diagrams)	

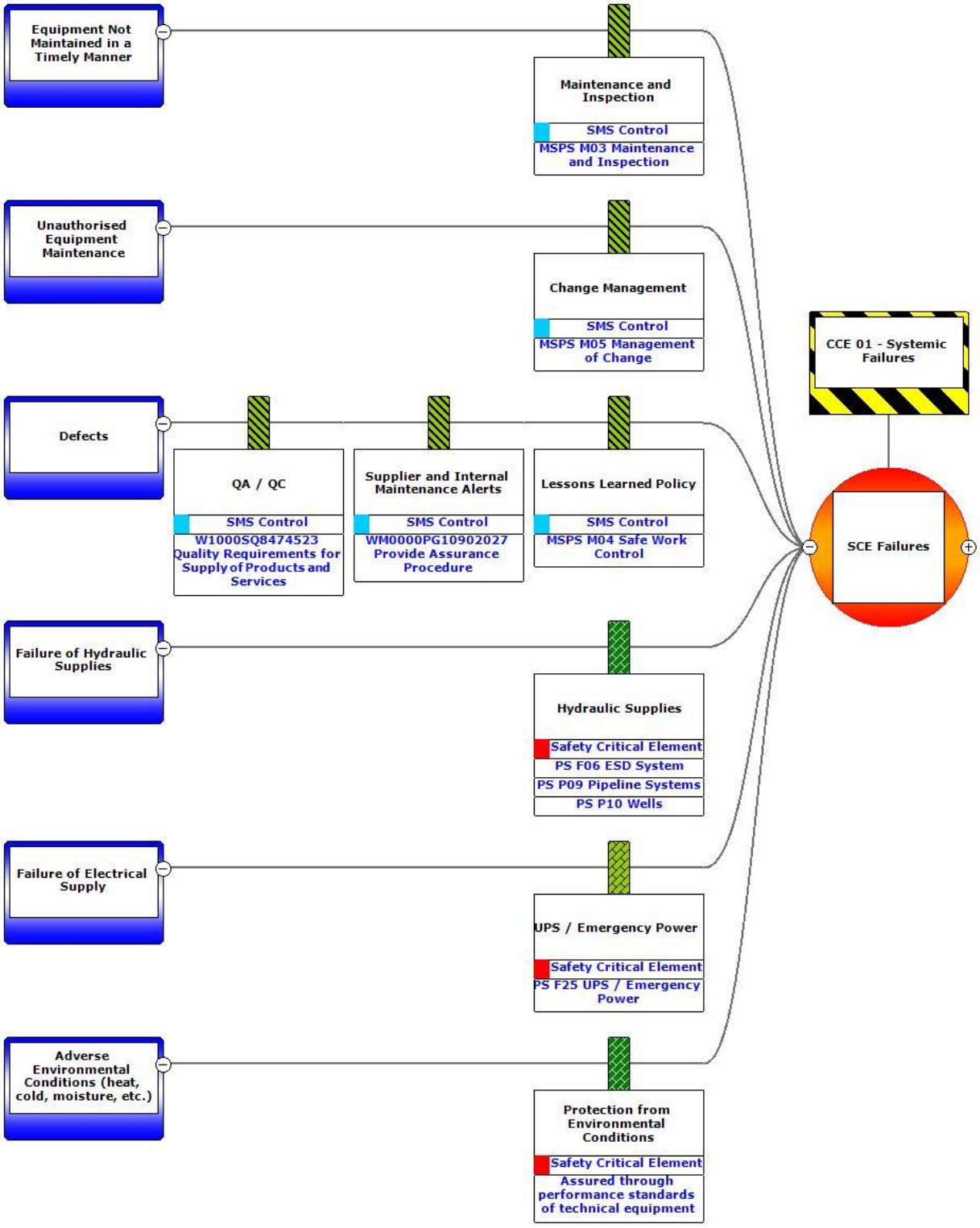

Figure 6-33: CCE 01 Safety critical element failure (causes)

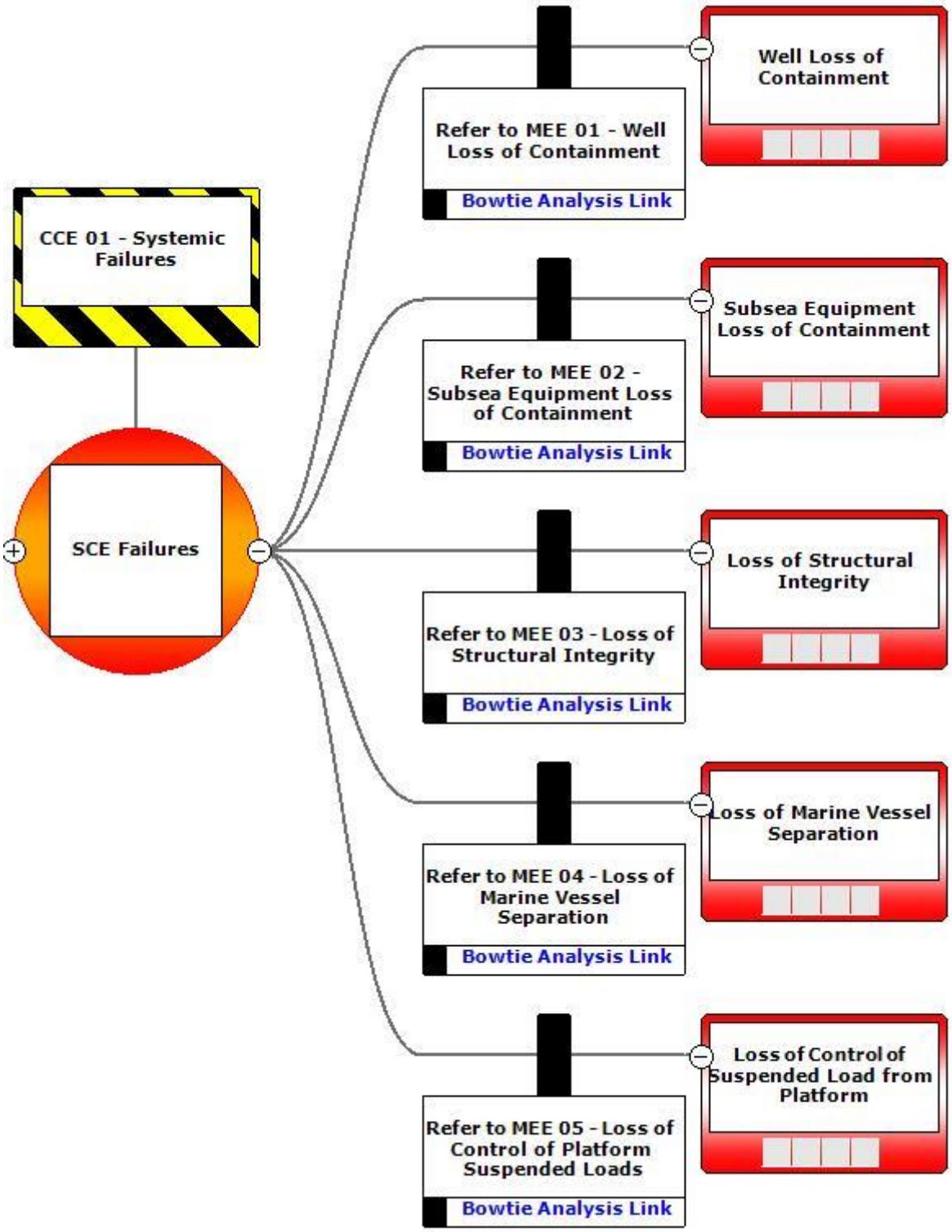

Figure 6-34: CCE 01 Safety critical element failure (outcomes)

CCE-01 Safety Critical Equipment Failure Risk Analysis and Demonstration of ALARP ALARP Control Measures				
Hierarchy	***Control/Barrier***	***SCE/Management System Reference***	***Type of Effect (Refer to Table 6-32)***	***Control Adopted***
Preventative Barriers – Safety and Environmental Critical Elements				
Elimination	Maintain hydraulic supplies (e.g., to support safety instrumented systems and actuation of SCE valves/isolations).	F06 – Safety Instrumented System P09 – Pipeline Systems P10 – Wells	Elimination (Technical)	Yes C 17.3
	Maintain protection from environmental conditions.	P01 – Pressure Vessels P02 – Heat Exchanger P03 – Rotating Equipment P04 – Tanks P07 – Topsides Structures P08 – Piping Systems P09 – Pipeline Systems P10 – Wells P21 – Substructures	Elimination (Technical)	Yes C 17.4
Substitution	N/A.	No elimination or substitution controls were identified beyond those incorporated in design.		
Engineering Controls	Maintain UPS/emergency power system to supply essential safety systems.	F25 – UPS/Emergency Power	Prevention (Technical)	Yes C 17.5
Mitigating Barrier – Safety and Environmental Critical Elements				
Mitigation	N/A.	No mitigation controls were identified beyond those incorporated in design.		
Legislation Codes and Standards				
Procedures and Administration	Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations 2009: Accepted Safety Case for the Pluto facility to: • identify hazards that have the potential to cause a MAE • detail assessment of MAE risks • describe the physical barriers SCEs and the safety management systems identified as being required to reduce the risk to personnel associated with an MAE to ALARP, thus contributing to management of associated potential environmental consequences of MAEs.	Pluto A Operations Safety Case and Pluto Export Pipeline Safety Case	Prevention (Administration) Control based on legislative requirements – must be adopted	Yes C 14.4

CCE-01 Safety Critical Equipment Failure Risk Analysis and Demonstration of ALARP ALARP Control Measures				
Hierarchy	***Control/Barrier***	***SCE/Management System Reference***	***Type of Effect (Refer to Table 6-32)***	***Control Adopted***
Management System Specific Measures: Key Standards or Procedures				
Procedures and Administration	Implement management systems to maintain: • MSPS 03 Maintenance and Inspection • MSPS 04 Safe Work Control • MSPS 05 Management of Change • Quality Requirements for Supply of Products and Service • Provide Assurance Procedure.	MSPS-03 – Maintenance and Inspection MSPS-04 –Safe Work Control MSPS-05 – Management of Change Provide Assurance Procedure	Prevention (Administration)	Yes – See Section 7 Implementation Strategy
Risk Evaluation				
Refer to MEEs.				

CCE-01 Safety Critical Element Failure Performance Outcomes, Standards and Measurement Criteria			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
Refer to relevant MEE EPOs: **EPOs 13–17**	**C 17.3** Maintain hydraulic supplies (e.g., to support Safety Instrumented Systems and actuation of SCE valves/isolations).	**PS 17.2** Integrity will be managed in accordance with SCE Management Procedures (Section 7.4) and SCE Technical Performance Standard(s) to prevent environment risk related Damage to SCEs for: • F06 – Safety Instrumented System • P09 – Pipeline Systems • P10 – Wells, to together maintain hydraulic supplies to support Emergency Shutdown Systems and actuation of SCE valves/isolations.	**MC 1.16.1** Records demonstrate implementation of SCE Technical Performance Standard(s) and Management of Hardware Controls in the Operate Phase Procedure (Section 7.4.2), in order to achieve the functional objective of the control. Records may include implementation and maintain/assure and manage-change information summarised in Section 7.4.2
	C 17.4 Maintain protection from environmental conditions.	**PS 17.4** Integrity will be managed in accordance with SCE Management Procedures (Section 7.4) and SCE Technical Performance Standard(s) to prevent environment risk related Damage to SCEs for: • P01 – Pressure Vessels	**MC 1.16.1** Records demonstrate implementation of SCE Technical Performance Standard(s) and Management of Hardware Controls in the Operate Phase Procedure (Section

CCE-01 Safety Critical Element Failure Performance Outcomes, Standards and Measurement Criteria			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
		• P02 – Heat Exchanger • P03 – Rotating Equipment • P04 – Tanks • P07 – Topsides/Surface Structures • P08 – Piping Systems • P09 – Pipeline Systems • P10 – Wells • P21 – Substructures, for each SCE to protect equipment from adverse environmental conditions (e.g., heat, cold, moisture, chemical reaction/ incompatibility).	7.4.2), in order to achieve the functional objective of the control. Records may include implementation and maintain/assure and manage-change information summarised in Section 7.4.2
	C 17.5 Maintain UPS/emergency power system to supply Essential safety systems.	**PS 17.5** Integrity will be managed in accordance with SCE Management Procedures (Section 7.4) and SCE Technical Performance Standard(s) to prevent environment risk related Damage to SCEs for: • F25 – UPS/emergency power, to provide continuous supply of power (emergency generation and uninterruptable power supply (UPS) to Essential loads following a total (mains) power failure.	**MC 1.16.1** Records demonstrate implementation of SCE Technical Performance Standard(s) and Management of Hardware Controls in the Operate Phase Procedure (Section 7.4.2), in order to achieve the functional objective of the control. Records may include implementation and maintain/assure and manage-change information summarised in Section 7.4.2
	C 14.4 OPGGS (Safety) Regulations 2009: Accepted Safety Case for the facility.	**PS 14.4** An accepted Safety Case is implemented, and safety notification and reporting is undertaken in accordance with the Regulations (as applicable).	**MC 14.4.1** Acceptance letter from NOPSEMA demonstrates acceptance of the Safety Case. Records demonstrate applicable NOPSEMA notification and reporting.

Pluto: Major Environment Event Datasheet	
MEE Number	All
Hazard Description	Generic Human Errors

Hazard Description

Hazard Overview and Scope

There are a number of causes of human errors which contribute to MEEs, or which can result in failure or degradation of the barriers in place to protect against MEEs. These are presented in the following bowtie pages and include:

- task issues; e.g., poor task design; time pressures, task complexity
- poor physical interfaces/working environment
- provision of inappropriate tools for the task
- communication errors; i.e., poor-quality information, lack of clarity in instructions
- operator failings; e.g., competence, fitness, impairment or fatigue
- organisational issues; e.g., peer pressure, poor safety culture, inadequate supervision, lack of clarity on roles and expectations.

The generic Human Error bowtie illustrates the causes, outcomes and the barriers in place for these failure mechanisms. Human Errors are managed solely via the WMS (no SCEs) and the bowtie is included in this section for completeness. Refer to Section 7 Implementation Strategy for applicable WMS procedures.

Hazard Management (Bowtie Diagrams)

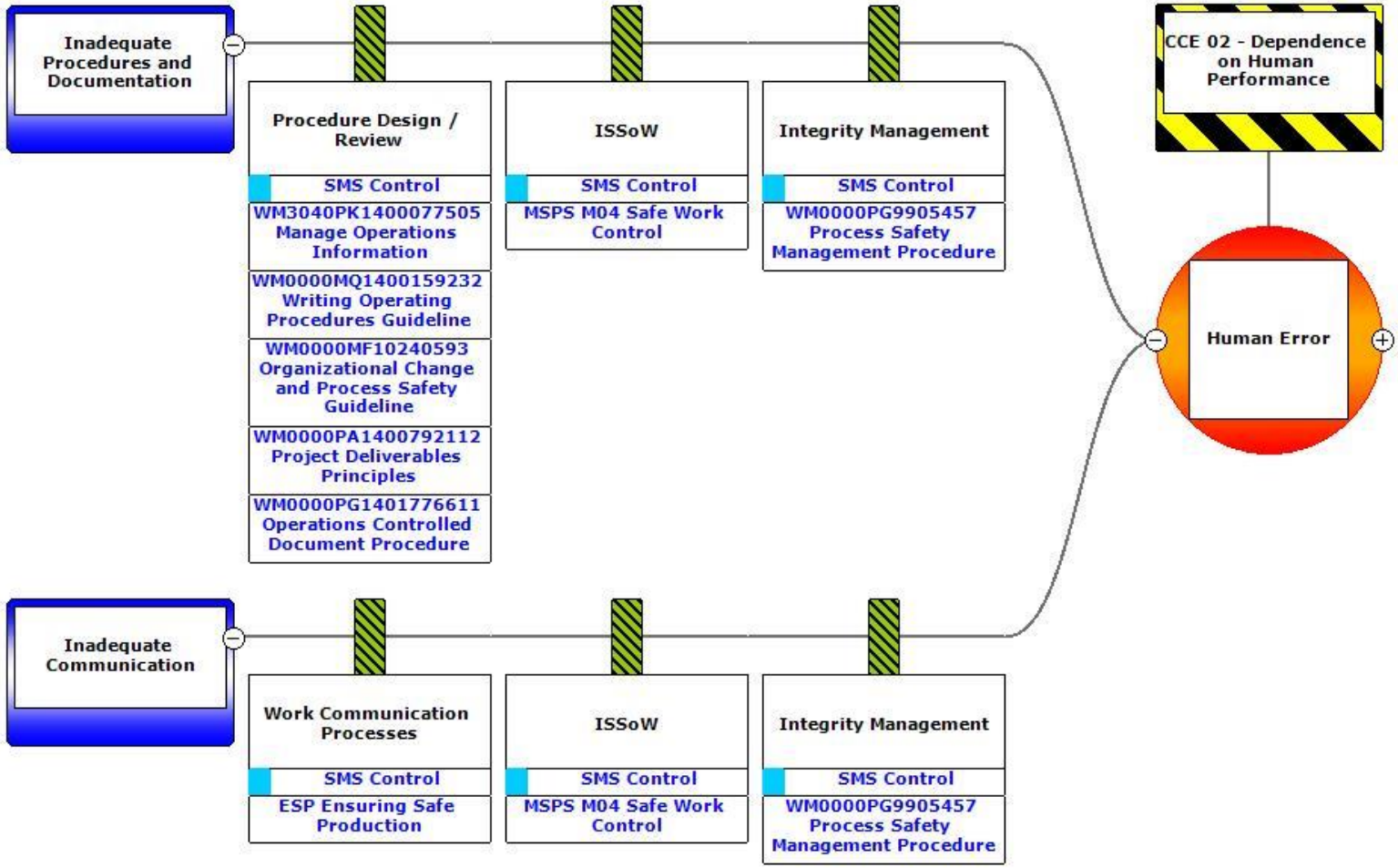

Figure 6-35: CCE-02 Human errors (Causes 1–2)

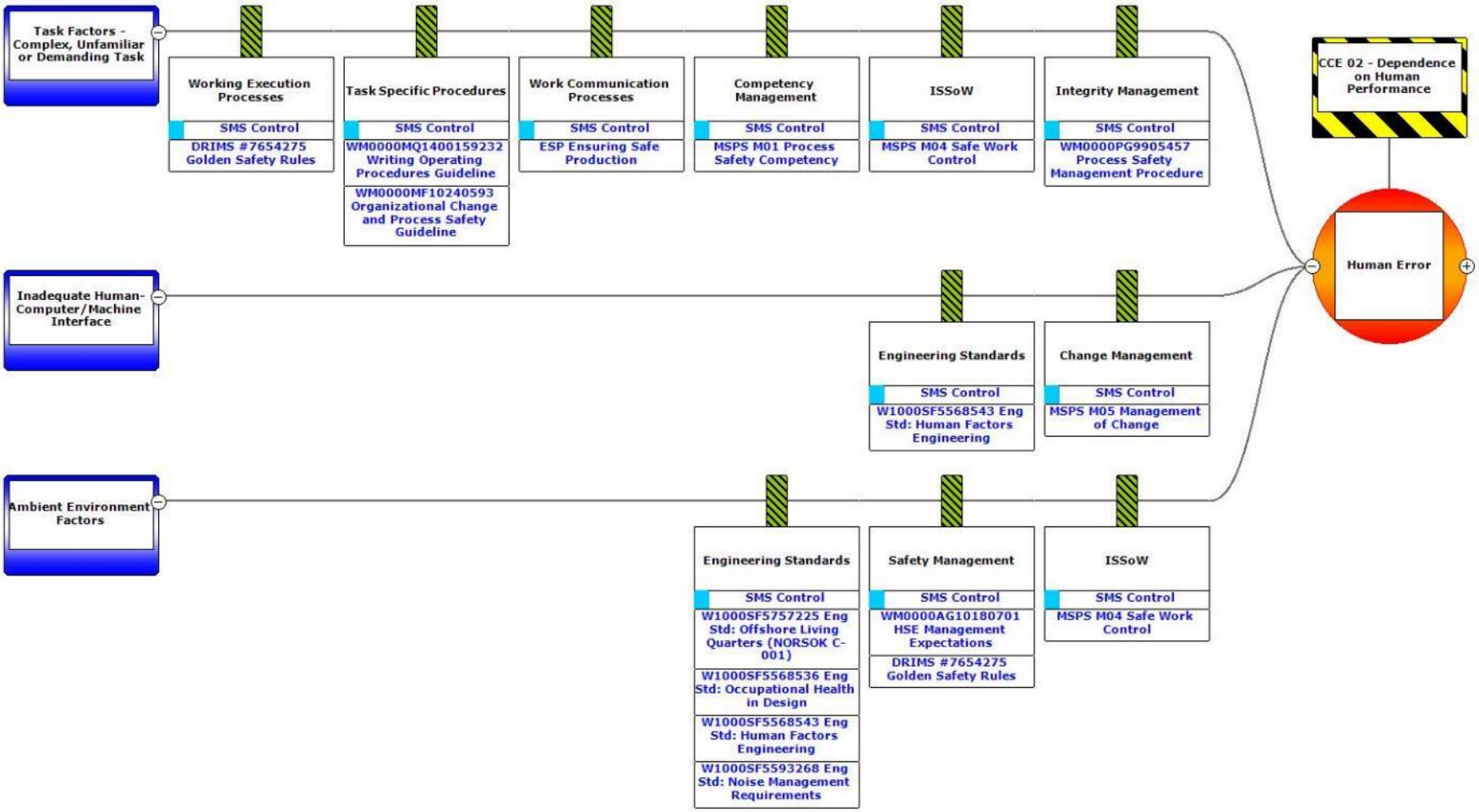

Figure 6-36: CCE-02 Human errors (Causes 3–5)

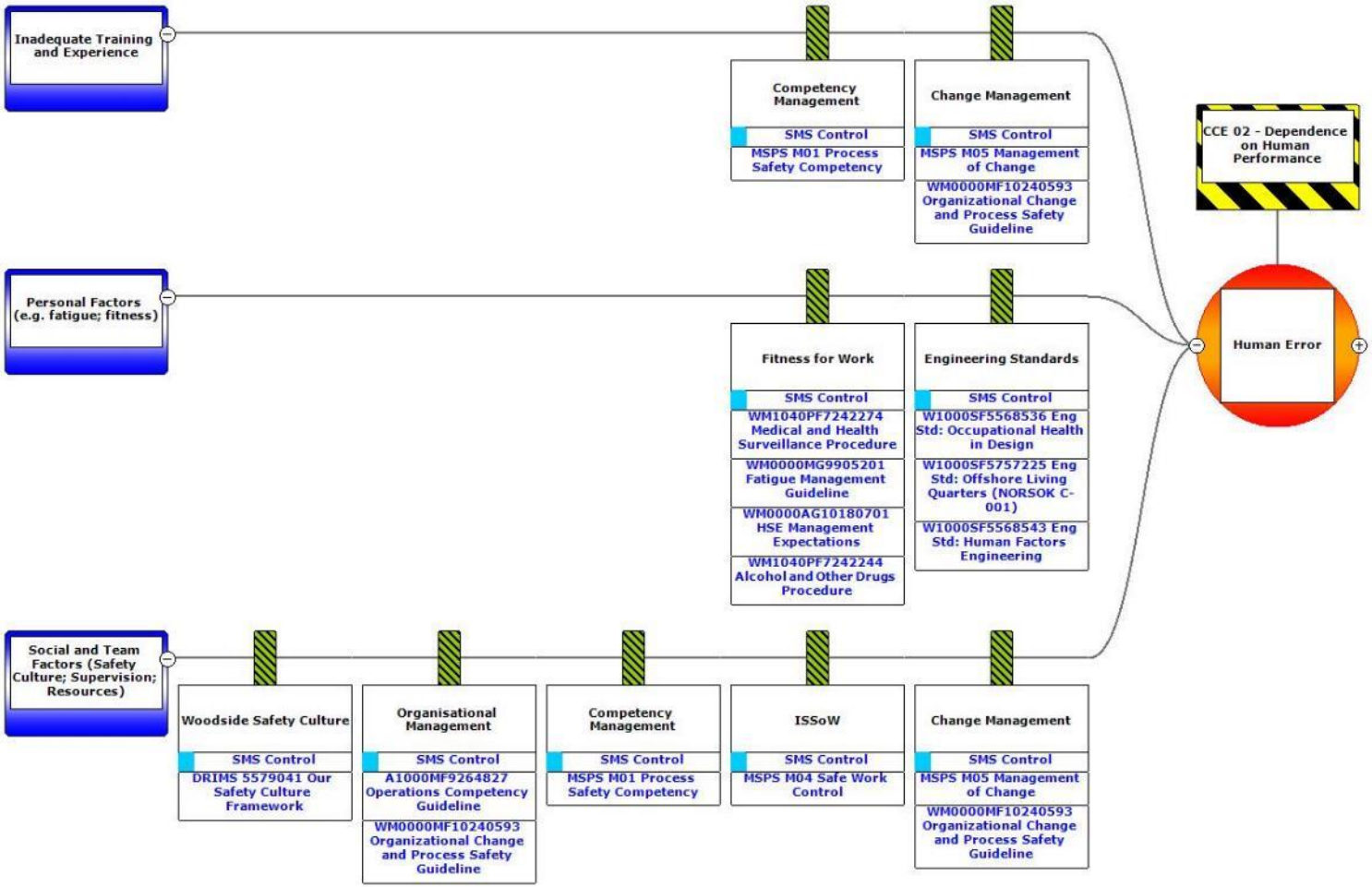

Figure 6-37: CCE-02 Human errors (Causes 6–8)

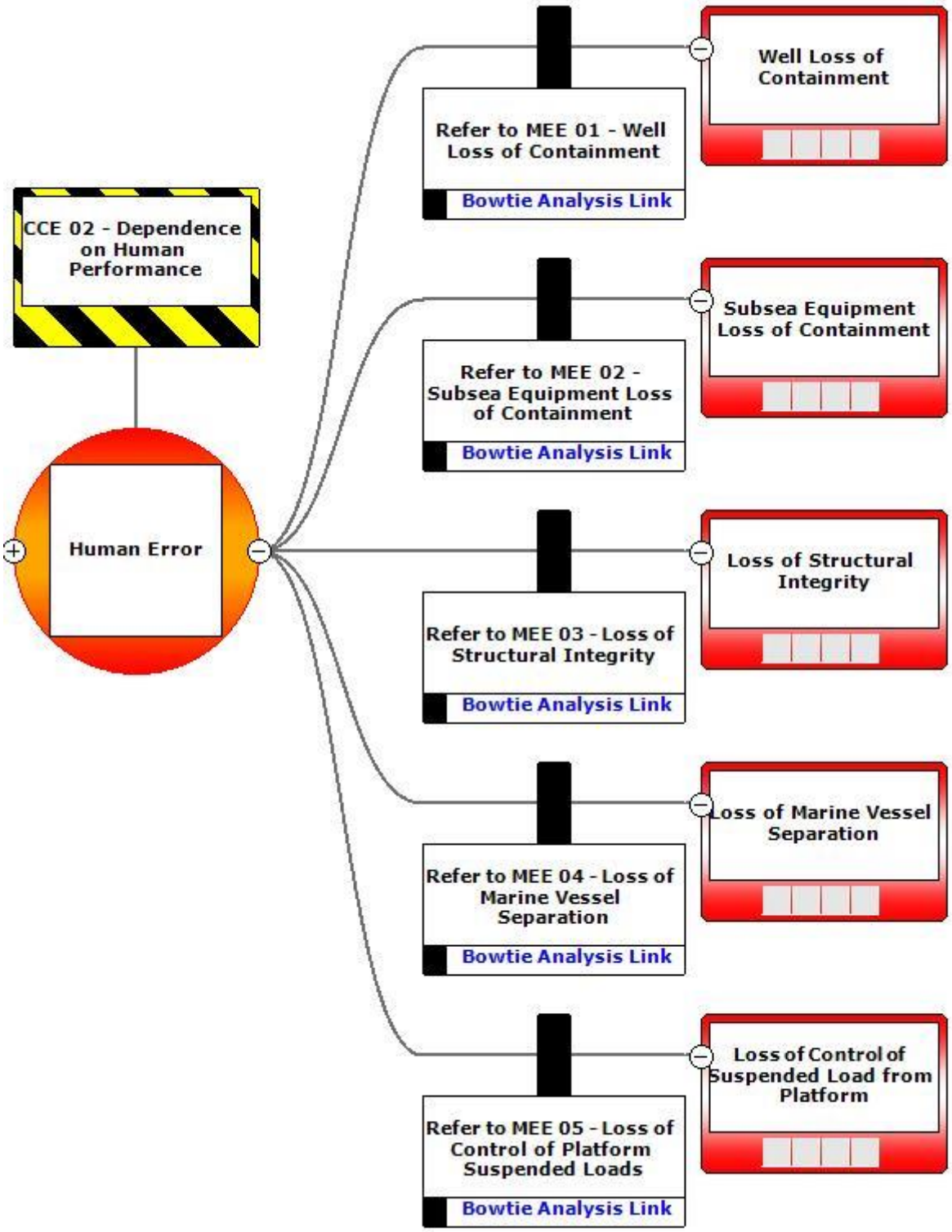

Figure 6-38: CCE-02 Human errors (outcomes)

6.9 Unplanned Events (Accidents, Incidents, Emergency Situations)

6.9.1 Unplanned Hydrocarbon Release: Loss of Well Containment during Drilling of Xena-03

Context		
Xena-03 Drilling and Tie-back Activities – Section 3.11	Physical Environment – Section 4.4 Habitats and Biological Communities – Section 4.5 Protected Species – Section 4.6 Protected Places – Section 4.8 Socio-economic Environment – Section 4.9	Consultation – Section 5

Impacts and Risks Evaluation Summary

Source of Risk	***Environmental Value Potentially Impacted***						***Evaluation***						
	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/Habitat	Species	Socio-economic	Decision Type	Consequence / Impact	Likelihood	Risk Rating	ALARP Tools	Acceptability	Outcome
Loss of hydrocarbons to marine environment due to loss of well containment during drilling of the Xena-03 well	x	x	x	x	x	x	B	B	1	M	LCS GP PJ RBA CV SV	Acceptable if ALARP	EPO 18

Description of Source of Risk

Woodside has identified a subsea well blowout as the scenario with the worst-case credible environmental outcome as a result of loss of well containment (LOWC) during drilling of the Xena-03 well. A LOWC is an uncontrolled release of reservoir hydrocarbon and/or other well fluids to the environment. A blowout is an incident where formation fluid flows out of the well or between formation layers after all the predefined technical well barriers (e.g. the blow out preventer [BOP]) or activation of the same has failed. Woodside has identified one well blowout scenario:

- well blowout – full reservoir open to flow in the 9-7/8" hole section.

The LOWC MEE scenario from all Pluto wells during operations is considered separately.

Industry Experience

A risk assessment by AMSA of oil spills in Australian ports and waters (Det Norske Veritas, 2011) concluded that:

- overall national exceedance frequency for oil spills from offshore drilling in Australia is 0.033 for spills >1 tonne/year decreasing to 0.008 for spills >100 tonnes/year
- probability of a blow-out from a well intervention is 1 x 10-4 (0.0001, or 0.01%), considerably lower than drilling activities (International Association of Oil and Gas Producers, 2010).

Woodside has a good history of implementing industry standard practice in well design and construction. In the company's history, it has not experienced any well containment events that have resulted in significant releases or significant environmental impacts.

Credible Scenario – Loss of Well Containment

The credible worst-case scenario to be considered during drilling of the Xena-03 well is an uncontrolled subsea release to environment lasting <64 days. This timeframe has been selected because:

- the Mutual Aid Memorandum of Understanding informed a likely relief well drilling and response time following the Montara well loss of containment in 2009 (77 days)
- internal Woodside guidelines and procedures indicate that appropriate modelling and response times for well based spill scenarios is reservoir-specific, and reliant on drilling times.

Quantitative Hydrocarbon Spill Modelling – Loss of Well Containment During Drilling at Xena-03

Spill modelling was undertaken by RPS (2024a), on behalf of Woodside, to determine the fate of hydrocarbon released from the loss of well containment scenario, based on the Xena condensate characteristics. The modelled release rate provided assumes the worst-case scenario for the largest oil volume release. Modelling considered metocean conditions throughout the year; this was done to inform the determination of consequence of loss of well control during intervention at any time of the year.

Table 6-44: Summary of modelled credible scenario – well blowout

Loss of Well Integrity	
Total discharge[126] at surface	5 days 1880 Sm^3
Total discharge at seabed	59 days 44,751 Sm^3
Water depth	178 m
Fluid	Eris-1 (and Pluto analogues) condensate

Subsea Plume dynamics

The well blowout surface/subsea release that has been modelled forecasts the size of the hydrocarbon droplets that would be released from the well as determined by the OILMAP model. The results of the OILMAP simulation predict that the discharge will generate a cone of rising gas that will entrain the oil droplets and ambient sea water up to the water surface. In the first week, the mixed plume is initially forecast to jet towards the water surface with a vertical velocity of around 12.3 m/s, gradually slowing and increasing in plume diameter as more ambient water is entrained. The diameter of the central cone of rising water and oil at the point of surfacing is predicted to be about 23 m.

Given the discharge velocity and turbulence generated by the expanding gas plume, the release is predicted to generate droplet sizes ranging from approximately 2500 µm to 12,884 µm. The results suggest that beyond the immediate vicinity of the blowout, the majority of the released hydrocarbons will be present in the upper layers of the ocean, with the potential for oil to form floating slicks under sufficiently calm local wind conditions.

The ongoing nature of the release combined with the potential for the plume to breach the water surface may present other hazards, including conditions that may lead to high local concentrations of atmospheric volatiles. These issues should be considered when evaluating the practicality of the response operations at or near the blowout site.

Consequence Assessment

Potential Impacts Overview

EMBA

Quantitative hydrocarbon spill modelling results have been used to define the EMBA (Section 4.1) (see RPS, 2024a for further details).

Surface Hydrocarbons

In the event of the loss of well containment scenario occurring, surface hydrocarbons at or above 1 g/m^2 and 10 g/m^2 are forecast to potentially occur up to 100 km and 25 km respectively from the release site. Floating oil concentrations greater than 10 g/m^2 are predicted to contact Montebello AMP at 2% probability.

Entrained Hydrocarbons

Entrained hydrocarbons at concentrations equal to or greater than the 100 ppb threshold are predicted to be found up to 600 km from the release site. Contact by entrained hydrocarbons at concentrations equal to or greater than 100 ppb is predicted to be greatest at Montebello AMP with 81% probability of hydrocarbon contact and worst-case entrained

[126] The discharge volumes are predicted using reservoir modelling software packages that consider a number of factors (well design, reservoir properties and environmental conditions such as water depth, temperature and pressure) to provide a production profile over the oil spill modelling period.

concentration of 1960 ppb. Several other sensitive receptors are predicted to be contacted at concentrations equal to or greater than 100 ppb include Tryal Rocks (4%), Argo-Rowley Terrace MP (1%), and Gascoyne MP (5%).

Dissolved Hydrocarbons

Dissolved aromatic hydrocarbons at concentrations equal to or greater than the 50 ppb thresholds are predicted to be found up to around 45 km from the release site. Contact by dissolved aromatic hydrocarbons at concentrations equal to or greater than 50 ppb is predicted to be at the Montebello AMP (5%), with a worst-case dissolved concentration of 454 ppb.

Accumulated Hydrocarbons

Shoreline oil concentrations above 10 g/m² are predicted to contact Muiron Islands with 18% probability. No shoreline oil impact is predicted at 100 g/m².

Table 6-45: Key receptor locations and sensitivities potentially contacted above impact thresholds by the loss of well containment scenario during drilling of Xena-03 with summary hydrocarbon spill contact with ≥ 1% probability (table cell values correspond to probability of contact [%])

Environmental Setting	Location/Name	Environmental, Social, Cultural, Heritage and Economic Aspects presented as per the Environmental Risk Definitions (Woodside's Risk Management Procedure)																											Probability of Hydrocarbon Contact and Fate (%) Note: the probability is based on stochastic modelling of 100 hypothetical worst-case spills under a variety of weather and metocean conditions					
		Physical		Biological																				Socioeconomic and Cultural					Socio-cultural EMBA		Ecological EMBA			
		Water Quality	*Sediment Quality*	*Marine Primary Producers*				*Other Communities/Habitats*							*Protected Species*								*Other Species*											
		Open Water (Pristine)	Marine Sediment (Pristine)	Coral Reef	Seagrass Beds/Macroalgae	Mangroves	Spawning/Nursery Areas	Open Water – Productivity/Upwelling	Non-biogenic Reefs	Offshore Filter Feeders and/or Deepwater Benthic Communities	Nearshore Filter Feeders	Sandy Shores	Estuaries/Tributaries/Creeks/Lagoons (including Mudflats)	Rocky Shores	Cetaceans – Migratory Whales	Cetaceans – Dolphins and Porpoises	Dugongs	Pinnipeds (Sea Lions and Fur Seals)	Marine Turtles (Foraging and Internesting Areas and Significant Nesting Beaches)	Sea Snakes	Whale Sharks	Sharks and Rays	Seabirds and/or Migratory Shorebirds	Pelagic Fish Populations	Resident/Demersal Fish	Fisheries – Commercial	Fisheries – Traditional	Tourism and Recreation	Protected Areas / Heritage – European and Indigenous/ Underwater Cultural Heritage	Offshore Oil and Gas Infrastructure (topside and subsea)	Surface Hydrocarbon (1–10 g/m²)	Accumulated Hydrocarbons (10–100 g/m²)	Surface Hydrocarbon (≥10 g/m²)	Entrained Hydrocarbon (≥100 ppb)	Dissolved Aromatic Hydrocarbon (≥50 ppb)	Accumulated Hydrocarbons (>100 g/m²)
Offshore[127]	Argo-Rowley Terrace AMP	✓						✓							✓	✓			✓			✓	✓	✓	✓	✓			✓					1		
	Montebello AMP	✓	✓	✓			✓	✓							✓	✓			✓	✓	✓	✓	✓	✓	✓	✓		✓	✓				2	81	5	
	Ningaloo AMP	✓	✓	✓			✓	✓							✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓							
	Gascoyne AMP	✓	✓												✓	✓			✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓				1		
Reefs, Banks and Shoals	Tryal Rocks	✓	✓	✓			✓	✓		✓		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓					4		

[127] Note: hydrocarbons cannot accumulate on open ocean, submerged receptors, or receptors not fully emergent.

Summary of Potential Impacts to Environmental Values

The potential impacts of spilled hydrocarbons to species (protected and otherwise), marine primary producers, other habitats and communities, water quality, marine sediment quality, air quality, protected areas and socio-economic values are described in Section 6.8.3. Potential impacts specific the loss of well containment during drilling of the Xena-03 well are summarised below.

Marine Mammals

A range of cetaceans were identified as potentially occurring within the Xena-03 Operational Area and wider EMBA (Section **Error! Reference source not found.**). In the event of a LOWC during drilling of Xena-03, surface, entrained, and dissolved hydrocarbons exceeding environmental impact threshold concentrations may drift across habitat for cetacean species. Migratory routes and BIAs of cetaceans considered to be MNES may be affected, including humpback whales and PBW (northbound and southbound migrations). As described in Section **Error! Reference source not found.**, cetaceans that have direct physical contact with surface, entrained, or dissolved aromatic hydrocarbons may suffer surface fouling, ingestion of hydrocarbons (from prey, water and sediments), aspiration of oily water or droplets, and inhalation of toxic vapours (Deepwater Horizon Natural Resource Damage Assessment Trustees [DHNRDT], 2016).

PBW and humpback whales are known to migrate seasonally through the Xena-03 Operational Area, the PAA and the modelled EMBA. Pygmy blue whale migration BIA intersects the Xena-03 Operational Area. A major spill in May to November would coincide with humpback whale migration through the waters off the Pilbara and North West Cape (Section **Error! Reference source not found.**). A major spill in April–August or October would coincide with pygmy blue whale migration (Section 4.6.5). Both pygmy blue and humpback whales are baleen whales, so are most likely to be significantly impacted by toxic effects when feeding. However, feeding during migrations is low level and opportunistic, with most feeding for both species occurring in the Southern Ocean. Fresh hydrocarbons (i.e., typically in the vicinity of the release location) may have a higher potential to cause toxic effects when ingested, while weathered hydrocarbons are considered to be less likely to result in toxic effects. As such, the risk of ingestion of hydrocarbons is low. Pygmy blue whale and humpback whale migrations are protracted through time and space (i.e., the whole population will not be within the EMBA), and as such, a spill from the loss of well integrity is unlikely to affect an entire population.

Coastal populations of small cetaceans and dugongs are known to reside or frequent nearshore waters, including the Ningaloo Coast, Muiron Islands, Montebello/Barrow Islands and Pilbara Southern Island Group which may be potentially impacted by entrained or dissolved hydrocarbons exceeding threshold concentrations in the event of a loss of well containment. The Exmouth Gulf is a known humpback whale aggregation area on the annual southern migration (September to December), as well as overlapping foraging, breeding, nursing and calving BIAs for dugongs (~207 km south of the Xena-03 Operational Area).; therefore, migratory humpbacks moving into the Gulf, or more residential dugongs, may be exposed to entrained or dissolved hydrocarbons above thresholds levels. However, entrained and dissolved hydrocarbons concentrations above the threshold are not expected within Exmouth Gulf itself. No hydrocarbon contact at or above threshold concentrations for the ecological EMBA is expected for Camden Sound, an important calving area for humpback whales.

The potential impacts of exposure are discussed above. However, nearshore populations of cetaceans and dugongs are known to exhibit site fidelity and are often resident populations. Therefore, avoidance behaviour may have greater impacts to population functioning. Nearshore dolphin species (e.g., spotted bottlenose dolphins) may exhibit higher site fidelity than oceanic species, although Geraci (1988) observed relatively little impacts beyond behavioural disturbance. Additional potential environment impacts may also include the potential for dugongs to ingest hydrocarbons when feeding on oiled seagrass stands, or indirect impacts to dugongs due to loss of this food source due to dieback in worst-affected areas.

In summary, a LOWC during drilling of Xena-03 has the potential to result in major long-term impacts to cetacean species and dugongs, with consequence severity dependent on the actual timing, duration and extent of a spill in relation to species' migratory movements and distributions.

Marine Reptiles

The Xena-03 Operational Area is unlikely to represent an important habitat for marine turtles as there is an absence of potential nesting or foraging habitat (i.e., no emergent islands, reef habitat or shallow shoals) and the water is deep (70–130 m). There is the potential for marine turtles to be present at submerged shoals within the EMBA, such as Rankin Bank and Glomar Shoals, however these receptors have a low probability of being contacted by dissolved hydrocarbons only above the threshold concentration (<1%).

An internesting BIA for the flatback turtle overlaps the Xena-03 Operational Area (Section 4.6.2). However, there are significant nesting and foraging sites along the mainland coast and islands of the region, including the Montebello Islands, and a number of BIAs and habitat critical for the survival of marine turtles overlap the EMBA (Section 4.6.2). In particular, the internesting BIAs and habitat critical to the survival of a species for green, loggerhead and hawksbill turtles extend for ~20 km from known nesting locations, and for ~60 km for flatback turtles. It is noted that the drilling of the Xena-03 well is proposed to be undertaken in Q2 2025, indicating species may be present, however avoids the peak nesting period (October to January) (refer to Section 4.6.5). Oil from an ongoing loss of containment could be present during nesting season for all hawksbill, flatback and green turtles depending on the timing of a spill. No floating or accumulated hydrocarbons above ecological threshold concentrations are predicted at shoreline locations,

although the nearshore waters of these turtle habitat areas have a low probability (1 to 2%) of contact with dissolved and/or entrained hydrocarbons.

In summary, a LOWC during drilling of Xena-03 has the potential to result in major long-term impacts to offshore foraging and nesting marine turtles, with consequence severity dependent on the actual timing, duration and extent of a spill in relation to species' migratory movements and distributions.

In general, sea snakes are found in continental shelf waters around offshore islands and potentially submerged shoals (water depths <100 m. Sea snakes may be present in the wider EMBA at the submerged shoals, Rankin Bank and Glomar Shoals, as well as the submerged reefs and shoals of Barrow Island and southern Pilbara islands. Sea snakes may also be present in nearshore waters of the mainland and islands which, along with submerged reefs and shoals, have the potential to be contacted by entrained and/or dissolved hydrocarbons above the threshold concentrations. Their abundance is not expected to by high given the water depth and offshore environment. However, sea snake species in Australia generally show strong habitat preferences (Heatwole and Cogger, 1993); species that have preferred habitats associated with submerged shoals may be disproportionally affects by a hydrocarbon spill affecting such habitat.

Therefore, a loss of well containment during drilling of Xena-03 may have a minor disruption to some individuals in the offshore environment. Population level impacts to sea snake species are not, however, considered credible.

Fish, Sharks and Rays

Shark and ray species may occasionally transit through the area and may potentially be exposed to hydrocarbons from a loss of well containment during drilling of the Xena-03 well, including species such as whale sharks and manta rays. Whale sharks may transit offshore open waters when migrating to and from Ningaloo Reef, where they aggregate for feeding from March to July. Both the Xena-03 Operational Area and the EMBA overlap the whale shark foraging BIA identified in Section 4.6.1. Should sharks or rays be present in offshore waters near the PAA during the spill, direct impacts may occur if foraging within surface slicks or in the upper 20 to 30 m of the water column containing entrained hydrocarbons and dissolved aromatics. Contamination of their food supply and the subsequent ingestion of this prey may also result in long term impacts as a result of bioaccumulation. Impacts are predicted to be limited to a small number of animals given the absence of key habitat and the low numbers of animals that may transit through the area during the short period when spilled hydrocarbons are present.

Seabirds and Migratory Shorebirds

Offshore waters of the PAA are potential foraging grounds for seabirds associated with the coastal roosting and nesting habitat (e.g., Ningaloo, Muiron Islands and the Barrow/Montebello Islands). A breeding BIA for the wedge-tailed shearwater overlaps the Xena-03 Operational Area. Foraging and breeding BIAs for a number of seabirds and migratory shorebirds overlap with the EMBA (Section **Error! Reference source not found.**). A hydrocarbon spill may result in surface slicks disrupting a significant portion of the foraging habitat for seabirds, including foraging BIAs, which are generally associated with breeding habitats. Seabird distributions are typically concentrated around islands, so hydrocarbons near nesting/roosting areas may result in increased numbers of seabirds being impacted, with many species of seabirds, such as the wedge-tailed shearwater and the various species of tern, foraging relatively close to breeding islands/colonies. Potential impacts on seabirds and shorebirds are expected to be major and long-term in the unlikely event of a loss of well control. However, given the volatile and non-persistent nature of the hydrocarbons and lack of shoreline accumulation predicted, the extent of impacts is not expected to result in a threat to the overall viability of seabird or shorebird populations in the wider region.

Other Habitats, Species and Communities

There is potential for plankton communities to be impacted where entrained hydrocarbon threshold concentrations are exceeded due to a loss of well containment during drilling of the Xena-03 well. A range of lethal and sublethal impacts may occur to plankton exposed to entrained or dissolved hydrocarbons within the EMBA. Communities are expected to recover quickly (weeks/months) due to high population turnover (ITOPF, 2011). It is therefore considered that any potential impacts would be low magnitude and temporary in nature.

Pelagic fish populations in the open water offshore environment of the EMBA are highly mobile and have the ability to move away from a marine diesel spill. It is therefore unlikely that fish populations would be exposed to widespread hydrocarbon contamination. Pelagic fish populations are distributed over a wide geographical area so impacts on populations or species level are considered to be limited. Combined with these factors and the rapid dispersion of condensate, it is considered that any potential impacts will be minor.

Other communities (e.g., demersal fish, benthic infauna and epifauna) and key sensitivities (e.g., KEFs identified in Section 4.7) occur within the EMBA and may potentially be exposed to entrained hydrocarbons from a loss of well containment.

Water Quality

It is likely that water quality will be reduced at the release location of the spill; however, such impacts to water quality would be temporary and localised in nature due to the rapid dispersion and weathering of condensate. The potential impact is therefore expected to be low.

Protected Areas

Entrained and/or dissolved hydrocarbons at or exceeding the 100 ppb and 50 ppb threshold, respectively, have a low probability of contacting the Argo-Rowley Terrace AMP, Montebello AMP, Gascoyne AMP and Ningaloo AMP and

WHA. Entrained and dissolved hydrocarbons are only predicted within the surface waters of the deep open waters of these protected areas, with no contact to seabed habitats or to shoreline contact. Potential impacts to water quality and the natural values (e.g., mobile protected species) in these areas would be temporary and localised in nature due to the rapid dispersion and weathering of the condensate, as described above. Visible surface hydrocarbons (at or exceeding 1 g/m² are not predicted to reach any protected areas.

Socio-economic

A spill resulting from a loss of well containment during drilling of the Xena-03 well is considered unlikely to cause significant direct impacts on the target species fished by Commonwealth State active fisheries identified in Section 4.10.1 which overlap with the EMBA. The fisheries management areas that overlap with the EMBA are predominantly for demersal fish species (demersal finfish and crustaceans) that inhabit waters in the range of >60 to 200 m depth, or pelagic species which are highly mobile. Therefore, a spill from a loss of well control is expected to only result in negligible impacts, considering that hydrocarbons are confined to the upper layers of the water column beyond the immediate area of the spill. Visible surface hydrocarbons at or exceeding 1 g/m² may also occur up to 100 km from the release site, which may result in fouling of fishing gear and a perception of impacts to fish stocks by fisheries stakeholders and the public. There is the potential that a fishing exclusion zone would be applied in the area of the spill, which would put a temporary ban on fishing activities and therefore potentially lead to subsequent economic impacts on commercial fishing operators if they were planning to fish within the area of the spill. Such measures would likely be in place for less than a week and would not result in widespread or long term impacts to fishing activities.

Cultural Heritage

There are a number of historic shipwrecks identified within the EMBA, but none identified within 50 km of the PAA (Section 4.10).

The modelling results do not predict surface slicks contacting the identified wrecks, and the majority of entrained hydrocarbons are expected to occur close to the surface. However, shipwrecks in the subtidal zone could be exposed to entrained and dissolved hydrocarbons. Marine life that shelter and take refuge in and around these wrecks may be affected by in-water toxicity of dispersed hydrocarbons. The consequences of such hydrocarbon exposure may include large fish species moving away and resident fish species and sessile benthos such as hard corals exhibiting sub-lethal and lethal impacts (which may range from physiological issues to mortality).

Within the wider EMBA are several designated heritage places (Section 4.10). These places are also covered by other designations such as WHA. Potential impacts are discussed in the sections above.

Summary of Potential Impacts to Environmental Values

In the highly unlikely event of a major hydrocarbon spill due to a loss of well containment during drilling of the Xena-03 well, the EMBA includes AMPs as well as other sensitive marine environments and associated receptors of the Muiron Islands, Ningaloo Coast, Rankin Bank, Montebello/Barrow Islands and the Pilbara Southern Islands Group. Long term impacts may occur at these locations, including socio-cultural effects as a result of a major spill of condensate from drilling activities within the PAA.

Given the adopted controls, the overall risk rating for an unplanned hydrocarbon due to a loss of well containment during drilling of the Xena-03 well is Moderate based on a Major consequence (long-term impact (10–50 years) on highly valued ecosystem, species, habitat or physical or biological attributes, or to a community, social infrastructure or highly valued area/item of cultural significance), and a remote likelihood.

Demonstration of ALARP

Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[128]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Legislation, Codes and Standards				
OPGGS (Resource Management and Administration) Regulations 2011: accepted WOMP which describes the well design and barriers to be used to prevent a loss of well integrity, which aligns with specifically: • All zones with flow potential penetrated by	F: Yes. CS: Minimal cost. Standard practice.	Compliance with an accepted WOMP will ensure a number of barriers are in place and verified, reducing the likelihood of a loss of well integrity event occurring. Although the consequence of a blowout would not be reduced, the reduction	Controls based on legislative requirements – must be adopted.	Yes C 10.4

[128] Qualitative measure

the well bore, containing hydrocarbons, shall be isolated from the surface environment by a minimum of two barriers (primary and secondary). The barriers shall: • be effective over the lifetime of well construction and abandonment • (fluid barriers) remain monitored and provide sufficient pressure to counter pore pressure during well construction and abandonment • (cementing barriers, including conductor, casing and liners) conform to the relevant minimum standards set out in the Woodside Barrier Standard. Verification: • Effectiveness of primary and secondary barriers shall be verified (physical evidence of the correct placement and performance) during the permanent plugging of the well (if required).		in likelihood reduces the overall risk.		
As-built checks shall be completed during well operations to establish a minimum acceptable standard of well integrity is achieved.	F: Yes. CS: Minimal cost. Standard practice.	Reduces the likelihood of occurrence. No reduction in consequence will occur.	Benefits outweigh cost/sacrifice.	Yes C 10.5
Incident reports are raised for unplanned releases within event reporting system.	F: Yes. CS: Minimal cost. Standard practice.	Requirement based on Woodside Health, Safety and Environment Event Reporting and Investigation Procedure.	Control based on Woodside Standard – must be adopted.	Yes C 13.5
In the event of a spill, emergency response activities implemented in accordance with the Xena-03 Tie-Back Oil Pollution First Strike Plan.	F: Yes. CS: Costs associated with implementing response strategies, vary dependant on nature and scale of spill event. Standard practice.	This control would not reduce the likelihood, but response activities may reduce the consequence.	Benefits outweigh cost/sacrifice.	Yes C 18.1
Arrangements supporting the activities in the	F: Yes.	Testing the Xena-03 Tie-Back Oil Pollution	Benefits outweigh cost/sacrifice.	Yes

Xena-03 Tie-Back Oil Pollution First Strike Plan will be tested to ensure the Xena-03 Tie-Back Oil Pollution First Strike Plan can be implemented as planned.	CS: Moderate costs associated with exercises. Standard practice.	First Strike Plan activities would not reduce the likelihood, but response activities may reduce the consequence.		C 18.2
In the event of requirement to abandon well, implement requirements for permanent well abandonment: • Well barrier as per the internal Woodside Standard and Procedure. • Placement, length, material and verification of a permanent barrier.	F: Yes. CS: Minimal cost. Standard practice.	Reduce the likelihood of hydrocarbon release.	Benefits outweigh cost/sacrifice.	Yes C 18.3
An approved Activity Source Control Emergency Response Plan (SCERP) shall exist prior to drilling the well, including feasibility and any specific considerations for relief well kick.	F: Yes. CS: Minimal cost. Standard practice.	The SCERP will describe the responses to a loss of well control including ROV intervention on BOP, use of capping stack to contain well, and the relief well. All of these responses are aimed at reducing the duration of the gas release, resulting in a reduction in consequence and overall risk.	Benefits outweigh cost/sacrifice.	Yes C 18.4
Good Practice				
BOP installed and tested during drilling operations. The BOP shall include: • one annular preventer • detailed specifications • two pipe rams (excluding the test rams) • a minimum of two sets of shear rams, one of which must be capable of sealing • deadman functionality • the capability of ROV intervention • independent power systems. Function testing shall be in accordance with the minimum standards for the expected drilling conditions, as detailed in the Woodside Engineering Standard Rig Equipment, Woodside Engineering	F: Yes. CS: Standard practice. Required by Woodside standards.	Testing of the BOP will reduce the likelihood of a blowout resulting in release of hydrocarbons to the marine environment. In the event of a blowout, this control would not reduce the consequence, although the reduction in likelihood reduces the overall risk ranking.	Benefits outweigh cost/sacrifice.	Yes C 10.6

Well Control Manual, Original Equipment Manufacturer (OEM) Standards and API Standard 53 4th Edition.				
Project-specific Mooring Design Analysis.	F: Yes. CS: Standard practice. Required by Woodside standards.	Ensure adequate MODU station holding capacity to prevent loss of station keeping. This will reduce the likelihood of a blowout resulting in release of hydrocarbons to the marine environment.	Benefits outweigh cost/sacrifice.	Yes C 2.8
Professional Judgement – Eliminate				
Do not drill well.	F: No. CS: Inability to achieve program objectives.	A hydrocarbon release would not be credible.	Disproportionate. Given the extremely low likelihood of a loss of well control due to the systematic implementation of Woodside's policies, standards, procedures and processes relating to drilling activities, the cost/sacrifice outweighs the benefit gained.	No
Professional Judgement – Substitute				
No additional controls identified.				
Professional Judgement – Engineered Solution				
No additional controls identified.				
Risk Based Analysis				
A quantitative spill risk assessment was performed (refer Section 6.8.2).				
Company Values				
Woodside's corporate values require all personnel to comply with appropriate policies, standards, procedures and processes while being accountable for their actions and holding others to account in line with Our Values. As detailed above, the PAP will be performed in line with these policies, standards and procedures that include suitable controls to prevent loss of well integrity, and response should a loss of well integrity occur.				
Societal Values				
Due to the Petroleum Activities Program's potential extent of the EMBA, the loss of well integrity current risk rating presents a Decision Type B, in accordance with the decision support framework described in Section 2.6.1. Consultation was conducted for this program to identify the views and concerns of relevant persons, as described in Section 5. Woodside has consulted with AMSA and WA DoT on spill response strategies. A copy of the Oil Pollution First Strike Plan was provided to AMSA and DoT.				
ALARP Statement On the basis of the environmental risk assessment outcomes and use of the relevant tools appropriate to the decision type (i.e., Decision Type B, Section 2.6.1), Woodside considers the adopted controls appropriate to manage the risks and consequences of a highly unlikely unplanned hydrocarbon release as a result of a loss of well integrity. As no reasonable additional/alternative controls were identified that would further reduce the risks and consequences without grossly disproportionate sacrifice, the risks and consequences are considered ALARP.				

Demonstration of Acceptability

Acceptability Criteria and Assessment

Loss of well integrity during drilling of the Xena-03 well was evaluated and the risk was rated as high due to the scale of potential environmental impacts. However, the loss of well integrity occurring is considered highly unlikely. As outlined in Section 2.6.1, Woodside considers the current risk ratings for a Decision Type B to be acceptable, if ALARP is demonstrated using good industry practice, consideration of company and societal values and RBA, if legislative requirements are met and societal concerns are accounted for, and the alternative control measures are grossly disproportionate to the benefit gained.

Principles of Ecologically Sustainable Development

The impact and risk evaluation has taken into account the relevant principles of ESDev:

- Decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations.
- The principle of inter-generational equity: the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.
- The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making.

Internal Context

The PAP is consistent with Woodside corporate policies, culture, processes, standards, structure and systems as outlined in the Demonstration of ALARP and Environmental Performance Outcomes, including:

- Woodside Environment and Biodiversity Policy
- Engineering Standards – Well Barriers
- Well Acceptance Criteria Procedure
- Global, Wells and Seismic – Well Control Procedure
- Woodside Engineering Standard – Rig Equipment
- Source Control Emergency Response Planning Guideline (SCERP Guidelines).

Oil spill preparedness and response strategies are considered applicable to the nature and scale of the risk and associated impacts of the response are reduced to ALARP.

Monitoring and Evaluation (operational monitoring) as a key response in the highly unlikely event of a hydrocarbon release will assess and track the extent of the hydrocarbon contact and revise the predicted extent of impact.

In addition, the Planning Area for scientific monitoring can be re-assessed in the unlikely event of hydrocarbon release with consideration of the conservation values and social-cultural values of state and commonwealth protected areas (including AMPs), National and Commonwealth Heritage Listed places; tourism and recreation; and fisheries. The post-response SMP will consider assessment and monitoring in line with the affected receptors such as habitat and species, AMPs and fisheries. Woodside corporate values include working sustainably with respect to the environment and communities in which we operate, listening to internal and external stakeholders, and considering HSE when making decisions. consultation, outlined below, has been performed prior to the Petroleum Activities Program.

External Context

During consultation with relevant persons, DoT requested to be consulted on spill risks with a potential to impact State Waters (Section 5). Woodside has also consulted with AMSA on spill response strategies. IA copy of the Oil Pollution First Strike Plan was provided to AMSA and DoT. No additional queries or concerns relating to a loss of well integrity hydrocarbon spill risk during drilling of the Xena-03 well were raised during consultation.

Other Requirements

Impact assessment has been informed by risk-based analysis, including hydrocarbon spill modelling. The proposed control measures are consistent with industry legislation, codes and standards, good practice and professional judgement, including:

- API Standard 53 for Subsea BOP Function Testing.
- AEP (Australian Energy Producers) Memorandum of Understanding: Mutual Assistance for relief well drilling is in place. Woodside develops an activity SCERP, including the Relief Well Plan, which is signed off by the Drilling Engineering Manager and maintains a list of rigs that are currently operating in Australia.
- OPGGS (Resource Management and Administration) Regulations 2011 mandate to have an accepted WOMP and application to permanently plug for abandonment of the wells.
- NOPSEMA will be notified of reportable and recordable incidents, if required (Section 7). A Mutual Aid MoU for relief well drilling is in place and the Woodside Head of Projects/Region (Global Wells and Seismic) maintains a list of rigs that are currently operating in WA.

The EMBA overlaps a number of BIAs for threatened and migratory species, as well as a number of State and Commonwealth MPAs and the Ningaloo Coast WHA. The residual risk of accidental hydrocarbon release from loss of

well integrity during drilling of the Xena-03 well is not inconsistent with the relevant objectives and actions of any applicable recovery plans or threat abatement plans. Regard has been given to relevant conservation advice and wildlife conservation plans during the assessment of potential impacts. The PAP is not considered to be inconsistent with the overall recovery objectives and actions of these recovery plans and conservation advice.

Acceptability Statement:

The impact assessment has determined that an accidental hydrocarbon release as a result of a loss of well integrity represents a moderate current risk rating and may result in major, long-term impacts (10–50 years) on highly valued ecosystems, species, habitat or physical or biological attributes. A number of BIAs for protected species overlap with the BIA and EMBA. Relevant recovery plans and conservation advice have been considered during the impact assessment, and the PAP is not considered to be inconsistent with the overall recovery objectives and actions of these recovery plans and conservation advice.

The likelihood of a loss of well integrity during drilling of the Xena-03 well occurring is highly unlikely, given the adopted controls. The adopted controls are considered consistent with industry legislation, codes and standards, and professional judgement and a risk-based assessment has been conducted to better understand the potential consequences and plan oil spill response. The adopted controls also meet the requirements and expectations of Australian Marine Orders, AMSA and AHO identified during impact assessment and consultation. As demonstrated in Section 6.10, the potential impacts of hydrocarbon release from loss of well integrity is not inconsistent with the relevant objectives and actions of any applicable recovery plans or threat abatement plans. Regard has been given to relevant conservation advice during the assessment of potential risks.

On the basis of the environmental impact assessment outcomes and Woodside's criteria for acceptability outlined in Section 2.8.2, this is considered an acceptable level of risk.

EPOs, EPSs and MC for Xena-03 Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 18 No release of hydrocarbons to the marine environment due to well loss of containment..	**C 10.4** OPGGS (Resource Management and Administration) Regulations 2011: accepted WOMP which describes the well design and barriers to be used to prevent a loss of well integrity, specifically: • All zones with flow potential penetrated by the well bore, containing hydrocarbons, shall be isolated from the surface environment by a minimum of two barriers (primary and secondary). The barriers shall: • be effective over the lifetime of well construction and abandonment • (fluid barriers) remain monitored and provide sufficient pressure to counter pore pressure during well construction and abandonment • (cementing barriers, including conductor, casing and liners) conform to the relevant minimum standards set out in the Woodside Barrier Standard. Verification:	**PS 10.4.1** Wells drilled in compliance with the accepted WOMP, including implementation of barriers to prevent a loss of well integrity.	**MC 10.4.1** Acceptance letter from NOPSEMA demonstrates the WOMP and application to drill were accepted by NOPSEMA prior to the drilling and plug and abandonment activities commencing. **MC 10.4.2** Records demonstrate minimum of two verified barriers (a single fluid barrier may be implemented during the initial stages of well construction if appropriateness is confirmed by a shallow hazard study) were in place for all permeable zones penetrated by the wellbore. **MC 10.4.3** Records demonstrate composition and weight of drilling fluids were applicable to down hole conditions.

EPOs, EPSs and MC for Xena-03 Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	• Effectiveness of primary and secondary barriers shall be verified (physical evidence of the correct placement and performance) during the permanent plugging of the well (if required).		
	C 10.5 As-built checks shall be completed during well operations to establish a minimum acceptable standard of well integrity is achieved.	**PS 10.5** Achieve a minimum acceptable standard of well integrity.	**MC 10.5.1** Records show well acceptance criteria are developed for the well.
			MC 10.5.2 Records demonstrate well acceptance criteria have been met.
	C 13.5 Incident reports are raised for unplanned releases within event reporting system. Refer Section 6.8.3.	**PS 13.5** Incident reports raised for unplanned releases and Recordable Incidents notified	**MC 13.5.1** Records demonstrate incident reports raised for unplanned releases, and applicable Recordable Incident notifications completed. Refer Section 6.8.3.
	C 18.1 In the event of a spill emergency response activities implemented in accordance with the Xena-03 Tie-Back Oil Pollution First Strike Plan.	**PS 18.1** In the event of a spill the Xena-03 Tie-Back Oil Pollution First Strike Plan (per Table 7-9) requirements are implemented.	**MC 18.1.1** Completed incident documentation.
	C 18.2 Arrangements supporting the activities in the Xena-03 Tie-Back Oil Pollution First Strike Plan will be tested to ensure the Xena-03 Tie-Back Oil Pollution First Strike Plan can be implemented as planned.	**PS 18.2.1** Exercises/tests will be conducted in alignment with the frequency identified in Section 7.14.2.	**MC 18.2.1** Testing of arrangement records confirm that emergency response capability has been maintained.
		PS 18.2.2 Woodside's procedure demonstrates a minimum level of trained personnel, for core roles in the Xena-03 Tie-Back Oil Pollution First Strike Plan, are maintained.	**MC 18.2.2** Emergency Management dashboard confirms that minimum level of personnel trained for core the Xena-03 Tie-Back Oil Pollution First Strike Plan roles are available.
	C 18.3 In the event of requirement to abandon well, implement requirements for permanent well abandonment: • well barrier as per the internal Woodside Standard and Procedure	**PS 18.3** Abandonment conducted in accordance with criteria identified in accepted WOMP.	**MC 18.3.1** Records demonstrate abandonment conducted in accordance with well acceptance criteria and accepted WOMP.

EPOs, EPSs and MC for Xena-03 Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	• placement, length, material and verification of a permanent barrier.		
	C 18.4 An approved SCERP shall exist prior to drilling the well, including feasibility and any specific considerations for relief well kick.	**PS 18.4** The SCERP is in place to ensure feasibility of responding to a source control incident.	**MC 18.4.1** An approved Source Control Emergency Response Plan.
	C 10.6 Subsea BOP installed and tested during drilling operations. The BOP shall include: • one annular preventer • two pipe rams (excluding the test rams) • a minimum of two sets of shear rams, one of which must be capable of sealing • deadman functionality • the capability of ROV intervention • independent power systems.	**PS 10.6** Subsea BOP specification, installation and testing compliant with internal Woodside Standards and international requirements (API Standard 53 5th Edition) as agreed by Woodside and MODU contractor.	**MC 10.6.1** Records demonstrate that BOP and BOP control system specifications and testing were in accordance with minimum standards for the expected drilling conditions as agreed by Woodside and MODU contractor.
	C 2.6 Project-specific MODU Mooring Design Analysis.	**PS 2.6** Seabed disturbance from MODU mooring limited to that required to ensure adequate MODU station holding capacity.	**MC 2.6.1** Records demonstrate Mooring Design Analysis approved and implemented during anchor deployment.
	Detailed preparedness and response performance outcomes, standards and measurement criteria for the PAP are presented in Appendix H.		

6.9.2 Unplanned Hydrocarbon Release: Pluto-A Topsides Loss of Containment

Context		
Topsides – Section 3.4.1 Process Description – Section 3.5.4 Hydrocarbon and Chemical Inventories and Selection – Section 3.9	Physical Environment – Section 4.4 Protected Species – Section 4.6	Consultation – Section 5

Impacts and Risks Evaluation Summary

Source of Risk	***Environmental Value Potentially Impacted***							***Evaluation***						
	Soil and Groundwater	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/Habitat	Species	Socio-economic	Decision Type	Consequence/Impact	Likelihood	Risk Rating	ALARP Tool	Broadly Acceptable Acceptability	Outcome
Hydrocarbon release from Pluto-A topsides equipment to the marine environment and atmosphere			x	x		x	x	A	D	1	M	LCS GP PJ		EPO 19

Description of Source of Risk

The facility has a range of topsides process and non-process equipment. A loss of containment from the topsides includes hydrocarbon inventories that could be released to the environment from high pressure process gas equipment and piping manifolds, and non-process hydrocarbon and chemical inventories.

Hazards that could lead to loss of containment from the topsides are:

- corrosion
- erosion
- material defect
- welding defect
- piping/equipment repair/defect
- vibration fatigue failure
- equipment overpressure
- uncontrolled transfer.

Escalation from MEEs can cause topsides loss of containment, specifically:

- loss of structural integrity (MEE-03) (Section 6.8.5)
- loss of marine vessel separation (MEE-04) (Section 6.8.6)
- loss of control of suspended load from facility lifting operations (MEE-05) (Section 6.8.7).

A number of common failure causes due to human error and SCC failures are presented in the generic Human Error and SCE Failure bowties in Section 6.8.8.

Topsides Loss of Containment – Credible Scenarios

Topsides process and non-process hydrocarbon inventories, and therefore, worst case credible spill scenarios, are relatively low for PLA riser platform in comparison to other offshore facilities, due to reservoir composition and the integrated Pluto Development design, including NNC offshore philosophy, meaning limited offshore processing and storage inventory. The maximum credible process-hydrocarbon loss scenario includes the loss of the potential condensate inventory within process vessels such as the production separator and produced water/condensate separator and cooler with potential ~30 m^3 condensate inventory. The maximum potential non-process hydrocarbons loss of containment scenario on the topsides is associated with the largest diesel storage inventory in the crane

pedestal storage tank (80 m³). While a number of hydrocarbon release scenarios were determined to constitute MEEs, the consequence assessment for a topsides loss of containment determined this source of risk is not an MEE.

Other smaller condensate and hydrocarbon inventories also present on the topsides (Section 3.4.1). Smaller volumes of stored diesel, hydraulic and lube oils and waste oil may also be released in case of loss of containment. While a number of hydrocarbon release scenarios were determined to constitute MEEs, the consequence assessment for a topsides loss of containment determined this source of risk is not an MEE.

Quantitative Hydrocarbon Risk Assessment

Spill modelling was performed by RPS, on behalf of Woodside to determine the fate of marine diesel (modelled as marine gas oil) released from loss of marine vessel separation within the PAA (RPS, 2024e) – as described in Section 6.8.6. The modelling assessed the extent of a marine diesel spill volume of 1000 m³ for all seasons, using an historic sample of wind and current data for the region. The results of the modelling can be used to demonstrate that a marine diesel spill within the PAA has an EMBA that is not predicted to include any shoreline contact or accumulation at impact thresholds. A total of 200 replicate simulations were modelled over an annual period (50 per quarter). As stated above, the largest topsides loss of containment diesel storage tank volume is 80 m³; therefore, the modelling of 1000 m³ is considered conservative for Topsides loss of containment scenarios. Historical spill risk assessment modelling undertaken for a smaller diesel spill (105 m³ released in under ten minutes) at the Greater Western Flank Project (GWF) location near the GWA facility, located 75 km north-east of the facility (APASA, 2016) also provides as an approximate analogue for the topside loss of containment scenario – which indicated floating hydrocarbons may occur above threshold criteria up to 10 km from the release site.

Hydrocarbon Characteristics

Marine diesel oil (MDO) is a mixture of both volatile and persistent hydrocarbons. Modelling conducted on a comparable marine gas oil (MGO) more typical of vessel fuel. Predicted weathering of marine diesel, based on typical conditions in the region, indicates that around 72% of the oil mass is forecast to have entrained and a further 24% is forecast to have evaporated over the first 24 hours (RPS, 2024e). After this time, the majority of the remaining hydrocarbon is entrained into the upper water column, leaving only a small proportion of the oil floating on the water surface (<1%). Given the large proportion of entrained oil and the tendency for it to remain mixed in the water column, the remaining hydrocarbons will decay and/or evaporate over time scales of several weeks to a few months, thereby extending the area of potential effect.

Given the environmental conditions experienced in the PAA, marine gas oil is expected to undergo rapid spreading and this, together with evaporative loss, is likely to result in a rapid dissipation of the spill. Marine gas oil distillates tend not to form emulsions at the temperatures found in the region. The characteristics of the marine gas oil are given in Section 6.8.2.

Consequence Assessment

Consequences associated with hydrocarbon release due to a topsides loss of containment event are similar, however, substantially more localised than consequences presented in this EP for diesel loss of containment events detailed in Section 6.8.6 Unplanned Hydrocarbon Release: Loss of Marine Vessel Separation (MEE-04) and Section 6.9.3 Unplanned Hydrocarbon Release: Vessel Collision During Drilling and Tie-back Activities

Once released to the open offshore setting around the riser platform (refer to Section 4), the potential for impacts to environmental receptors is limited to those in the open ocean, up to 10 km from the riser platform.

Given the density of the hydrocarbon, this decrease in water quality will be restricted to the top few metres of the water column. As such, impacts to demersal or benthic receptors (e.g., Ancient Coastline or continental slope demersal fish KEFs) are not considered credible.

Water Quality

There may be a minor short-term decrease in water quality in the immediate vicinity of the release location. The soluble fraction of condensate may cause acute toxic effects to planktonic organisms. Given the short generation times and high productivity of planktonic communities, this impact would be localised and have no lasting effect on planktonic species populations.

Air Quality

A topsides release of Pluto condensate may be potentially accompanied by release of a limited volume of methane and ethane released to atmosphere. The gas plume is expected to mix and disperse rapidly in the atmosphere. Hence, it has limited potential to impact fauna in the vicinity of the release location. Impacts, such as asphyxiation, would be highly localised and of no lasting effect to species populations.

Marine Fauna

A range of marine species may be present around the riser platform, such as cetaceans, marine turtles, whale sharks, fishes and birds. These species are widely distributed relative to the potential EMBA that would result from a topsides loss of containment (due to the relatively small volume of hydrocarbons compared to the scenarios considered in Section 6.8.6). Many large marine fauna in the region are migratory and are seasonally present in the PAA, which reduces the likelihood of exposure. Air breathing marine species may be impacted by the reduction in air quality (refer above); however, the potential for this impact is very limited. Marine fauna at or near the sea surface may be contacted by liquid-phase hydrocarbons, resulting in oiling. This may lead to impacts such as irritation of sensitive

mucous membranes (e.g., eyes, mouth and digestive tract), matting of feathers (leading to inability to fly and loss of insulation) or clogging of filtering structures (e.g., gills). Pelagic and site-attached fish (i.e., those resident around risers and jackets) may be exposed to spilled hydrocarbons, but are expected to avoid areas of high concentrations. Depending on the degree of exposure and the sensitivity of the receptor, these impacts may lead to injury or death. Mortality of larger fauna is not expected to occur. No impacts to ecosystem function are expected. Given the volatile nature of the hydrocarbons and the relatively small release volume, the potential for these impacts is largely constrained to the initial 12 hours immediately after the release. Hence, the potential impacts to species would be localised and of no lasting effect to species populations.

Socio-economic

Slight, short-term impacts may occur to other marine users (e.g., commercial fisheries); however, as the worst case marine diesel spill would weather rapidly, and there is already no fishing within PSZ and limited fishing within the PAA it is unlikely that there would be any significant impact to commercial fishers.

Summary

Given the adopted controls, the overall risk rating for an unplanned hydrocarbon due to a Pluto-A topsides loss of containment is Moderate based on a Minor consequence (short-term impact (one to two years) on species, habitat (but not affecting ecosystem function), physical or biological attribute, or to a community or highly valued area/item of cultural significance community), and a highly unlikely likelihood.

Demonstration of ALARP

While the loss of topsides containment does not constitute an MEE, it is considered to be a potential MAE in the Pluto A Operations Safety Case. As such, this source of risk is managed under the SCE management system (Section 7.4) for the facility. Specific measures and controls presented below are drawn from this management system.

Control Considered	Control Feasibility (F) and Cost/ Sacrifice (CS)	Benefit in Impact/Risk Reduction	Proportionality	Control Adopted
Legislation, Codes and Standards				
Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations 2009: Accepted Safety Case for the facility.	F: Yes. CS: Minimal cost. Standard practice.	Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations 2009: Accepted the Pluto A Operations Safety Case to: • identify hazards that have the potential to cause an MAE • detail assessment of MAE risks • describe the physical barriers SCEs and the safety management systems identified as being required to reduce the risk to personnel associated with an MAE to ALARP, thus contributing to management of associated potential environmental consequences of MAEs.	Control based on legislative requirements – must be adopted.	Yes C 14.4
Good Practice				
Incident reports are raised for unplanned releases within event reporting system.	F: Yes. CS: Minimal cost. Standard practice.	Good practice that operators identify, report and learn from unplanned release events. Supports compliance with regulatory reporting requirements.	Control based on Woodside standard and regulatory requirements – must be adopted.	Yes C 13.5

Professional Judgement – Elimination				
None identified beyond those integrated within PLA facility design.				
Professional Judgement – Substitute				
None identified beyond those integrated within PLA facility design.				
Professional Judgement – Engineered Solution				
Facility open hazardous and diesel drain system integrity maintained to contain potential spilled liquid hydrocarbon in areas as appropriate to safe integrated facility design.	F: Yes. The riser platform has been designed with an integral drains system (as practicable to suit NNC facility safety design requirements) to prevent escalation associated with hazardous inventories and support the appropriate containment of environmentally hazardous liquids. CS: Inherent feature of riser platform design ALARP. Some safety philosophy sacrifice.	Reduces the likelihood of environmental harm by: • limiting escalation of an incident following loss of containment, fire and/or explosion by removing or containing flammable liquid from hazardous areas supporting appropriate containment and disposal of environmentally hazardous liquids.	Benefits outweigh cost/sacrifice.	Yes C 6.3
Maintaining Safety Instrumented System (Safety Instrumented Functions and ESD actions) and valves to detect and respond to pre-defined initiating conditions, and/or initiating responses that put the process plant, equipment, and the wells in a safe condition to prevent or mitigate the effects of an MEE.	F: Yes. CS: Minimal cost. Standard practice.	Safety instrumented systems reduce the risk of topsides loss of containment by detecting and responding to pre-defined conditions and/or initiate responses that put the process plant and equipment in a safe condition so as to prevent or mitigate the effects of an MAE/MEE.	Benefits outweigh cost/sacrifice.	Yes C 13.3
Maintain topsides hydrocarbon-containing infrastructure integrity (P01 – Pressure Vessels, P04 Tanks).	F: Yes. CS: Minimal cost. Standard practice.	Reduces the likelihood of topsides loss of containment through inspection and assurance of key hydrocarbon containing vessels/tanks.	Benefits outweigh cost/sacrifice.	Yes C 19.1
Emergency Response				
Mitigation – Emergency and Hydrocarbon Spill Response	Standard practice to implementing management systems to maintain: • Pluto Offshore Facility Emergency Response Plan • Pluto Offshore Facility Oil Pollution First Strike Plan • Oil Pollution Emergency Arrangements – Australia. Refer to Appendix H: Oil Spill Preparedness and Response Mitigation Assessment for discussion around the ALARP assessment of controls related to hydrocarbon spill response.			

ALARP Statement:

The controls for the Topsides loss of containment are based on the controls similar to those identified for MEE-03, MEE-04 and MEE-05 (Sections 6.8.5 to 0) and are supported by specific measures presented in Section 7.2. On the basis of the environmental risk assessment outcomes and use of the relevant tools appropriate to the decision type, Woodside considers the adopted controls appropriate to manage the risks of a topsides loss of containment. As no reasonable additional/alternative controls were identified that would further reduce the consequences and risks without grossly disproportionate sacrifice, the risks are considered ALARP.

Demonstration of Acceptability

Acceptability Statement:

The consequence assessment has determined that, given the adopted controls, a highly unlikely worst case hydrocarbon release from topside loss of containment represent a Moderate risk rating. Consequences are unlikely to result in a consequence greater than Minor, short-term impacts. Further opportunities to reduce the risks have been investigated above. The adopted controls are considered good oil-field practice/industry best practice and consistent with the safety case. The potential risks are considered broadly acceptable if the adopted controls are implemented. Therefore, Woodside considers the adopted controls appropriate to manage the risks of process hydrocarbon release from loss of containment to a level that is broadly acceptable.

EPOs, EPSs and MC for Pluto Facility Operations

Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 19 No release of hydrocarbons to the marine environment due to a topsides loss of containment.	**C 14.4** OPGGS (Safety) Regulations 2009: Accepted Safety Case for the Pluto facility.	**PS 14.4** An accepted Safety Case is implemented, and safety notification and reporting is undertaken in accordance with the Regulations (as applicable).	**MC 14.4.1** Acceptance letter from NOPSEMA demonstrates acceptance of the Safety Case. Records demonstrate applicable NOPSEMA notification and reporting.
	C 13.5 Incident reports are raised for unplanned releases within event reporting system.	**PS 13.5** Incident reports raised for unplanned releases	**MC 13.5.1** Records demonstrate incident reports raised for unplanned releases
	C 6.3 Facility open hazardous and diesel drain system integrity maintained to contain potential spilled liquid hydrocarbon in areas as appropriate to safe integrated facility design.	**PS 6.3** Integrity will be managed in accordance with SCE Management Procedures (Section 7.4) and SCE Technical Performance Standard(s) to prevent environment risk related damage to SCEs for F22 – Open Hazardous and Diesel Drains, to: • prevent escalation of an incident following loss of containment, fire and/or explosion by removing or containing flammable liquid from hazardous areas support appropriate containment and disposal of environmentally hazardous liquids to avoid damage to the environment.	**MC 1.16.1** Records demonstrate implementation of SCE Technical Performance Standard(s) and Management of Hardware Controls in the Operate Phase Procedure (Section 7.4.2), in order to achieve the functional objective of the control. Records may include implementation and maintain/assure and manage-change information summarised in Section 7.4.2
	C 13.3 Maintaining Safety Instrumented System (Safety Instrumented Functions and ESD actions) and valves to detect and respond to	**PS 13.3** Integrity will be managed in accordance with SCE Management Procedures (Section 7.4) and SCE Technical Performance Standard(s) to	**MC 1.16.1** Records demonstrate implementation of SCE Technical Performance Standard(s) and Management of

	pre-defined initiating conditions, and/or initiating responses that put the process plant, equipment, and the wells in a safe condition to prevent or mitigate the effects of an MEE.	prevent environment risk related Damage to SCEs for: • F06 – Safety Instrumented System • P10 – Wells, to together detect and respond to predefined initiating conditions and/or initiate responses that put the process plant, equipment, and the wells in a safe condition to prevent or mitigate the effects of an MEE.	Hardware Controls in the Operate Phase Procedure (Section 7.4.2), in order to achieve the functional objective of the control. Records may include implementation and maintain/assure and manage-change information summarised in Section 7.4.2
	C 19.1 Maintaining topsides hydrocarbon-containing infrastructure integrity.	**PS 19.1** Integrity will be managed in accordance with SCE Management Procedures (Section 7.4) and SCE Technical Performance Standard(s) to prevent environment risk related Damage to SCEs for: • P01 – Pressure Vessels • P04 – Tanks, to provide minimum required mechanical integrity for identified pressure vessel systems for operation within defined integrity limits to prevent an MAE/MEE or worst-case diesel loss of containment.	**MC 1.16.1** Records demonstrate implementation of SCE Technical Performance Standard(s) and Management of Hardware Controls in the Operate Phase Procedure (Section 7.4.2), in order to achieve the functional objective of the control. Records may include implementation and maintain/assure and manage-change information summarised in Section 7.4.2
	Mitigation – Emergency and Hydrocarbon Spill Response.	Refer to Appendix H for discussion around the ALARP assessment of controls related to hydrocarbon spill response.	

6.9.3 Unplanned Hydrocarbon Release: Vessel Collision During Drilling and Tie-back Activities

Context		
Vessel-based Activities for Xena-03 Tie-back – Section 3.12	Physical Environment – Section 4.4 Habitats and Biological Communities – Section 4.5 Protected Species – Section 4.6 Socio-economic Environment – Section 4.9	Consultation – Section 5

Impacts and Risks Evaluation Summary

Source of Risk	***Environmental Value Potentially Impacted***						***Evaluation***						
	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/Habitat	Species	Socio-economic	Decision Type	Consequence/Impact	Likelihood	Risk Rating	ALARP Tools	Acceptability	Outcome
Loss of hydrocarbons to marine environment due to a vessel collision during drilling and tie-back of the Xena-03 well		x		x	x	x	A	C	1	M	LCS GP PJ	Broadly Acceptable	EPO 20

Description of Source of Risk

Background

The temporary presence of the MODU, AHVs, installation and support vessels in the Xena-03 Operational Area during Xena-03 Tie-back activities will result in a navigational hazard within the immediate area.

Spill scenarios involving the MODU are not considered likely for a hydrocarbon release given the collision points, vessel speeds and locations of the vessel tanks. MODU fuel tanks are located in the MODU pontoons, typically located on the inner sides of pontoons and can be over 10 m below the waterline.

The installation vessel is expected to have a total fuel capacity of 2200 m^3, with the largest tank holding approximately 340 m^3 (Section 3.12.2). AHVs and other support vessels for the Xena-03 Tie-back activities are likely to have multiple isolated marine diesel tanks distributed throughout the hull of the vessel, typically ranging from 22 to 105 m^3.

In the unlikely event of a vessel collision involving the installation vessel or a support vessel during the Xena-03 Tie-back activities, the vessel will have the capability to pump marine diesel from a ruptured tank to a tank with spare volume in order to reduce the potential volume of fuel released to the environment. It is noted that a hydrocarbon spill from a loss of vessel separation during operational activities is assessed in Section 6.8.6.

Industry Experience

Registered vessels or foreign flag vessels in Australian waters are required to report events to the Australian Transport Safety Bureau (ATSB), AMSA or Australian Search and Rescue (AusSAR).

From a review of the ATSB marine safety and investigation reports, one vessel collision occurred in 2011/12 that resulted in a spill of 25–30 L of hydrocarbon into the marine environment as a result of a collision between a tug and support vessel off Barrow Island. Two other vessel collisions occurred in 2010, one in the port of Dampier, where a support vessel collided with a barge being towed. Minor damage was reported and no significant injury to personnel or pollution occurred. The second 2010 vessel collision involved a vessel under pilot control in port connecting with a vessel alongside a wharf, causing it to sink. No reported pollution resulted from the sunken vessel. These incidents demonstrate the likelihood of only minor volumes of hydrocarbons being released during the highly unlikely event of a vessel collision.

From 2010 to 2011, the ATSB's annual publication defines the individual safety action factors identified in marine accidents and incidents: 42% related to navigation action (2011). Of those, 15% related to poor communication and

42% related to poor monitoring, checking and documentation (ATSB, 2011). The majority of these related to the grounding instances.

Credible Scenario

For a vessel collision to result in the worst-case scenario of a hydrocarbon spill potentially impacting an environmental receptor, several factors must align as follows:

- The identified causes of vessel interaction must result in a collision.
- The collision must have enough force to penetrate the vessel hull.
- The collision must be in the exact location of the fuel tank.
- The fuel tank must be full, or at least of volume which is higher than the point of penetration.

The environmental risk analysis and evaluation identified and assessed a range of potential scenarios that could result in a loss of vessel structural integrity, resulting in damage to fuel storage tank(s) and a loss of marine diesel to the marine environment. Spill scenarios involving the MODU are not considered likely for a hydrocarbon release given collision points, vessel speeds and locations of the vessel tanks. Instead, the most credible scenarios are associated with the collision of an installation vessel with a support vessel in the event that one should be used within the field.

In summary, it is not a credible scenario that the total storage volume of the MODU, installation and support vessels would be damaged or lost, as fuel is stored in more than one tank and stored within the hull, behind the bilge tanks, below the waterline.

The last scenario considered was a collision between a project vessel with a third-party vessel (i.e. other petroleum related vessel or commercial fishing vessel). This was assessed as being credible but highly unlikely, given the standard vessel operations and equipment in place to prevent collision at sea, the standby role of a support vessel (low vessel speed) and its operation in close proximity to the MODU (exclusion areas), and the construction and placement of storage tanks. Potential spill volumes for these scenarios are summarised in Table 6-46. Given the offshore location of the PAA, vessel grounding is not considered a credible risk.

Table 6-46: Summary of credible hydrocarbon spill scenario as a result of vessel collision

Scenario	Hydrocarbon Volumes	Preventative and Mitigation Controls	Credibility
Loss of containment from MODU as a result of vessel collision	Submerged marine diesel tanks up to an individual capacity of 500 m³.	Fuel tanks are located on the inside of pontoons and protected by location below water line, protection from other tanks; e.g., bilge tanks. The draught of vessel and location of tanks in terms of water line prevent the tanks from being breached.	Not credible Due to location of tanks.
Breach of support vessel fuel tanks due to support vessel – other vessel collision including commercial, shipping/fisheries.	Activity support vessel has multiple marine diesel tanks typically ranging between 22–105 m³ each.	Typically, double wall, tanks which are located midship (not bow or stern). Vessels are not anchored and steam at low speeds when relocating within the PAA or providing stand-by cover. Normal maritime procedures would apply during such vessel movements.	Credible Activity support vessel – other vessel collision could potentially result in the release from a fuel tank.
Breach of installation vessel fuel tanks due to collision with another vessel including commercial shipping/fisheries.	The installation vessel has multiple isolated tanks, largest volume of a single tank is unlikely to exceed 500 to 1000 m³.	Tank locations midship (not bow or stern). Installation vessel will be holding station during installation activities or steaming at low speeds when relocating within the PAA.	Credible – Worst Case Installation vessel – third party vessel collision could potentially result in the release from a fuel tank.

Quantitative Hydrocarbon Risk Assessment

Spill modelling was performed by RPS, on behalf of Woodside to determine the fate of marine diesel (modelled as marine gas oil) released from a collision within the PAA (RPS, 2024e). The modelling assessed the extent of a marine diesel spill volume of 1000 m³ for all seasons, using an historic sample of wind and current data for the region. The results of the modelling can be used to demonstrate that a marine diesel spill within the PAA has an EMBA that is not

predicted to include any shoreline contact or accumulation at impact thresholds. A total of 200 replicate simulations were modelled over an annual period (50 per quarter). As stated above, the largest tank volume on an installation vessel is expected to be 500 m³; therefore, the modelling of 1000 m³ is considered conservative for a vessel collision scenario during drilling and tie-back activities.

Hydrocarbon Characteristics

Marine diesel oil (MDO) is a mixture of both volatile and persistent hydrocarbons. Modelling conducted on a comparable marine gas oil (MGO) more typical of vessel fuel. Predicted weathering of marine diesel, based on typical conditions in the region, indicates that around 72% of the oil mass is forecast to have entrained and a further 24% is forecast to have evaporated over the first 24 hours (RPS, 2024e). After this time the majority of the remaining hydrocarbon is entrained into the upper water column, leaving only a small proportion of the oil floating on the water surface (<1%). Given the large proportion of entrained oil and the tendency for it to remain mixed in the water column, the remaining hydrocarbons will decay and/or evaporate over time scales of several weeks to a few months, thereby extending the area of potential effect.

Given the environmental conditions experienced in the PAA, marine gas oil is expected to undergo rapid spreading and this, together with evaporative loss, is likely to result in a rapid dissipation of the spill. Marine gas oil distillates tend not to form emulsions at the temperatures found in the region. The characteristics of the marine gas oil are given in Table 6-47.

Table 6-47: Characteristics of the marine gas oil

Hydrocarbon Type	Initial Density (g/cm³) at 25 ºC	Viscosity (cP @ 25 ºC)	Component BP (ºC)	Volatiles %<180	Semi Volatiles % 180 to 265	Low Volatility (%) 265 to 380	Residual (%) >380
				Non-Persistent			Persistent
Marine gas oil	0.829	4.0	% of total	6	34.6	54.4	5

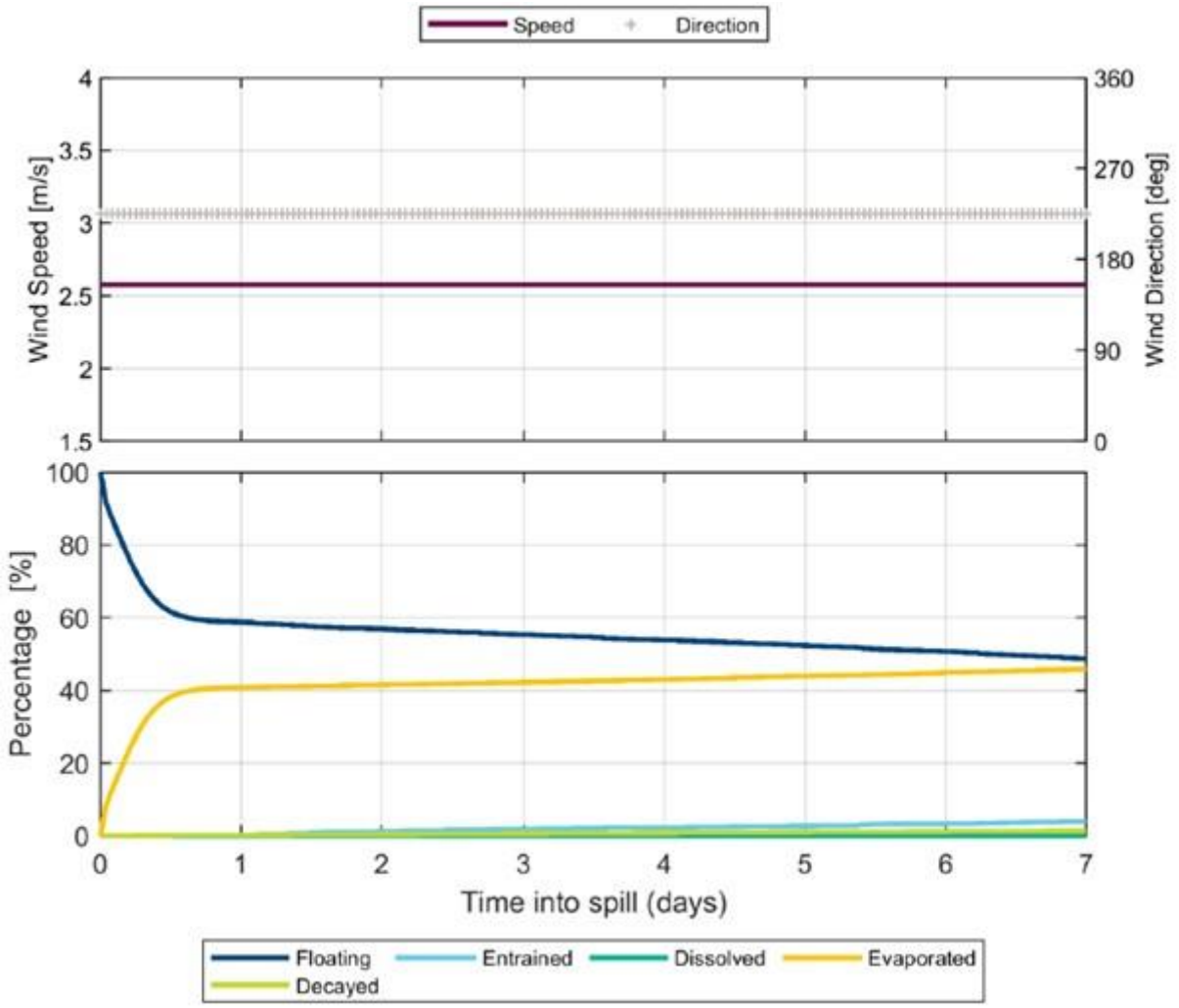

Figure 6-39: Proportional mass balance plot representing the weathering of MGO spilled onto the water surface as a one-off release (50 m³) and subject to a constant 5 kn (2.6 m/s) wind at 27°C water temperature and 25°C air temperature (RPS Group, 2024e)

Consequence Assessment

Environment that May Be Affected

In the event of a 1000 m³ release of marine diesel spill due to vessel collision during drilling and tie-back activities, the modelling predicts a low probability of receptors being contacted by entrained hydrocarbons >100 ppb or dissolved aromatic hydrocarbons >50 ppb (RPS, 2024e).

The greatest likelihood of contact is at the Montebello AMP (24% probability for surface hydrocarbons, 57.5% probability for entrained and 19.5% for dissolved). All other sensitive locations identified are predicted to have a 0.5% probability or less of contact at threshold concentrations. Further, entrained hydrocarbons reaching these environments will be highly weathered, with the volatile and water soluble (often the most toxic) components expected to have dissipated. No surface hydrocarbons above 10 g/m² are predicted to contact sensitive receptors and no shoreline oiling above 100 g/m² is predicted (RPS, 2024e).

Potential Impacts to Environmental Value(s)

The potential impacts from a hydrocarbon release caused by a vessel separation (Pluto Operations) are discussed in Section 6.8.6 (MEE-04). Taking into consideration that the EMBA derived from hydrocarbon spill modelling for a marine diesel spill (during drilling and operations) will fall within the EMBA of the spill from a loss of well containment outlined in Section 6.9.1; moreover, given the expected maximum fuel tank size of the installation vessel (350 m³) is much lower than the modelled scenario (1000 m³), this assessment is considered to be conservative. A summary of the potential environmental impacts specific to a vessel collision scenario during drilling and tie-back activities are provided below.

Water Quality

There may be a short-term decrease in water quality in the immediate vicinity of the release location. Given the localised area of the potential EMBA and the rapid dispersion, dilution and weathering of a marine diesel spill, it is expected that any potential impacts will be minor and temporary in nature.

Marine Sediment Quality

Low probabilities (<2%) of entrained hydrocarbons were predicted to contact a few nearshore receptors, such as the Ningaloo Coast, Montebello Islands and Shoals, Barrow Island and Muiron Islands. No shorelines were predicted to be exposed to either shoreline accumulation or floating surface hydrocarbons at any threshold (RPS, 2024e). However, hydrocarbon contact from this scenario may lead to reduced marine sediment quality by processes such as adherence to sediment and deposition seabed habitat away from shoreline areas.

Protected Species

Cetaceans

As identified in Section 4, protected species including migrating PBW may be encountered near the PAA, and therefore could be impacted in close proximity to the marine diesel spill location, where the volatile, water soluble and most toxic components of the diesel may be present. However, the window for exposure to hydrocarbons with the potential for any toxicity effects in these waters would be limited to a few days following the spill. Potential impacts may include behavioural impacts (e.g., avoidance of impacted areas), sub-lethal biological effects (e.g., skin irritation, irritation from ingestion or inhalation, reproductive failure) and, in rare circumstances, organ or neurological damage leading to death. Given the absence of critical habitats or aggregation areas, cetaceans in the area are expected to be transient, and impacts are expected to be limited to individuals or small groups of animals. Impact on the overall population viability of cetaceans are not predicted.

There is also the potential for migrating humpback whales, dugongs and coastal dolphin populations to be exposed in nearshore waters, however, the low concentrations and advanced degree of weathering of hydrocarbons in these nearshore waters is not expected to result in any discernible sublethal or lethal impacts to cetaceans.

Marine Turtles

The EMBA modelled for a release of hydrocarbons following a vessel collision overlaps with BIAs for marine turtle internesting habitat, as identified in Section 4.6.2. Turtle internesting habitats, such as those in waters adjacent to the Dampier Archipelago Islands, are predicted to have very limited or no exposure to surface or dissolved hydrocarbons above their respective impact threshold concentrations. Some marine turtles in these areas may be exposed to patchy occurrences of entrained hydrocarbons, which would be in an advanced state of weathering with reduced toxicity. Low concentrations are only capable of causing sublethal impacts to the most sensitive marine organisms and no lethal or sub-lethal impacts to marine turtles are expected in the BIAs. The potential for lethal and sub-lethal impacts to marine turtles is limited to small numbers of transient individuals that may be present in offshore waters near the release location.

Seabirds

Seabirds may also be exposed to marine diesel on the sea surface or upper water column, if resting or foraging in waters near to the release in the event of a marine diesel spill during drilling and tie-back activities. Impacts may include mortality due to oiling of feathers or the ingestion of hydrocarbons. However, due to the limited spatial extent of a marine diesel spill and limited window for exposure, population level impacts are not expected.

Other Species

Other protected species that may occasionally transit through the area and may potentially be exposed to a marine diesel spill during drilling and tie-back activities, include shark and ray species such as whale sharks and manta rays. Should sharks or rays be present in offshore waters near the PAA during the spill, direct impacts may occur if foraging within surface slicks or in the upper 20 to 30 m of the water column containing entrained hydrocarbons and dissolved aromatics. Contamination of their food supply and the subsequent ingestion of this prey may also lead to long term impacts as a result of bioaccumulation. Impacts are again predicted to be limited to a small number of animals, given the absence of key habitat and the high population turnover of prey (ITOPF, 2011). It is therefore considered that any potential impacts would be low magnitude and temporary in nature.

Pelagic fish populations in the open water offshore environment of the EMBA are highly mobile and have the ability to move away from a marine diesel spill. The spill-affected area would be confined to the surface layer and upper 20 to 30 m of the water column. It is therefore unlikely that fish populations would be exposed to widespread hydrocarbon contamination. Pelagic fish populations are distributed over a wide geographical area so impacts on populations or species level are considered to be negligible. Combined with these factors and the rapid dispersion of marine diesel, it is considered that any potential impacts will be minor.

Other communities (e.g., demersal fish, benthic infauna and epifauna) and key sensitivities (e.g., KEFs identified in Section 4.7) occur within the combined EMBA, however will not be directly exposed or impacted by a marine diesel spill as hydrocarbons are confined to the upper layers of the water column (0–10 m).

Protected Areas

Entrained hydrocarbons at or exceeding the 100 ppb threshold have a low probability of contacting the Montebello AMP, Gascoyne AMP, and Ningaloo MPWHA in the event of a vessel collision during drilling and tie-back activities

(RPS, 2024e). Entrained hydrocarbons are only predicted within the surface waters of the deep open waters of these protected areas, with no contact to seabed habitats or to shoreline contact. Potential impacts to water quality and the natural values (e.g., mobile protected species) in these areas would be temporary and localised in nature due to the rapid dispersion and weathering of the marine diesel, as described above. Dissolved and visible surface hydrocarbons (at or exceeding 1 g/m²) are not predicted to reach any other protected areas.

Socio-economic

A marine diesel spill is considered unlikely to cause significant direct impacts on the target species fished by the Commonwealth and State active fisheries identified in Section 4.10.1 which overlap with the combined EMBA. The fisheries that operate within the EMBA predominantly target demersal fish species (demersal finfish and crustaceans) that inhabit waters in the range of >60–200 m depth, or pelagic species which are highly mobile. Therefore, a marine diesel spill is expected to only result in negligible impacts, considering that hydrocarbons are confined to the upper layers of the water column (0–10 m). There is the potential that a fishing exclusion zone would be applied in the area of the spill, which would put a temporary ban on fishing activities and therefore potentially lead to subsequent economic impacts on commercial fishing operators if they were planning to fish within the area of the spill. Such measures would likely be in place for less than a week and would not result in widespread or long-term impacts to fishing activities.

Demonstration of ALARP

Given the adopted controls, the overall risk rating for an unplanned hydrocarbon release resulting from a vessel collision during drilling and tie-back activities is Moderate based on a Minor consequence (short term impact: one to two years), to the high value receptors (marine fauna, AMPs, KEFs and commercial fishing), and a highly unlikely likelihood.

Control Considered	Control Feasibility (F) and Cost/Sacrifice (CS)[129]	Benefit in Impact/Risk Reduction	Proportionality	Control Adopted
Legislation, Codes and Standards				
Contract vessels complying with Marine Orders for safe vessel operations: • Marine Order 21 (Safety of navigation and emergency procedures) 2016 • Marine Order 27 (Safety of navigation and radio equipment) 2016 • Marine Order 30 (Prevention of collisions) 2016.	F: Yes. CS: Minimal cost. Standard practice.	Legislative requirements to be followed, reduces the likelihood of interference with other marine users resulting in a collision.	Controls based on legislative requirements – must be adopted.	Yes C 1.1
Establishment of a 500 m sez around MODU and primary installation vessel and communicated to marine users.	F: Yes. CS: Minimal cost. Standard practice.	Establishment of a 500 m safety exclusion zone around MODU and the primary installation vessel reduces the likelihood of interaction with other marine users.	Benefits outweigh cost/sacrifice. Control is also standard practice.	Yes C 1.4
Arrangements supporting the activities in the Xena-03 Tie-back Oil Pollution First Strike Plan (per Section 7.14) will be tested to ensure the Xena-03 Tie-Back Oil Pollution First	F: Yes. CS: Minimal cost. Standard practice.	Legislative requirement based on vessel class. Unlikely to have a significant reduction in consequence.	Controls based on legislative requirements – must be adopted.	Yes C 18.2

[129] Qualitative measure.

Strike Plan can be implemented as planned.				
Good Practice				
Support vessel on standby as required during the PAP to assist in third-party vessel interactions. When a support vessel is designated for standby it will undertake actions to prevent unplanned interactions, such as: • Maintain a 24-hour radio watch on designated radio channel(s). • Undertake continuous surveillance and warn the MODU/ installation vessel of any approaching vessels reaching the 500 m safety exclusion zone. Surveillance shall be conducted by a combination of: • visual lookout – radar watch – other electronic systems available including Automatic Identification System (AIS) – monitoring any additional/ agreed radio communications channels – all other means available. • While complying with the International Regulations for Preventing Collisions at Sea (COLREGS), approach any vessel attempting to transit through the 500 m zone and contact vessel by all available means. • Monitor and advise the MODU if: • MODU navigation signals are defective. • visibility becomes restricted • any buoys in the area are not holding position or are not working as expected.	F: Yes. CS: Minimal cost – support vessels available routinely in PAA during Petroleum Activities Program. Standard practice.	Given the legislative controls in place, use of a support vessel, as defined in the One Marine Charterers Instructions, will provide a small reduction in likelihood of a collision with a third-party vessel.	Benefits outweigh cost/sacrifice.	Yes C 20.1

Notify AHO of activities no less than four working weeks prior to scheduled activity commencement date.	F: Yes. CS: Minimal cost. Standard practice.	Notification of AHO will enable them to issue a Maritime Safety Information Notifications (MSIN) and Notice to Mariners (NTM) thereby reducing the likelihood of unplanned interactions with other vessels.	Benefits outweigh cost/sacrifice. Control is also Standard Practice.	Yes C 1.9
Notify AMSA ARC least 24-48 hours before operations commence.	F: Yes. CS: Minimal cost. Standard practice.	Communicating the PAP to other marine users ensures they are informed and aware should emergency response be required.	Benefits outweigh cost/sacrifice. Control is also Standard Practice.	Yes C 1.10
Notify DoD no less than four weeks before Xena-03 Tie-back activities commence.	F: Yes. CS: Additional cost. Standard practice.	In accordance with request made by DoD during consultation.	Benefits outweigh cost/sacrifice.	Yes C 1.12
Notify relevant government departments, fishing industry representative bodies and licence holders of activities prior to commencement and upon completion of the Xena-03 Tie-back activities	F: Yes. CS: Minimal cost. Standard practice.	Communication of the PAP to other marine users ensures they are informed and aware, thereby reducing the likelihood of interference with other marine users.	Benefits outweigh cost/sacrifice. Control is also standard practice.	Yes C 1.13
Develop a SIMOPS Plan to manage MODU interactions with other facilities/vessels, where multiple campaigns occur within the PAA (i.e. during xmas tree installation). SIMOPS Plan will contain information on: • minimum separation distances • communications • MODU/vessels/ activities involved in SIMOPS • exclusion zone entry and exit processes • ROV operations • helicopter operations • key roles, responsibilities and emergency contacts • PTW arrangements • incident reporting and investigation management of change.	F: Yes. CS: Minimal cost. Standard practice.	SIMOPS Plan contains detail such as communications requirements, exclusion zones and entry/exit requirements and roles and responsibilities – which can help reduce likelihood of vessel collision.	Benefits outweigh cost/sacrifice. Control is also standard practice.	Yes C 1.15
Mitigation: Oil Spill Response	Refer to Appendix H.			

Professional Judgement – Eliminate				
Eliminate use of vessels.	F: No. The use of vessels is required to conduct the Petroleum Activities Program. CS: Not considered, control not feasible.	Not considered, control not feasible.	Not considered, control not feasible.	No
Professional Judgement – Substitute				
No additional controls identified.				
Professional Judgement – Engineered Solution				
No additional controls identified.				
ALARP Statement: On the basis of the environmental risk assessment outcomes and use of the relevant tools appropriate to the decision type (i.e., Decision Type A, Section 2.6.1), Woodside considers the adopted controls appropriate to manage the risks and consequences of an unplanned loss of hydrocarbon as a result of a vessel collision during drilling and tie-back activities. As no reasonable additional/alternative controls were identified that would further reduce the risks and consequences without grossly disproportionate sacrifice, the risks and consequences are considered ALARP.				
Demonstration of Acceptability				
Acceptability Statement: The impact assessment has determined that an accidental hydrocarbon release as a result of a vessel collision during drilling and tie-back activities represents a moderate current risk rating and is unlikely to result in a risk consequence greater than Minor. Relevant recovery plans and conservation advice have been considered during the impact assessment, and the PAP is not considered to be inconsistent with the overall recovery objectives and actions of these recovery plans and conservation advice. The adopted controls are considered consistent with industry legislation, codes and standards, good practice and professional judgement and meet the requirements and expectations of Australian Marine Orders, AMSA and AHO identified during impact assessment and consultation. The potential risks and consequences are considered acceptable if the adopted controls are implemented. Therefore, Woodside considers the adopted controls appropriate to manage the risks and consequences of a loss of vessel structural integrity to a level that is broadly acceptable.				
EPOs, EPSs and MC for Xena-03 Tie-back Activities				
Environmental Performance Outcomes	***Controls***	***Standards***	***Measurement Criteria***	
EPO 20 No release of hydrocarbons to the marine environment due to a vessel collision.	**C 1.1** Contract vessels compliant with Marine Orders for safe vessel operations: • Marine Order 21 (Safety of navigation and emergency procedures) 2016 • Marine Order 27 (Safety of navigation and radio equipment) 2016 • Marine Order 30 (Prevention of collisions) 2016.	**PS 1.1** Vessels contracted whose practices comply with Marine Order as applicable to vessel size, type and class (Marine Orders 21, 27 and 30).	**MC 1.1.1** Marine verification records demonstrate compliance with standard maritime safety procedure (Marine Orders 21, 27 and 30).	

	Compliance with Marine Orders 21, 27 and 30 reduces the likelihood of interactions.		
	C 1.4 Establishment of a 500 m SEZ around MODU installation vessel and communicated to marine users.	**PS 1.4** No entry of unauthorised vessels within the 500 m SEZ.	**MC 1.4.1** Daily Operations Reports and Incident records demonstrate breaches by unauthorised vessels within the SEZ are recorded.
	C 18.1 In the event of a spill emergency response activities implemented in accordance with the Xena-03 Tie-Back Oil Pollution First Strike Plan.	**PS 18.1** In the event of a spill the Xena-03 Tie-Back Oil Pollution First Strike Plan requirements are implemented. Refer Section 6.9.1.	**MC 18.1.1** Completed incident documentation. Refer Section 6.9.1.
	C 18.2 Arrangements supporting the activities in the Xena-03 Tie-Back Oil Pollution First Strike Plan will be tested to ensure the Xena-03 Tie-Back Oil Pollution First Strike Plan can be implemented as planned.	**PS 18.2.1** Exercises/tests will be conducted in alignment with the frequency identified in Section 7.14.2.	**MC 18.2.1** Testing of arrangement records confirm that emergency response capability has been maintained.
		PS 18.2.2 Woodside's procedure demonstrates a minimum level of trained personnel, for core roles in the Xena-03 Tie-Back Oil Pollution First Strike Plan, are maintained.	**MC 18.2.2** Emergency Management dashboard confirms that minimum level of personnel trained for core the Xena-03 Tie-Back Oil Pollution First Strike Plan roles are available.
	C 20.1 Support vessel on standby as required during the PAP to assist in third-party vessel interactions. When a support vessel is designated for standby it will undertake actions to prevent unplanned interactions, such as: • Maintain a 24-hour radio watch on designated radio channel(s). • Perform continuous surveillance and warn the MODU/ installation vessel of any approaching	**PS 20.1** Define role of support vessels in maintaining petroleum safety zone, preventing unplanned third-party vessel interactions, monitoring the effectiveness of navigation controls (e.g., signals), and warning third-party vessels of navigation hazards.	**MC 20.1.1** Daily Drilling Report will include details on the support vessel that is on standby. Non-conformance will be detailed in an incident report.

	vessels reaching 500 m petroleum safety zone. Surveillance shall be conducted by a combination of: • visual lookout • radar watch • other electronic systems available including Automatic Identification System (AIS) • monitoring any additional/agreed radio communications channels • all other means available. • While complying with the International Regulations for Preventing Collisions at Sea (COLREGS), approach any vessel attempting to transit through the 500 m zone and contact vessel by all available means. • Monitor and advise the MODU if: • MODU navigation signals are defective • visibility becomes restricted. • Advise if any buoys in the area are not holding position or are not working as expected.		
	C 1.9 Notify AHO of activities no less than four working weeks prior to scheduled	**PS 1.9** Notification to AHO of activities and movements to allow generation of navigation warnings (MSIN and NTM)	**MC 1.9.1** Consultation records demonstrate that AHS has been notified before commencing an activity to allow generation of navigation

	activity commencement date	(including AUSCOAST warnings where relevant)).	warnings (MSIN and NTM (including AUSCOAST warnings where relevant)).
	C 1.10 Notify AMSA ARC least 24-48 hours before operations commence.	**PS 1.10** Notification to AMSA JRCC to prevent activities interfering with other marine users. AMSA's JRCC will require the MODU's details (including name, callsign and Maritime Mobile Service Identity (MMSI)), satellite communications details (including INMARSAT-C and satellite telephone), area of operation, requested clearance from other vessels and need to be advised when operations start.	**MC 1.10.1** Records demonstrate a once-off notification provided to AMSA's JRCC within required timeframes before mobilisation.
	C 1.12 Notify DoD no less than four weeks before Xena-03 Tie-back activities commence.	**PS 1.12** Woodside will provide DoD activity notification no less than 4 weeks prior to commencement of drilling, well interventions/workovers or subsea installation activities.	**MC 1.12.1** Consultation records demonstrate that DoD and AHO have been notified prior to commencement of drilling or subsea installation activities.
	C 1.13 Notify relevant government departments, fishing industry representative bodies and licence holders of activities prior to commencement and upon completion of the Xena-03 Tie-back activities.	**PS 1.13** AFMA, DCCEEW, CFA, DAFF – Fisheries, Recfishwest, DPIRD, WAFIC and relevant Fishery Licence Holders (North West Slope and Trawl Fishery, Western Deepwater Trawl Fishery) will be notified no less than ten days before activity commences and following completion of activities.	**MC 1.13.1** Consultation records demonstrate that listed relevant persons have been notified prior to commencement and following completion of drilling or subsea installation activities.
	C 1.15 Develop a SIMOPS Plan to manage MODU interactions with other facilities/vessels, where multiple campaigns occur within the PAA (i.e. during xmas tree installation). SIMOPS Plan will contain information on: • minimum separation distances • communications • MODU/vessels/ activities involved in SIMOPS	**PS 1.15** MODU and applicable vessels compliant with SIMOPS Plan.	**MC 1.15.1** Records demonstrate implementation of SIMOPS Management Plan when MODU working in vicinity of other facilities/vessels, i.e. during xmas tree installation.

	• exclusion zone entry and exit processes • ROV operations • helicopter operations • key roles, responsibilities and emergency contacts • PTW arrangements • incident reporting and investigation management of change.		
	Detailed preparedness and response performance outcomes, standards and measurement criteria for the PAP are presented in Appendix H.		

6.9.4 Unplanned Hydrocarbon or Chemical Release: Hydrocarbon Release During Bunkering, Refuelling and Chemical Release during Transfer, Storage and Use, Rupture of Chemical Supply Lines – Pluto Operations

Context		
Operational Details – Section 3.5 Utility Systems – Section 3.6 Support Vessel Operations – Section 3.8 Hydrocarbon and Chemical Inventories and Selection – Section 3.9 Subsea Chemical Use – Section 3.10.2	Physical Environment – Section 4.4 Habitats and Biological Communities – Section 4.5 Protected Species – Section 4.6 Socio-economic Environment – Section 4.9	Consultation – Section 5

Impacts and Risks Evaluation Summary

Source of Risk	***Environmental Value Potentially Impacted***							***Evaluation***						
	Soil and Groundwater	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/Habitat	Species	Socio-economic	Decision Type	Consequence/Impact	Likelihood	Risk Rating	ALARP Tool	Acceptability	Outcome
Accidental discharge of marine diesel/hydrocarbons to the marine environment during bunkering or refuelling			x		x	x	x	A	D	2	M	LCS GP PJ	Broadly Acceptable	EPO 21
Accidental discharge of chemicals to the marine environment from transfer, storage and use, or rupture of chemical supply lines			x		x	x	x	A	D	1	M			
Accidental release of MEG from chemical supply lines			x		x	x	x	A	E	2	M			

Description of Source of Risk

Operations: Marine Diesel Bunkering and Refuelling

Marine diesel fuel is transferred to the facility (during crewed visits) and ASV by bunkering. Two key scenarios for the loss of containment of marine diesel during bunkering operations were identified:

- Partial or total failure of a bulk transfer hose or fittings during bunkering, due to operational stress or other integrity issues could spill marine diesel to the deck and/or into the marine environment. This would be less than 200 L, based on the likely volume of a bulk transfer hose (assuming a failure of the dry break and complete loss of hose volume).
- Partial or total failure of a bulk transfer hose or fittings during bunkering or refuelling, combined with a failure in procedure to shutoff fuel pumps, for a period of up to five minutes, resulting in approximately 8 m^3 marine diesel loss to the deck and/or into the marine environment.

Mechanisms are available to capture potential topsides diesel spillage from process/piping associated with the PLA bunkering station and manual fuel transfers, enabling drainage flow to be routed inboard to the open drains collections tank when the facility is crewed and during specific activities. The diesel unloading stations have isolation and vent valves to allow draining of bunkering hoses between uses.

Diesel system storage and use risks are covered in Section 6.9.2 Topsides Loss of Containment.

Chemical Transfer, Bunkering, Storage and Use

Transfer and Bunkering

Operational process chemicals are transferred to the facility in a dedicated MEG supply line, or transportable containers. Operational non-process and facility maintenance chemicals, such as subsea control fluid, cleaning products, paint and degreaser, are typically transferred to the facility in containers.

Spills have the potential to occur during transfer to the facility (e.g., transport or lifting incidents). Given the small volumes being handled, the worst credible release volumes are relatively small (e.g., the typical largest chemical transfer is via transportable 4–6 m^3 ISO containers of MEG, corrosion inhibitor and water clarifier).

Installation of the PWH provided equipment to facilitate chemical bunkering of corrosion inhibitor and water clarifier – however, this is not used – with a long-term isolation in place.

MEG loss of containment risks associated with supply and distribution is discussed below.

Storage and Use

Spills of chemicals (including non-process hydrocarbons stored in transportable containers) can originate from stored hydrocarbons/chemicals or equipment on the platform, vessel decks or subsea (refer to Section 6.7.5 for an assessment of the impacts of planned routine and non-routine chemical discharges).

The chemical planned to be stored in the largest volume on the riser platform is corrosion inhibitor (28 m^3 stainless steel tank associated with the PWH). Therefore, the worst-case credible chemical spill scenario could result in up to 28 m^3 of corrosion inhibitor being discharged from the riser platform if all controls were to fail.

Selection of operational chemicals and those used during IMR activities is undertaken in accordance with the Woodside Chemical Selection and Assessment Environment Guideline.

Operational process chemicals are typically stored in dedicated vessels which have similar controls of those related to mitigating hydrocarbon releases; e.g., permanent piping to the process, isolatable by valves, open drain systems and collection tanks, and assurance through risk-based inspection in accordance with the Maintenance and Inspection regimes under the Maintain Assets Process (Section 7.2.1.2).

The riser platform and support vessels also store other non-process chemicals and hydrocarbons, in various volumes. Operational non-process chemicals and facility maintenance chemicals present on the riser platform and support vessels are typically held in low quantities (usually less than 50 L).

Chemical storage areas are typically set up in cabinets, or bunded storage areas to contain any releases to deck from transportable containers (e.g., ISOs, IBCs, barrels, drums). Releases from equipment are predominantly from the failure of hoses or minor leaks from process components, or spills during decant or refuelling of equipment, which can either be located within bunded/drained areas or outside of bunded/drained areas (e.g., over grating on cranes).

Subsea Support Vessels undertaking IMR activities may also store quantities of chemicals for subsea use. Subsea chemical selection process and use is described in Section 3.9. Accidental releases of small quantities of subsea chemicals may occur (e.g. deck spills). Operational experience indicates potential volumes of such spills is small (<20 L).

ROV hydraulic fluid is supplied through hoses containing approximately 20 L of fluid. Hydraulic lines to the ROV arms and other tooling may become caught resulting in minor leaks to the marine environment. Small volume hydraulic leaks may occur from equipment operating via hydraulic controls subsea (subsea control fluid). These include the diamond wire cutter, bolt tensioning equipment, ROV tooling, etc.

Six-inch and Four-inch Chemical Supply Lines

MEG may be released from 6-inch chemical supply and 4-inch chemical supply lines due to a rupture of the lines. Subsea umbilicals transport production chemicals such as corrosion inhibitor for distribution to wells and manifolds. The worst-case credible spill scenario has been determined to be a loss of containment of lean MEG from the 6inch chemical supply line due to a rupture caused by external impact (such as a vessel's anchor). If a rupture occurs the likely volume to be released to the marine environment is 35 m^3 through the depressurisation of the MEG pipeline from its operating pressure of 25 MPag to seabed pressure. Additional MEG losses may occur if:

- there are severe tidal movements around the rupture location causing sea water ingress into the chemical supply line and displacing the MEG to the marine environment, or
- there is a downward flow of MEG due to gravity, dependent on the location of the rupture.

In the unlikely event that there is a continuous leak which does not trigger alarms due to flow differential between onshore and offshore, MEG release could be in the order of 30 m^3/day resulting in a worst-case release of 420 m^3, over two weeks, until detection based on consumption trends.

Surface Spill (Hydrocarbons/Chemicals)

Small diesel spills will rapidly spread on the water surface, with the diesel expected to evaporate and disperse rapidly (National Oceanic and Atmospheric Administration (NOAA), 2006). Woodside has commissioned RPS APASA to model several small marine diesel spills, including surface spill volumes of 8 m^3 in the offshore waters of northwest WA. The results of these models have indicated that exposure to surface hydrocarbons above the 10 g/m^2 threshold is limited to the immediate vicinity of the release site, with little potential to extend beyond 1 km. Based on these

modelling results, the potential impacts of the credible marine diesel and chemical spill scenarios described above are reasonably expected to occur within 1 km of the release location.

The impact assessment assumes this release location to be the riser platform, as this is where all platform-based and most vessel-based spills will potentially occur. Given the nature and scale of the risk, along with the relatively low sensitivity of the receiving environment, no additional modelling studies were considered necessary to inform the impact assessment of unplanned discharges of hydrocarbons or chemicals during transfer, storage and use.

Hydrocarbon Characteristics

Refer to Section 6.8.2 for a description of the characteristics of marine diesel, including detail on the predicted fate and weathering of a spill to the marine environment.

Consequence Assessment

Marine Diesel

Given the low viscosity of marine diesel, along with the high portion of volatile components, a spill of up 8 m^3 of marine diesel during transfer, storage or use would spread and weather rapidly. Environmental receptors at risk would be restricted to those in the vicinity (<1 km from the release location).

Consequences to marine environmental receptors are assessed as consistent with diesel loss of containment impacts described in Section 6.9.2, however, with an order of magnitude lower volume potential, and hence spatial extent.

Given the adopted controls, the overall risk rating for an unplanned bunkering loss of containment is Moderate based on a Minor consequence (short-term impact (one to two years) on species, habitat (but not affecting ecosystem function), physical or biological attribute, or to a community or highly valued area/item of cultural significance community), and an Unlikely likelihood.

Chemicals and Non-process Hydrocarbons

MEG is considered PLONOR; however, very high concentrations of MEG (>50%) may cause irritation to sensitive areas of larger marine fauna (e.g., eyes, gills). Woodside undertook ecotoxicity testing on the lean Pluto MEG (90% monoethylene glycol, ~10% demineralised water and 0.05% corrosion inhibitor). Seven tests, comprised of five different species representing five different taxonomic groups (algae, echinoderm, crustacea, molluscs and fish), were used. The toxicity of the MEG was found to be low, 240 mg/L for 99% species protection and 780 mg/L for 95% species protection (SKM, 2014). MEG is water soluble and will dilute rapidly in the marine environment to low concentrations. Impacts may occur as described above if marine fauna are within the mixing zone when the MEG is released. However, given MEG's low toxicity impacts, it is unlikely there would be any measurable effects on marine species resident in the vicinity of the release. The maximum credible spill of MEG is expected to mix rapidly with the local receiving environment with short term environmental impact.

Accidental releases of chemicals (including corrosion inhibitor) or non-process hydrocarbons decrease the water quality in the immediate area of the release; however, the worst-case loss of containment consequences are expected to be minor with a short-term impact given the water depths, the open ocean mixing environment, distance from sensitive receptors and relatively low credible release volumes. Depending on the chemical released the toxicity and/or potential to bioaccumulate may potentially result in impacts to pelagic fish or other marine species in the vicinity of the discharge.

Potential impacts to plankton from an accidental chemical spill may include acute toxicity resulting in mortality of planktonic organisms. Given the rapid turnover of plankton communities and nature and scale of the credible releases, these impacts will be short-lived (hours to days). Impacts to fish are expected to be of no lasting effect, as fish species are mobile and expected to avoid the area affected by an accidental chemical spill. Impacts to air-breathing fauna such as cetaceans, birds and marine turtles, are expected to be restricted to irritation of sensitive membranes such as the eyes, mouth, and digestive system.

Slight, short-term impacts may occur to other marine users (e.g., commercial fisheries); however, as there is limited fishing within the PAA, it is unlikely there would be any significant impact to commercial fishers.

Summary of Potential Impacts to Environmental Values

Given the adopted controls, the overall risk rating for an unplanned hydrocarbon or chemical release to the marine environment resulting from bunkering, transfer, storage and use is Moderate based on a maximum of Minor consequence (short-term impact: one to two years) to species, habitat (but not affecting ecosystems function), physical and biological attributes, or to a community or highly valued area/item of cultural significant, and an Unlikely likelihood.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Legislation, Codes and Standards				
Contract vessels complying with Marine Orders for safe vessel operations: • Marine Order 91 (Marine pollution prevention – oil) Marine Orders 91 (pollution prevention) reduce the potential impact of marine wastewater discharges on water quality.	F: Yes. CS: Minimal cost. Standard practice.	Marine Orders required under Australian Regulations; implementation is standard practice for commercial vessels as applicable to vessel size, type and class.	Controls based on legislative requirements – must be adopted.	Yes C 6.1
Helicopter fuel storage areas are bunded or secondarily contained when they are not being handled/moved temporarily in accordance with the Australian Government Civil Aviation Safety Authority CAAP 92-4(0) 'Guidelines for the development and operation of offshore helicopter landing sites, including vessels.	F: Yes. CS: Minimal cost. Standard practice.	Reduced the likelihood of an unplanned release during helicopter operations. The consequence is unchanged.	Controls based on legislative requirements – must be adopted.	Yes C 21.1
Implementation of bunkering procedures to reduce the risk of a hydrocarbon release as a result of a bunkering incident.	F: Yes. CS: Minimal cost. Standard practice.	Reduced the likelihood of an unplanned release.	Benefits outweigh cost/sacrifice.	Yes C 21.2
Good Practice				
Implement Woodside's Chemical Selection and Assessment Environment Guideline: • Where Gold, Silver, E or D OCNS rating (and no OCNS substitution or product warning), chemicals are selected – no further control required. • If chemicals with a different OCNS rating, sub warning or non-OCNS rated chemicals are required, chemicals will be assessed in accordance with the guideline prior to use.	F: Yes. Routinely implemented to the chemical selection process for Woodside facilities. CS: Minimal cost. Standard practice.	Selection and assessment of chemicals in accordance with the Woodside process, reduces environmental impacts associated with planned chemical discharge.	Control is a WMS requirement – must be adopted.	Yes C 5.1
Incident reports are raised for unplanned releases within event reporting system.	F: Yes. CS: Minimal cost. Standard practice.	Good practice that operators identify, report and learn from unplanned release events. Supports compliance with	Control based on Woodside standard and regulatory requirements.	Yes C 13.5

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
		regulatory reporting requirements.		
PLA bunkering equipment controls: • All bulk transfer hoses shall be pressure-rated at purchase to reduce the risk of accidental hydrocarbon release during bunkering. • There shall be dry-break couplings on fuel hoses. • There shall be an adequate number of appropriately stocked, located and maintained spill kits.	F: Yes. CS: Minimal cost. Standard practice.	By ensuring the appropriate equipment is in place, tested and maintained appropriately, the likelihood of a spill occurring is reduced. Although no significant reduction in consequence could result, the overall risk is reduced.	Benefits outweigh cost/sacrifice	Yes C 21.3
Contractor procedures include requirements to be implemented during vessel bunkering/refuelling operations, including: • A completed PTW and/or job safety analysis (JSA) shall be implemented for the hydrocarbon bunkering/refuelling operation. • Visually monitoring of gauges, hoses, fittings and the sea surface during the operation. • Hoses will be checked before starting. • Bunkering/refuelling will commence in daylight hours. If the transfer is to continue into darkness, the JSA risk assessment must consider lighting and the ability to determine if a spill has occurred. • Hydrocarbons shall not be transferred in marginal weather conditions.	F: Yes. CS: Minimal cost. Standard practice.	By ensuring the appropriate equipment is in place, tested and maintained appropriately, the likelihood of a spill occurring is reduced. Although no significant reduction in consequence could result, the overall risk is reduced.	Benefits outweigh cost/sacrifice.	Yes C 21.4
Chemicals and diesel stored safely to prevent the release to the marine environment.	F: Yes. CS: Minimal cost. Standard practice.	Reduces risk of unplanned chemical/diesel release.	Benefits outweigh cost/sacrifice.	Yes C 21.5
Monitoring and maintenance of subsea infrastructure to ensure integrity management (MEG lines inspected during hydrocarbon system ROV inspection).	F: Yes. CS: Minimal cost. Standard practice.	Good practice to inspect integrity of MEG pipeline.	Benefit outweighs cost/sacrifice.	Yes C 21.6

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Monitoring MEG use, investigating material discrepancies, and monitoring flow discrepancy to support identification of potential integrity failures (instruments in scope of P31).	F: Yes. The use of MEG is monitored to maintain adequate fluid in the system. CS: Minimal cost.	Chemical inventory monitoring and surveillance limits the volumes of MEG potentially discharged to the marine environment.	Benefit outweighs cost/sacrifice.	Yes C 21.7
Professional Judgement – Substitute				
None identified.				
Professional Judgement – Substitute				
None identified.				
Professional Judgement – Engineered Solution				
Facility open hazardous and diesel drain system integrity maintained to contain potential spilled liquid hydrocarbon in areas as appropriate to safe integrated facility design.	F: Yes. The riser platform has been designed with an integral drains system (as practicable to suit NNC facility safety design requirements) to prevent escalation associated with hazardous inventories and support the appropriate containment of environmentally hazardous liquids. CS: Inherent feature of riser platform design to ALARP. Some safety philosophy sacrifice.	The drains system can support the appropriate segregation and containment of environmentally hazardous liquids in case of unplanned loss of containment before it reaches the environment.	Benefit outweighs cost/sacrifice.	Yes C 6.3
Emergency Response				
Mitigation – Emergency and Hydrocarbon Spill Response.	Standard practice to implementing management systems to maintain: • Pluto Offshore Facility Emergency Response Plan • Pluto Offshore Facility Oil Pollution First Strike Plan • Oil Pollution Emergency Arrangements – Australia. Refer to Appendix H: Oil Spill Preparedness and Response Mitigation Assessment for discussion around the ALARP assessment of controls related to hydrocarbon spill response			

ALARP Statement:

On the basis of the environmental risk assessment outcomes and use of the relevant tools appropriate to the decision type, Woodside considers the adopted controls appropriate to manage the impacts of accidental spills of hydrocarbons from bunkering/refuelling, chemicals transfer, storage, and use, and accidental release of 6-inch MEG chemical supply line and 4-inch chemical supply lines. As no reasonable additional/alternative controls were identified that would further reduce the consequences and risks without grossly disproportionate sacrifice, the risks are considered ALARP

Demonstration of Acceptability
Acceptability Statement: The consequence assessment has determined that, given the adopted controls, accidental spills during bunkering/refuelling, or spills from storage, transfer and use and from a release of 6-inch MEG chemical supply line and 4-inch chemical supply lines represent a moderate risk rating that is unlikely to result in a consequence greater than Minor, short-term impacts. Further opportunities to reduce the risks have been investigated above. The adopted controls are considered good oil-field practice/industry best practice and meet requirements of Australian Marine Orders. The potential risks are considered broadly acceptable if the adopted controls are implemented. Therefore, Woodside considers the adopted controls appropriate to manage the risks of bunkering/refuelling, and storage, transfer and use, and the release of 6-inch MEG chemical supply line and 4-inch chemical supply lines to a level that is broadly acceptable.

EPOs, EPSs and MC for Pluto Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 21 No unplanned release of hydrocarbons or chemicals to the marine environment during operations.	**C 6.1** Contract vessels complying with Marine Orders for safe vessel operations: • Marine Order 91 (Marine pollution prevention – oil).	**PS 6.1** Vessels contracted whose practices comply with Marine Orders as applicable to vessel size, type and class (Marine Order 91).	**MC 6.1.1** Records demonstrate vessels are compliant with standard maritime safety procedures (Marine Order 91).
	C 21.1 Helicopter fuel storage areas are bunded or secondarily contained when they are not being handled/moved temporarily in accordance with the Australian Government Civil Aviation Safety Authority CAAP 92-4(0) 'Guidelines for the development and operation of offshore helicopter landing sites, including vessels.	**PS 21.1** Failure of primary containment in storage areas does not result in loss to the marine environment.	**MC 21.1.1** Records confirm all fuels are stored in bunded/secondarily contained areas when not being handled/moved temporarily.
	C 21.2 Implementation of PLA bunkering procedures to reduce the risk of a hydrocarbon release as a result of a bunkering incident.	**PS 21.2** Implement Diesel Fuel System – Loading Bunkers – Standard Operating Procedure. Key requirements include: • Routine bunkering to be carried out when adequate lighting is available for spill detection unless following an activity-specific risk assessment approved by the OIM. • Communications between the supply vessel and facility bunker station will be maintained during bunkering.	**MC 21.2.1** Records demonstrate bunkering undertaken in accordance with facility and contractor bunkering procedures.

EPOs, EPSs and MC for Pluto Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
		• Hoses and connections to be visually checked during refuelling. • Tank levels will be monitored throughout bunkering. • Spill clean-up equipment will be available near the bunker station. • Bunkering hose inventory will be drained to the supply vessel before disconnection.	
	C 6.3 Facility open hazardous and diesel drain system integrity maintained to contain potential spilled liquid hydrocarbon in areas as appropriate to safe integrated facility design.	**PS 6.3** Integrity will be managed in accordance with SCE Management Procedures (Section 7.4) and SCE Technical Performance Standard(s) to prevent environment risk related damage to SCEs for F22 – Open Hazardous and Diesel Drains, to: • prevent escalation of an incident following loss of containment, fire and/or explosion by removing or containing flammable liquid from hazardous areas • support appropriate containment and disposal of environmentally hazardous liquids to avoid damage to the environment.	**MC 1.16.1** Records demonstrate implementation of SCE Technical Performance Standard(s) and Management of Hardware Controls in the Operate Phase Procedure (Section 7.4.2), in order to achieve the functional objective of the control. Records may include implementation and maintain/assure, and manage-change information summarised in Section 7.4.2
	C 21.3 PLA bunkering equipment controls: • All bulk transfer hoses shall be pressure-rated at purchase to reduce the risk of accidental hydrocarbon release during bunkering. • There shall be dry-break couplings on fuel hoses. • There shall be an adequate number of appropriately	**PS 21.3.1** All diesel transfer hoses to have dry break couplings and pressure rating suitable for intended use.	**MS 21.3.1** Records confirm presence of dry break of couplings and flotation on fuel hoses.
		PS 21.3.2 To ensure adequate resources are available to allow implementation of Ship Oil Pollution Emergency Plan (SOPEP).	**MS 21.3.2** Records confirm presence of spill kits.

EPOs, EPSs and MC for Pluto Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	stocked, located and maintained spill kits.		
	C 21.4 Contractor procedures include requirements to be implemented during vessel bunkering/refuelling operations, including: • A completed PTW and/or job safety analysis (JSA) shall be implemented for the hydrocarbon bunkering/refuelling operation. • Gauges, hoses, fittings and the sea surface will be visually monitored during the operation. • Hoses will be checked before starting. • Bunkering/refuelling will commence in daylight hours. If the transfer is to continue into darkness, the JSA risk assessment must consider lighting and the ability to determine if a spill has occurred. • Hydrocarbons shall not be transferred in marginal weather conditions.	**PS 21.4** Compliance with Contractor procedures for the management of vessel bunkering/ helicopter operations.	**MC 21.4.1** Records demonstrate bunkering/refuelling undertaken in accordance with contractor bunkering procedures.
	C 21.5 Chemicals and diesel stored safely to prevent the release to the marine environment.	**PS 21.5** Chemical/diesel storage areas for transportable containers on the riser platform will have adequate containment in place to contain an accidental chemical/ diesel spill.	**MC 21.5.1** Riser platform chemical/diesel storage areas for transportable containers provided with adequate bunding/containment.
	C 13.5 Raising incident reports within event reporting system for unplanned releases.	**PS 13.5** Incident reports raised for unplanned releases and Recordable Incidents notified.	**MC 13.5.1** Records demonstrate incident reports raised for unplanned releases, and applicable Recordable Incident notifications completed.
	C 5.1 Implement Woodside's Chemical Selection and Assessment Environment Guideline: • Where Gold, Silver, E or D OCNS rating (and no OCNS substitution or product warning), chemicals are	**PS 5.1** All chemicals intended or likely to be discharged to the marine environment will be assessed and approved prior to use in accordance with the Chemical Selection and Assessment Environment Guideline (described in	**MC 5.1.1** Chemical assessment register demonstrates the chemical selection, assessment and approval process for selected chemicals is followed.

EPOs, EPSs and MC for Pluto Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	selected – no further control required. • If chemicals with a different OCNS rating, sub warning or non-OCNS rated chemicals are required, chemicals will be assessed in accordance with the guideline prior to use.	Section 3.9) to ensure the impacts associated with use are ALARP and acceptable.	
	C 21.6 Monitoring and maintenance of subsea infrastructure to ensure integrity management (MEG lines inspected during hydrocarbon system ROV inspection).	**PS 14.1** Integrity will be managed in accordance with SCE Management Procedures and SCE Technical Performance Standard(s) to prevent environment risk related damage to SCEs for: • P09 – Pipeline Systems, to maintain the minimum required mechanical integrity to prevent loss of containment.	**MC 1.16.1** Records demonstrate implementation of SCE Technical Performance Standard(s) and Management of Hardware Controls in the Operate Phase Procedure (Section 7.4.2), in order to achieve the functional objective of the control. Records may include implementation and maintain/assure, and manage-change information summarised in Section 7.4.2
	C 21.7 Monitoring MEG use, investigating material discrepancies, and monitoring flow discrepancy to support identification of potential integrity failures (instruments in scope of P31).	**PS 21.7** Instrumentation integrity will be managed in accordance with SCE Management Procedures (Section 7.4) and SCE Technical Performance Standard(s) to prevent environment risk related Damage to SCEs for: • P31 – Environmental Emissions Monitoring and Controls, to ensure monitoring data is available to identify and investigate potential material MEG use discrepancies.	**MC 1.16.1** Records demonstrate implementation of SCE Technical Performance Standard(s) and Management of Hardware Controls in the Operate Phase Procedure (Section 7.4.2), in order to achieve the functional objective of the control. Records may include implementation and maintain/assure and manage-change information summarised in Section 7.4.2
	Mitigation – Emergency and Hydrocarbon Spill Response.	Refer to Appendix H: Oil Spill Preparedness and Response Mitigation Assessment for discussion around the ALARP assessment of controls related to hydrocarbon spill response.	

6.9.5 Unplanned Hydrocarbon or Chemical Release: Bunkering, Deck and Subsea Spills – Xena-03 Tie-back

Context		
Xena-03 Drilling and Tie-back Activities – Section 3.11 Vessel-based Activities for the Xena-03 Tie-back – Section 3.12	Physical Environment – Section 4.4 Habitats and Biological Communities – Section 4.5 Protected Species – Section 4.6 Socio-economic Environment – Section 4.9	Consultation – Section 5

Impacts and Risks Evaluation Summary

Source of Risk	***Environmental Value Potentially Impacted***						***Evaluation***						
	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/Habitat	Species	Socio-economic	Decision Type	Consequence/Impact	Likelihood	Risk Rating	ALARP Tools	Acceptability	Outcome
Accidental discharge of marine diesel/hydrocarbons to the marine environment during bunkering and/or refuelling		x			x		A	D	2	M	LCS GP	Broadly Acceptable	EPO 22
Accidental discharge of other hydrocarbons and chemicals from MODU or project vessels deck activities and equipment (e.g., cranes) including subsea ROV hydraulic leaks		x		x	x		A	F	1	L	LCS GP	Acceptable if ALARP	

Description of Source of Risk

Marine Diesel Bunkering/Refuelling

Bunkering of marine diesel between the MODU and project vessels, as well as the possible refuelling of cranes and other equipment, may take place on the MODU.

Three credible scenarios for the loss of containment of marine diesel during bunkering operations have been identified:

- Partial or total failure of a bulk transfer hose or fittings during bunkering, due to operational stress or other integrity issues could spill marine diesel to the deck and/or into the marine environment. This would be in the order of less than 200 L, based on the likely volume of a bulk transfer hose (assuming a failure of the dry break and complete loss of hose volume).
- Partial or total failure of a bulk transfer hose or fittings during bunkering, combined with a failure in procedure to shutoff fuel pumps, for a period of up to fifteen minutes, resulting in approximately 24 m³ marine diesel lost to the deck and/or into the marine environment.
- Partial or total failure of a bulk transfer hose or fittings during helicopter refuelling could spill aviation jet fuel to the helicopter deck and/or into the marine environment. All helicopter refuelling activities are closely supervised and leaks on the helideck are considered to be easily detectable. In the event of a leak, transfer would cease immediately. The credible volume of such a release during helicopter refuelling would be in the order of <100 L.

Quantitative Spill Risk Assessment

Small diesel spills rapidly spread on the water surface, with the diesel expected to evaporate and disperse rapidly (National Oceanic and Atmospheric Administration (NOAA), 2006). Woodside commissioned RPS to model several small marine diesel spills in the offshore waters of northwest WA. The results of these models have indicated that exposure to surface hydrocarbons above the 10 g/m² threshold is limited to the immediate vicinity of the release site, with little potential to extend beyond 1 km. Therefore, it is considered that exposure to threshold concentrations from a 24 m³ surface spill from MODU bunkering activities would be well within the EMBA for the vessel collision scenario detailed in Section 6.9.3. Given this, the offshore location of the Xena-03 Operational Area, and the fact that the same hydrocarbon type is involved for both scenarios, specific modelling for a 24 m³ marine diesel release was not undertaken for this Petroleum Activities Program.

Hydrocarbon Characteristics

Refer to Section 6.9.3 for a description of the characteristics of marine diesel (comparable characteristics for marine gas oil used in the modelling), including detail on the predicted fate and weathering of a spill to the marine environment.

Chemical Spills – Deck and Subsea

MODU, Installation Vessel and ROV Operations

Deck spills can result from spills from stored chemicals or equipment. Installation vessels typically store chemicals in various volumes (20 L, 205 L; up to approximately 4000–6000 L). Storage areas are typically set up with effective primary and secondary bunding to contain any deck spills. Releases from equipment are predominantly from the failure of hydraulic hoses, which can either be located within bunded areas or outside of bunded or deck areas (e.g., over water on cranes). Helicopter refuelling may also take place within the PAA, on the helipad of the MODU and project vessels.

Chemicals that will be used and may be accidentally released include:

- non process chemicals (maintenance and cleaning chemicals)
- non process hydrocarbons; i.e., hydraulic fluids used in machinery (including cranes, winches, ROVs), small volumes of fuel
- drilling and well fluids
- pre-commissioning chemicals used for leak testing (MEG/treated water mixture).

Non-Process Chemicals

Non-process chemicals, such as wash chemicals, cleaning chemicals, maintenance and solvents, are generally held onboard in low quantities (typically <50 L containers) and are located within chemical cabinets or bunded storage areas on the project vessels and MODU. Non-process chemical spills may result from human error or damage to a chemical container during handling. Spills are generally captured by the drain system and routed to a holding tank for treatment or disposal onshore. In the event that a spill is not contained on deck or within a bunded area, there would be a release to the marine environment of an estimated up to 50 L.

Non-Process Hydrocarbons

Woodside's operational experience demonstrates that non-process hydrocarbon spills are most likely to originate from hydraulic hoses and are typically less than 100 L, with an approximate average volume <10 L.

Non-process hydrocarbons (hydraulic fluids) are used in hydraulic-powered machinery, such as winches, cranes and ROVs, and are hydrocarbon-based with added chemical component additives. Unplanned discharges are predominantly due to failure of hydraulic hoses or minor leaks from process components, or spills during periodic refuelling of hydraulic hoses. Spills or leaks from hydraulic hoses are usually very small volumes (~1 L) and are typically contained within a bunded or drained area under the equipment mounted on deck. These small on-deck spills are unlikely to reach the marine environment. A burst hydraulic hose on an extended crane could potentially result in hydraulic fluid being sprayed in a fine jet out over the water. However, this would only result in a small volume (~25 L) being released, due to the small capacity of hydraulic hoses.

Subsea leaks or spills can result from a loss of containment of fluids from subsea equipment including the BOP or ROVs. Subsea chemical use is described in Section 3.9. Typically, subsea spills during Woodside drilling activities generally do not exceed 26 L.

The ROV hydraulic fluid is supplied through hoses containing approximately 20 L of fluid. Hydraulic lines to the ROV arms and other tooling may become caught resulting in minor leaks to the marine environment. Small volume hydraulic leaks may occur from equipment operating via hydraulic controls subsea (subsea control fluid).

Hydraulic fluids are medium oils of light to moderate viscosity. They have a relatively rapid spreading rate and will dissipate quickly, particularly in high sea states. Lubricating oils may also be held onboard, typically stored with the non process chemicals and held in low quantities. These hydrocarbons are more viscous, so in the event of an unplanned discharge, the spreading rate of a slick of these oils would be slightly slower.

Contingency Activities

Wireline Operations

Minor unplanned leaks of hydrocarbons or chemicals during wireline activities with a live well include leaks such as:

- leaks from the lubricator, stuffing box and hose or fitting failure, which are expected to be less than 10 L (0.01 m^3)
- loss of containment – fluids – surface holding tanks
- backloading of raw slop fluids in an IBC
- stuffing box leak/under pressure
- draining of lubricator contents
- excess grease/lubricant leaking from the grease injection head
- wind-blown lubricant dripping from cable/on deck
- lubricant used to lubricate hole.

Consequence Assessment

Marine Diesel

Given the low viscosity of marine diesel, along with the high portion of volatile components, a surface spill of marine diesel during transfer, storage or use would spread and weather rapidly. Environmental receptors at risk would be restricted to those in the vicinity (<1 km from the release location). The biological consequences of a small volume diesel spill on identified open water sensitive receptors relate to the potential for minor consequences to megafauna, plankton and fish populations (surface and water column biota). Impacts to plankton may include acute toxicity resulting in mortality of planktonic organisms. Given the rapid turnover of plankton communities, these impacts will be short-lived (hours to days). Impacts to fish are expected to be of no lasting effect, as fish species are mobile and expected to avoid the area affected by a marine diesel spill incident. Impacts to larger fauna such as cetaceans and marine turtles may be light fouling, potentially resulting in irritation of sensitive membranes such as the eyes, mouth and digestive system (Helm et al., 2015). Mortality of larger fauna is not expected to occur. No impacts to ecosystem function are expected.

Hydrocarbons may extend into the Multiple Use Zone of the Montebello Marine Park and impacts would be as described above for open ocean receptors. No impacts are predicted to Continental Slope Demersal Fish Communities and the Ancient Coastline at 125 m Depth Contour KEFs. Although they do overlap the operational area, they are outside the predicted spill impact zone.

Slight, short-term impacts may occur to other marine users (e.g., commercial fisheries); however, as there is already no fishing within the PSZ and limited fishing within the Xena-03 Operational Area, it is unlikely that there would be any significant impact to commercial fishers.

Accidental spills of hydrocarbons or chemicals from the MODU, installation vessel and support vessels will decrease the water quality in the immediate area of the spill; however, the impacts are expected to be temporary and very localised due to dispersion and dilution in the open ocean environment.

Given the offshore/open water location, receptors such as marine fauna may be affected if they come in direct contact with a release (i.e., by traversing the immediate spill area). In the event that marine fauna come into contact with a release, they could suffer fouling, ingestion, inhalation of toxic vapours, irritation of sensitive membranes in the eyes, mouth, digestive and respiratory tracts, and organ or neurological damage. Cetaceans may exhibit avoidance behaviour patterns and, given they are smooth skinned, hydrocarbons and other chemicals are not expected to adhere. Given the small area of the potential spill and the dilution and weathering of any spill, the likelihood of ecological impacts to marine fauna (protected species), other communities and habitats is expected to have no lasting effect.

No impacts on socio-economic receptors are expected due to the low levels of fishing activity in the Xena-03 Operational Area, the small volumes of hydrocarbons/chemicals that could be accidentally spilled, and the localised and temporary nature of the impacts.

Summary of Potential Impacts to Environmental Values

Given the adopted controls, it is considered that hydrocarbon spills to the marine environment from bunkering will not result in a potential impact greater than minor, short term local impacts on species, habitat (but not affecting ecosystems function), physical and biological attributes (i.e., Consequence – D). Further, other hydrocarbon and chemical spills to the marine environment from deck/subsea is expected to have no lasting effect (<1 month), localised impact not significant to environmental receptor (i.e., Consequence – F).

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[130]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Legislation, Codes and Standards				
Contract vessels complying with Marine Orders for safe vessel operations: • Marine Order 91 (Marine pollution prevention – oil) Marine Orders 91 (pollution prevention) reduce the potential impact of marine wastewater discharges on water quality.	F: Yes. CS: Minimal cost. Standard practice.	Marine Orders required under Australian Regulations; implementation is standard practice for commercial vessels as applicable to vessel size, type and class.	Controls based on legislative requirements – must be adopted.	Yes C 6.1
Helicopter fuel storage areas are bunded or secondarily contained when they are not being handled/moved temporarily in accordance with the Australian Government Civil Aviation Safety Authority CAAP 92-4(0) 'Guidelines for the development and operation of offshore helicopter landing sites, including vessels.	F: Yes. CS: Minimal cost. Standard practice.	Reduced the likelihood of an unplanned release during helicopter operations. The consequence is unchanged.	Controls based on legislative requirements – must be adopted.	Yes C 21.1
Liquid chemical and fuel storage areas are bunded or secondarily contained when they are not being handled/moved temporarily.	F: Yes. CS: Minimal cost. Standard practice.	Reduces the likelihood of contaminated deck drainage water being discharged to the marine environment.	Controls based on legislative requirements – must be adopted.	Yes C 22.1
Good Practice				
Bunkering equipment controls: • All hoses that have a potential environmental risk following damage or failure shall be placed on a hose	F: Yes. CS: Minimal cost. Standard practice.	By ensuring the appropriate equipment is in place, tested and maintained appropriately, the likelihood of a spill occurring is reduced. Although no	Benefits outweigh cost/sacrifice.	Yes C 22.2

[130] Qualitative measure

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[130]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
register that is linked to the MODU's preventative maintenance system. • All bulk transfer hoses shall be pressure-rated at purchase to reduce the risk of accidental hydrocarbon release during bunkering. • There shall be dry-break couplings and flotation on fuel hoses. • There shall be an adequate number of appropriately stocked, located and maintained spill kits.		significant reduction in consequence could result, the overall risk is reduced.		
Contractor procedures include requirements to be implemented during vessel bunkering/refuelling operations, including: • A completed PTW and/or job safety analysis (JSA) shall be implemented for the hydrocarbon bunkering/refuelling operation. • Visually monitoring of gauges, hoses, fittings and the sea surface during the operation. • Hoses will be checked before starting. • Bunkering/refuelling will commence in daylight hours. If the transfer is to	F: Yes. CS: Minimal cost. Standard practice.	By ensuring the appropriate equipment is in place, tested and maintained appropriately, the likelihood of a spill occurring is reduced. Although no significant reduction in consequence could result, the overall risk is reduced.	Benefits outweigh cost/sacrifice.	Yes C 21.4

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[130]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
continue into darkness, the JSA risk assessment must consider lighting and the ability to determine if a spill has occurred. • Hydrocarbons shall not be transferred in marginal weather conditions.				
Where there is potential for loss of primary containment of oil and chemicals on the MODU, deck drainage must be collected via a drainage water management system.	F: Yes. CS: Minimal cost. Standard practice.	Requirements for deck drainage and management of oily water would reduce the likelihood of contaminated deck drainage water being discharged to the marine environment. No change in consequence would occur.	Benefits outweigh cost/sacrifice.	Yes C 6.2
For Xena-03 Tie-back activity fluids, six-monthly chemical reviews are performed during active drilling campaigns.	F: Yes. CS: Minimal cost. Standard practice.	Reduces the consequence of impacts resulting from discharges to the marine environment by ensuring chemicals have been assessed for environmental acceptability. Planned discharges are required for safely executing activities; therefore, no reduction in likelihood can occur.	Benefits outweigh cost/sacrifice.	Yes C 5.5
Contractor procedure for managing project fluids transfers onto, around and off the MODU, which requires: • emergency shutdown systems for stopping losses of containment (e.g., burst hoses) • break-away dry-break	F: Yes. CS: Minimal cost. Standard practice for Woodside to review contractor systems prior to performing activity.	Reduces the likelihood of an unplanned release occurring. Although no change in consequence would occur, the reduction in likelihood decreases the overall risk, providing environmental benefit.	Benefits outweigh cost/sacrifice.	Yes C 22.3

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[130]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
couplings for oil-based mud hoses • transfer hoses to have floatation devised to allow detection of a leak • the valve line-up checked prior to commencing mud transfers • constant monitoring of the transfer process • direct radio communications • completed PTW and JSA showing contractor procedures are implemented • recording and verification of volumes moved to identify any losses • mud pit dump valves locked closed when not in use for mud transfers and operated under a PTW.				
Check for the functionality of: • additional SCE (augers and cuttings dryers) • mud tanks • mud tank room • transfer hoses • NWBM base fluid transfer lines • NWBM base fluid transfer station • base fluid storage.	F: Yes. CS: Minimal cost. Standard practice	Reduces the likelihood of an event occurring and reduces the potential consequences (by limiting volume released).	Benefits outweigh cost/sacrifice.	Yes C 22.4
Spill kits positioned in high-risk locations around the rig (near potential spill points such as transfer stations).	F: Yes. CS: Minimal cost. Standard practice.	Spill kits would reduce the likelihood of a deck spill from entering the marine environment. The	Benefits outweigh cost/sacrifice.	Yes C 22.5

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[130]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
		consequence is unchanged.		
Installation and support vessels have self-containing hydraulic oil drip tray management system.	F: Yes. CS: Minimal cost. Standard practice.	Requirements for self-containing hydraulic oil drip tray management system would reduce the likelihood of contaminants being discharged to the marine environment. No change in consequence would occur.	Benefits outweigh cost/sacrifice.	Yes C 22.6
Chemical Selection and Assessment Environment Guideline: • Where Gold/Silver/E/D OCNS rating (and no OCNS substitution or product warning), chemicals are selected, no further control required. • If chemicals with a different OCNS rating, sub warning or non OCNS rated chemicals are required, chemicals will be assessed in accordance with the guideline prior to use.	F: Yes. Woodside routinely implements a chemical selection process based on OCNS at the facility. CS: Minimal. The OCNS is widely used throughout the industry and chemical suppliers are aware of the requirements of the scheme.	Selection and assessment of chemicals in accordance with Woodside process reduces environmental impacts associated with planned chemical discharge.	Benefits outweigh cost/sacrifice.	Yes C 5.1
Incident reports are raised for unplanned releases within event reporting system.	F: Yes. CS: Minimal cost. Standard practice.	Good practice that operators identify, report and learn from unplanned release events. Supports compliance with regulatory reporting requirements.	Control based on Woodside standard and regulatory requirements.	Yes C 13.5
Professional Judgement – Eliminate				
No refuelling of helicopter on MODU.	F: No. Given the distance of the Xena-03 Operational Area from the airports suitable for helicopter operations, and the	Not considered, control not feasible.	Not considered, control not feasible.	No.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[130]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
	endurance of available helicopters, eliminating helicopter refuelling is not feasible. Helicopter flights cannot be eliminated, and may be required in emergency situations. CS: Not assessed, control cannot feasibly be implemented.			
The MODU/project vessel brought into port to refuel.	F: No. Does not eliminate the fuel transfer risk. It is not operationally practical to transit MODU/project vessel back to port for refuelling based on the frequency of the refuelling requirements and distance from the nearest port (Dampier). CS: Significant due to schedule delay and vessel transit costs and day rates.	Eliminates the risk in the Xena-03 Operational Area, However, moves risk to another location. Therefore, no overall benefit.	Disproportionate. The cost/ sacrifice outweighs the benefit gained.	No.
Professional Judgement – Substitute				
No additional controls identified.				
Professional Judgement – Engineered Solution				
Below-deck storage of all hydrocarbons and chemicals.	F: No. During operations there is a need to keep small volumes near activities and within equipment requiring use of hydrocarbons and chemicals and can result in increased risk of leaks from transfers via hose or smaller containers. CS: Not considered, control not feasible.	Not considered, control not feasible.	Not considered, control not feasible.	No
A reduction in the volumes of chemicals and hydrocarbons stored	F: Yes. Increases the risks associated with transportation and lifting operations.	No reduction in likelihood or consequence since chemicals will still be required to enable	Disproportionate. The cost/sacrifice outweighs the benefit gained.	No

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[130]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
onboard MODU/ project vessels.	CS: Project delays if required chemicals not on board. Increases the risks associated with transportation and lifting operations.	drilling activities to occur.		
ALARP Statement: On the basis of the environmental risk assessment outcomes and use of the relevant tools appropriate to the decision type, Woodside considers the adopted controls appropriate to manage the risks and consequences of unplanned release of chemicals and hydrocarbons from bunkering, deck and subsea spills during Xena-03 Tie-back activities. As no reasonable additional/alternative controls were identified that would further reduce the impacts without grossly disproportionate sacrifice, the impacts and risks are considered ALARP.				

Demonstration of Acceptability
Acceptability Statement: The consequence assessment has determined that, given the adopted controls, accidental spills during bunkering/refuelling from Xena-03 Tieback activities represent a moderate risk rating that is unlikely to result in a consequence greater than Minor, short-term impacts. Other accidental hydrocarbon or chemical spills to Deck/subsea during Xena-03 Tieback activities represent a low risk rating that is unlikely to result in potential impact greater than localised, minor and temporary disruption to a small proportion of the population and no impact on critical habitat or activity. Further opportunities to reduce the risks have been investigated above. The adopted controls are considered good oil-field practice/industry best practice and meet requirements of Australian Marine Orders. The potential risks are considered broadly acceptable if the adopted controls are implemented. Therefore, Woodside considers the adopted controls appropriate to manage the risks of unplanned hydrocarbon or chemical release from bunkering, deck and subsea spills to a level that is broadly acceptable.

EPOs, EPSs and MC for Drilling and Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 22 No unplanned release of hydrocarbons or chemicals to the marine environment during Xena 03 tie-back activities.	**C 6.1** Contract vessels complying with Marine Orders for safe vessel operations: • Marine Order 91 (Marine pollution prevention – oil).	**PS 6.1** Vessels contracted whose practices comply with Marine Orders as applicable to vessel size, type and class (Marine Order 91).	**MC 6.1.1** Records demonstrate vessels are compliant with standard maritime safety procedures (Marine Order 91).
	C 21.1 Helicopter fuel storage areas are bunded or secondarily contained when they are not being handled/moved temporarily in accordance with the Australian Government Civil Aviation Safety Authority CAAP 92-4(0) 'Guidelines for the development and operation of offshore helicopter landing sites, including vessels.	**PS 21.1** Failure of primary containment in storage areas does not result in loss to the marine environment.	**MC 21.1.1** Records confirm all fuels are stored in bunded/secondarily contained areas when not being handled/moved temporarily.

EPOs, EPSs and MC for Drilling and Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	C 22.1 Liquid chemical and fuel storage areas are bunded or secondarily contained when they are not being handled/ moved temporarily.	**PS 22.1** Failure of primary containment in storage areas does not result in loss to the marine environment.	**MC 22.1.1** Records confirms all liquid chemicals and fuel are stored in bunded/secondarily contained areas when not being handled/ moved temporarily.
	C 22.2 Bunkering equipment controls: • All hoses that have a potential environmental risk following damage or failure shall be placed on a hose register that is linked to the MODU's preventative maintenance system. • All bulk transfer hoses shall be pressure-rated at purchase to reduce the risk of accidental hydrocarbon release during bunkering. • There shall be dry-break couplings and flotation on fuel hoses. • There shall be an adequate number of appropriately stocked, located and maintained spill kits.	**PS 22.5.1** All diesel transfer hoses to have dry break couplings and pressure rating suitable for intended use.	**MS 22.5.1** Records confirm presence of dry break of couplings and flotation on fuel hoses.
		PS 22.5.2 To ensure adequate resources are available to allow implementation of Ship Oil Pollution Emergency Plan (SOPEP).	**MS 22.5.2** Records confirm presence of spill kits.
	C 21.4 Contractor procedures include requirements to be implemented during bunkering/refuelling operations, including: • A completed PTW and/or job safety analysis (JSA) shall be implemented for the hydrocarbon bunkering/refuelling operation. • Gauges, hoses, fittings and the sea surface will be visually monitored during the operation. • Hoses will be checked before starting. • Bunkering/refuelling will commence in daylight hours. If the transfer is to continue into darkness, the JSA risk assessment	**PS 21.4** Compliance with Contractor procedures for the management of bunkering/helicopter operations.	**MC 21.4.1** Records demonstrate bunkering/refuelling undertaken in accordance with contractor bunkering procedures.

EPOs, EPSs and MC for Drilling and Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	must consider lighting and the ability to determine if a spill has occurred. • Hydrocarbons shall not be transferred in marginal weather conditions.		
	C 6.2 Where there is a potential for loss of primary containment of oil and chemicals on the MODU, deck drainage must be collected via a drainage water management system.	**PS 6.2** Contaminated drainage contained, treated and/or separated prior to discharge.	**MC 6.2.1** Environmental inspection records demonstrate MODU has a functioning bilge/oily water management system.
	C 5.5 For Xena-03 Tie-back activity fluids, six-monthly chemical reviews are performed during active drilling campaigns.	**PS 5.5** Acceptability of previously approved chemicals are re-evaluated to ensure ALARP and alternatives are considered.	**MC 5.5.1** Records confirm six-monthly reviews have occurred during active drilling campaigns, and any actions/ changes are being tracked to closure..
	C 22.3 Contractor procedure for managing project fluids transfers onto, around and off the MODU, which requires: • emergency shutdown systems for stopping losses of containment (e.g., burst hoses) • break-away dry-break couplings for oil-based mud hoses • transfer hoses to have flotation devised to allow detection of a leak • the valve line-up checked prior to commencing mud transfers • constant monitoring of the transfer process • direct radio communications • completed PTW and JSA showing contractor procedures are implemented • recording and verification of volumes moved to identify any losses • mud pit dump valves locked closed when not in use for mud transfers and operated under a PTW.	**PS 22.3** Compliance with Contractor procedures to limit accidental loss to the marine environment.	**MC 22.3.1** Records demonstrate drilling fluid transfers are performed in accordance with the applicable contractor procedures.

EPOs, EPSs and MC for Drilling and Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	C 22.4 Check for the functionality of: • additional SCE (augers and cuttings dryers) • mud tanks • mud tank room • transfer hoses • NWBM base fluid transfer lines • NWBM base fluid transfer station base fluid storage.	**PS 22.4** Prevent the unacceptable use or discharge of NWBM/base oil.	**MC 22.4.1** Environmental inspection records demonstrate the presence and functionality of the specified equipment.
	C 22.5 Spill kits positioned in high risk locations around the rig (near potential spill points such as transfer stations).	**PS 22.5** Spill kits to be available for use to clean up deck spills.	**MC 22.5.1** Environmental inspection records confirm that spill kits are present, maintained, and suitably stocked.
	C 22.6 Installation and support vessels have self-containing hydraulic oil drip tray management system.	**PS 22.6** To contain any on-deck spills of hydraulic oil.	**MC 22.6.1** Environmental inspection records demonstrate project installation vessels are equipped with self-containing hydraulic oil drip tray management system.
	C 5.1 Chemical Selection and Assessment Environment Guideline: • Where Gold/Silver/E/D OCNS rating (and no OCNS substitution or product warning), chemicals are selected, no further control required. • If chemicals with a different OCNS rating, sub-warning or non-OCNS rated chemicals are required, chemicals will be assessed in accordance with the guideline prior to use.	**PS 5.1** All chemicals intended or likely to be discharged to the marine environment will be assessed and approved prior to use in accordance with the Chemical Selection and Assessment Environment Guideline (described in Section 3.9) to ensure the impacts associated with use are ALARP and acceptable.	**MC 5.1.1** Chemical assessment register demonstrates the chemical selection, assessment and approval process for selected chemicals is followed.
	C 13.5 Raising incident reports within event reporting system for unplanned releases.	**PS 13.5** Incident reports raised for unplanned releases and Recordable Incidents notified.	**MC 13.5.1** Records demonstrate incident reports raised for unplanned releases, and applicable Recordable

EPOs, EPSs and MC for Drilling and Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
			Incident notifications completed.
	Refer to Appendix H for discussion around the ALARP assessment of controls related to hydrocarbon spill response.		

6.9.6 Unplanned Discharges: Drilling Fluids

Context		
Xena-03 Drilling and Tie-back Activities – Section 3.11	Physical Environment – Section 4.4 Habitats and Biological Communities – Section 4.5 Protected Species – Section 4.6 Socio-economic Environment – Section 4.9	Consultation – Section 5

Impacts and Risks Evaluation Summary

Source of Risk	***Environmental Value Potentially Impacted***						***Evaluation***						
	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/Habitat	Species	Socio-economic	Decision Type	Consequence/Impact	Likelihood	Risk Rating	ALARP Tools	Acceptability	Outcome
Accidental discharge of project fluids (WBM, NWBM, base oil) and cement to marine environment		x		x	x	x	A	E	1	L	LCS GP	Acceptable if ALARP	EPO 23

Description of Source of Risk

Drilling Fluids – Transfers

A project vessel will undertake bulk transfer of drilling muds or base oil to the MODU, if and when required during tie-back activities. Failure of a transfer hose or fittings during a transfer or backload, as a result of an integrity or fatigue issue, could result in a spill of mud or base oil to either the bunded deck or into the marine environment.

The most likely spill volume of mud is likely to be less than 0.2 m² based on the volume of the transfer hose and the immediate shutoff of the pumps by personnel involved in the bulk transfer process. However, the worst-case credible spill scenario could result in up to 8 m³ of mud being discharged. This scenario represents a complete failure of the bulk transfer hose combined with a failure to follow procedures requiring transfer activities to be monitored, coupled with a failure to immediately shut off pumps (e.g., mud pumped through a failed transfer hose for a period of about five minutes).

Drilling Fluids – Slip Joint Packer Failure

The slip joint packer enables compensation for the dynamic movement of the MODU (heave) in relation to the static location of the BOP. A partial or total failure of the slip joint packer could result in a loss of mud to the marine environment. The likely causes of this failure include a loss of pressure in the pneumatic (primary) system combined with loss of pressure in the back up (hydraulic) system.

Catastrophic sequential failure of both slip joint packers (pneumatic and hydraulic) would trigger the alarm and result in a loss of the volume of fluid above the slip joint (conservatively 1.5 m³) plus the volume of fluid lost in the one minute (maximum) taken to shut down the pumps. At a flow rate of 3800 L (1000 gallons) per minute this volume would equate to an additional 3.8 m². In total, it is expected that this catastrophic failure would result in a loss of 5.3 m².

Failure of either of the slip joint packers at a rate not large enough to trigger the alarms could result in an undetected loss of 20 bbl (3 m³) maximum assuming a loss rate of 10 bbl/hr and that MODU personnel would likely walk past the moon pool at least every two hours.

Loss of a drilling chemical container or drum during transfer from the supply vessel to the MODU may occur due to crane operator error or machinery failure. The maximum container that could be lost is an intermediate bulk container (IBC) which can hold 1 m³ of chemicals. In the event that an IBC or drum is lost to the marine environment and cannot be recovered the contents will discharge, either immediately or over a period depending on the damage to the drum or container.

NWBM Drilling Fluid System

The selection of a NWBM drilling fluid system (if required) will be based on Woodside processes; however, for the purposes of this risk assessment, an example base oil (Saraline 185V) has been used. Saraline 185V is a mixture of

volatile to low volatility hydrocarbons. Predicted weathering of base oil, based on typical conditions in the region, indicates that about 50% by mass is predicted to evaporate over the first day or two. At this time, most of the remainder could be entrained into the water column. In calm conditions, entrained hydrocarbons are likely to resurface with up to 100% able to evaporate over time.

Table 6-48: Characteristics of the non-water-based mud base oil

Oil Type	Initial Density (kg/m³)	Viscosity (cP @ 20 °C)	Volatiles (%) <180	Semi Volatiles (%) 180–265	Low Volatility (%) 265–380	Residual (%) >380	Aromatic (%) of Whole Oil <380 °C BP
Base oil (Saraline 185V)			***Non-Persistent***		***Persistent***		
	0.7760	2.0 @ 40°C	8.5	41.1	50.4	0	0

Cement

Bulk cement is transferred as powder from the supply vessel to the MODU prior to being mixed into a slurry in the cement unit. Additives are required to form a cement slurry; these are transferred to the MODU in drums from the supply vessel to the MODU. Unplanned discharge to the marine environment may occur due to crane operator error or machinery failure resulting in loss of a drum of cement additive, which cannot be recovered. Cement additives are typically stored in drums <100 litres.

Contingency Activities

Activation of the Emergency Disconnect Sequence

The EDS is an emergency system that provides a rapid means of shutting in the well (i.e., BOP closed) and disconnecting the MODU from the BOP. The EDS could be manually activated due to an identified threat to the safety of the MODU, including loss of MODU station keeping resulting from loss of multiple moorings, potential collision by a third-party vessel or a loss of well control. During operations, this could result in a subsurface release of a combination of WBM and/or NWBM and solids at the seabed and a release of base fluid. The volume of material released depends on the water depth and, hence, the length of the riser (i.e. the entire riser volume would be lost). The base oil of the NWBM would remain in an emulsion with the other components of the mud system. Approximately 103 m³ of base oil could be released in the event of the riser being disconnected when drilling with NWBM.

Consequence Assessment

Potential Impacts to Environmental Values

Some drilling fluids/cement may be spilt at the sea surface (e.g., transfer failure) and some in the water column potentially close to the seabed (e.g., in the event of an EDS or Slip Joint Packer Failure). Due to water depth in the PAA (70–130 m), this will determine the exposure pathway, and hence potential impacts and receptors.

Water Quality

NWBM is made up of a number of components including base oil, which generally has a high volatile to semi-volatile fraction. If released to the marine environment at surface, this generally evaporates within the first 48 hours, with the remaining fraction being on the sea surface and weathering at a slower rate. As a result of this volatility, combined with the worst-case credible spill scenario volumes (8 m³, during bulk transfer from supply vessel to MODU), and based on Woodside's experience of modelling base oil, it is considered there would be an extremely small footprint area associated with any release. Therefore, any surface oil would be confined to open waters with a minor surface slick that would not reach any sensitive receptors. Therefore, impacts on water quality would be minor and temporary in nature. The material safety datasheet for Saraline 185V indicates that it is readily biodegradable, non-toxic in the water column and has low sediment toxicity (Shell, 2014). Marine fauna may be affected if they come in direct contact with a release (i.e., by traversing the immediate spill area), but due to the small footprint of such a spill, it is anticipated that any impacts would be negligible and temporary in nature.

WBM is made up of a number of components including a variety of chemicals, incorporated into the selected drilling fluid system to meet specific technical requirements. If released to the marine environment at surface, there would be an extremely small impact footprint area associated with a release. Any release would be confined to the open waters of the Operational Area that would not reach any sensitive receptors. Components of the WBM would settle out in the water column and be subject to dilution. Given the low toxicity of WBM and its planned discharge during drilling, any impacts on water quality would be slight and temporary in nature.

The EMBA associated with the release of NWBM from the activation of the EDS would be small and limited to deeper water seabed surrounding the well site (the release point). The environmental consequence of such a release would include a highly localised area at the discharge location. Lethal impacts to the underlying infauna may occur but are considered unlikely, and recolonisation would occur over time. Elevated hydrocarbon and metal concentrations in the localised area of deposition would also occur, with reduction over time. It is likely that any impacts to water and sediment quality and low-sensitivity deeper water benthos would be short term, localised and a full recovery expected.

All chemicals that may be operationally released or discharged to the marine environment by the PAP are evaluated using a defined framework and set of tools to ensure the potential impacts of the chemicals selected are acceptable, ALARP and meet Woodside's expectation for environmental performance. Therefore, any chemicals selected and potentially released are expected to be of low toxicity and biodegradable.

Base oil has a high volatile to semi-volatile fraction. A surface spill would typically evaporate within 48 hours, with the remaining portion to weather at a slow rate. The example base oil, Saraline 185V, is readily biodegradable, non-toxic in the water column and has low sediment toxicity (Shell, 2014). Due to its volatility, and small worst-case credible spill scenario, there would be a very localised footprint unlikely to reach any sensitive receptors.

Given the occasional nature of unplanned chemical discharge, the small volumes, and the offshore location of the PAA, the change to water quality resulting from unplanned discharge of chemicals will not be substantial.

Therefore, any potential impact of a change in water and sediment quality and low-sensitivity deeper water benthos would be short-term and localised, with a full recovery expected. Receptor sensitivity of water quality is low (low value, open ocean), and therefore the consequence of a release of hydrocarbons/chemicals on water and sediment quality would be no lasting effect (F).

Marine Fauna

Injury or Mortality to Marine Fauna

As a result of a change in water quality, further impacts to receptors may occur, which may include injury or mortality to marine fauna resulting from exposure to toxins in the released drilling fluids. Neff (2010) explains that the lack of toxicity and low bioaccumulation potential of the drilling muds means that the effects of the discharges are highly localised and are not expected to spread through the food web (of which planktonic species are the basis). Given that surface discharges are rapidly dispersed, potential impacts would be highly localised and temporary.

Local increases in turbidity from cement spills may affect zooplankton with variations in predator prey dynamics, which favours planktonic feeders over visual feeders (Gophen, 2015), while impacts to phytoplankton may occur due to decreases in available light, therefore reducing productivity (Dokulil, 1994). The magnitude of potential impact to marine fauna is no lasting effect, which results in a consequence of Slight (E) based on the high receptor sensitivity.

Suspended sediment levels greater than 500mg/L are likely to produce a measurable impact on larvae of most fish species, and levels of 100 mg/L may affect the larvae of some species if exposed for periods greater than 96 hours (Jenkins and McKinnon, 2006). In addition, levels of 100 mg/L may affect the larvae of several marine invertebrate species. Dilution estimates (e.g. Hinwood et al., 1994; Neff, 2005) would suggest that suspended sediment concentrations from unplanned cement discharge, loss of drilling mud from slip joint packer failure, or activation of the EDS, would dilute rapidly with instantaneous exposures of 500 mg/L unlikely and exposure times of 100 mg/L well below 96 hours.

Due to the low levels of planktonic productivity in the offshore area, the fact that the Xena-03 Operational Area (70 to 130 m depth) is outside of the highly productive shelf break situated on the 200 m isobath, plankton populations on a regional scale are not expected to be adversely affected by drill and project fluid spills. In addition, due to the open nature of the marine environment of the Xena-03 Operational Area and associated environmental conditions (windy, strong currents, etc), the content and dispersive nature of drilling muds within the marine environment and the high population replenishment of these organisms, it is expected that impacts to plankton species will be limited to within tens of metres of the discharge point and return to previous conditions within a relatively short period of time. On this basis, the risk to plankton from unplanned discharges during Xena-03 Tie-back activities is low and would result in consequences no greater than slight, short-term effects.

Seafloor Receptors (Benthic Communities and Cultural Heritage Sites)

The impact area associated with release of NWBM from activation of the EDS would be small, limited to the seabed surrounding the well. Base fluids for NWBM are designed to be biodegradable in offshore marine sediments. Biodegradation can result in a low oxygen (anoxic) environment resulting in changes in benthic community structure. NWBMs are designed to be low in toxicity and are not readily bioavailable, based on their physical/chemical properties, for bioaccumulation to infauna and epifauna. Deleterious impacts to the infauna may still occur to a limited extent, together with increased hydrocarbon and metal concentrations in the area of deposition. The ability for the infauna communities to recolonise following a small localised disturbance within the Xena-03 Operational Area would mean impacts are short-term and slight.

Drill cuttings from unplanned loss of used drilling fluids would increase turbidity and TSS levels above ambient, where coarser material will deposit on the seabed and finer sediment material (WBM) will temporarily cause elevated TSS above the seabed surrounding the well. This would rapidly disperse and dilute with the prevailing seabed currents.

Accumulation of drill cuttings, grit and flocculent on the seabed causes changes in the physical properties of the seabed sediment such as the particle size distribution (PSD), the introduction of contaminants (metals such as barium) from retained drilling fluids (WBM) and associated ecological effects.

Impacts associated with unplanned drill and project fluid discharges will be largely limited to an area surrounding the well. The low sensitivity of the benthic communities/habitats within and in the vicinity of the Xena-03 Operational Area, combined with the low toxicity of WBMs and residual NWBMs, insoluble mineralised salts (the source of barium) having low bioavailability to benthic biota, and the highly localised nature and scale of predicted physical impacts to seabed biota, affirm that any predicted impact is considered likely but of a short-term environmental consequence.

Cultural Heritage
As described in Section 4.10, the Xena-03 Operational Area is located further offshore than the Ancient Coastline at 125 m depth contour KEF. Seabed disturbance resulting from Xean-03 Tie-back activities does not pose a threat to Indigenous Cultural features of the Ancient Landscape.
Summary of Potential Impacts to Environmental Values
Given the adopted controls, it is considered that unplanned discharges of drilling fluids or cement to the marine environment will not result in a potential impact greater than slight and short-term impacts on species, habitat (but not affecting ecosystems function), physical and biological attributes (i.e., Environment Impact – E).

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[131]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Legislation, Codes and Standards				
Contract vessels complying with Marine Orders for safe vessel operations: • Marine Order 91 (Marine pollution prevention – oil) • Marine Order 95 (Pollution prevention – garbage) • Marine Order 96 (Pollution prevention – sewage).	F: Yes. CS: Minimal cost. Standard practice.	Legislative requirements to be followed reduce the likelihood of an unplanned release. The consequence is unchanged.	Controls based on legislative requirements – must be adopted.	Yes C 6.1
Good Practice				
Marine riser's telescopic joint to be: • comprised of a minimum of two packers (one hydraulic and one pneumatic) • pressure tested in accordance with manufacturers recommendations.	F: Yes. CS: Minimal cost. Standard practice.	Reduces the likelihood of equipment failure leading to an unplanned release of drilling fluids. Although the consequence of an unplanned release would be reduced, the reduction in likelihood reduces the overall risk providing an overall environmental benefit.	Benefits outweigh cost/sacrifice.	Yes C 23.1
Chemical Selection and Assessment Environment Guideline: • Where Gold/Silver/E/D OCNS rating (and no OCNS substitution or product warning), chemicals are selected, no further control required. • If chemicals with a different OCNS rating, sub warning or non OCNS rated chemicals are required, chemicals	F: Yes. CS: Minimal cost. Standard practice.	Environmental assessment of chemicals may reduce the consequence of impacts resulting from discharges to the marine environment by ensuring chemicals have been assessed for environmental acceptability. Planned discharges are required for the safe execution of activities and	Benefits outweigh cost/sacrifice.	Yes C 5.1

[131] Qualitative measure.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[131]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
will be assessed in accordance with the guideline prior to use.		therefore no reduction in likelihood can occur.		
Contractor procedure for managing project fluids transfers onto, around and off the MODU, which requires: • emergency shutdown systems for stopping losses of containment (e.g., burst hoses) • break-away dry-break couplings for oil-based mud hoses • transfer hoses to have floatation devised to allow detection of a leak • the valve line-up checked prior to commencing mud transfers • constant monitoring of the transfer process • direct radio communications • completed PTW and JSA showing contractor procedures are implemented • recording and verification of volumes moved to identify any losses • mud pit dump valves locked closed when not in use for mud transfers and operated under a PTW.	F: Yes. CS: Minimal cost. Standard practice for Woodside to review contractor systems prior to performing activity.	Reduces the likelihood of an unplanned release occurring. Although no change in consequence would occur, the reduction in likelihood decreases the overall risk, providing environmental benefit.	Benefits outweigh cost/sacrifice.	Yes C 22.3
Check for the functionality of: • additional SCE (augers and cuttings dryers) • mud tanks • mud tank room • transfer hoses • NWBM base fluid transfer lines • NWBM base fluid transfer station • base fluid storage.	F: Yes. CS: Minimal cost. Standard practice	Reduces the likelihood of an event occurring and reduces the potential consequences (by limiting volume released).	Benefits outweigh cost/sacrifice.	Yes C 22.4

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[131]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Where there is potential for loss of primary containment of oil and chemicals on the MODU, deck drainage must be collected via a closed drainage system. E.g., drill floor.	F: Yes. CS: Minimal cost. Standard practice	Reduces the likelihood of contaminated deck drainage water being discharged to the marine environment. No change in consequence would occur.	Benefits outweigh cost/sacrifice.	Yes C 6.2
Incident reports are raised for unplanned releases within event reporting system.	F: Yes. CS: Minimal cost. Standard practice.	Good practice that operators identify, report and learn from unplanned release events. Supports compliance with regulatory reporting requirements.	Control based on Woodside standard and regulatory requirements.	Yes C 13.5
Professional Judgement – Eliminate				
No additional controls identified.				
Professional Judgement – Substitute				
Only use WBM during drilling.	F: Not feasible. While the base case is to use WBM, a contingent NWBM drilling fluid system is required for safety and technical reasons; therefore, option to use must be maintained. CS: Not considered, control not feasible.	Not considered, control not feasible.	Not considered, control not feasible.	No
Professional Judgement – Engineered Solution				
Use a MODU which may have a larger tank storage capacity for WBM. As such, there would be fewer bulk transfer movements.	F: Not feasible. The use of a MODU with greater storage capacity cannot be confirmed. CS: Significant cost and schedule delay would occur if the MODU was limited to greater storage capacity.	Not considered, control not feasible.	Not considered, control not feasible.	No
ALARP Statement: On the basis of the environmental risk assessment outcomes and use of the relevant tools appropriate to the decision type, Woodside considers the adopted controls appropriate to manage the impacts and risks of unplanned release of project fluids. As no reasonable additional/alternative controls were identified that would further reduce the impacts without grossly disproportionate sacrifice, the impacts and risks are considered ALARP.				

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[131]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Demonstration of Acceptability				
Acceptability Statement: The impact assessment has determined that, given the adopted controls, unplanned discharges of drilling fluids represent a low current risk rating that is unlikely to result in a potential impact greater than minor and/or temporary contamination above background levels and/or national/international quality standards and/or known biological effect concentrations on a localised scale. Further opportunities to reduce the risks and consequences have been investigated above. The adopted controls are considered good oil-field practice/industry best practice. The potential risks and consequences are considered broadly acceptable if the adopted controls are implemented. Therefore, Woodside considers the adopted controls appropriate to manage the risks and consequences of an unplanned discharge of NWBM/base oil or WBM to a broadly acceptable level.				

EPOs, EPSs and MC for Xena-03 Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 23 No unplanned release of drilling fluids to the marine environment.	**C 6.1** Contract vessels complying with Marine Orders for safe vessel operations: • Marine Order 91 (Marine pollution prevention – oil) • Marine Order 95 (Pollution prevention – garbage) • Marine Order 96 (Pollution prevention – sewage).	**PS 6.1** Vessels contracted whose practices comply with Marine Orders as applicable to vessel size, type and class (Marine Orders 91, 95 and 96).	**MC 6.1.1** Environmental and MARPOL inspection records demonstrate vessels are compliant with standard maritime safety procedures (Marine Orders 91, 95 and 96).
	C 6.2 Where there is potential for loss of primary containment of oil and chemicals on the MODU, deck drainage must be collected via a drainage water management system.	**PS 6.2** Contaminated drainage contained, treated and/or separated prior to discharge.	**MC 6.2.1** Environmental inspection records demonstrate MODU has a functioning bilge/oily water management system.
	C 23.1 Marine riser's telescopic joint to be: • comprised of a minimum of two packers (one hydraulic and one pneumatic) • pressure tested in accordance with manufacturer's recommendations.	**PS 23.1** MODU's joint packer designed and maintained to reduce hydrocarbons discharged to the environment.	**MC 23.1.1** Environmental inspection records demonstrate that MODU's joint packer is compliant.
	C 5.1 Chemical Selection and Assessment Environment Guideline: • Where Gold/Silver/E/D OCNS rating (and no OCNS substitution or product warning), chemicals are	**PS 5.1** All chemicals intended or likely to be discharged to the marine environment will be assessed and approved prior to use in accordance with the Chemical Selection and Assessment Environment Guideline	**MC 5.1.1** Chemical assessment register demonstrates the chemical selection, assessment and approval process for selected chemicals is followed.

EPOs, EPSs and MC for Xena-03 Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	selected, no further control required. • If chemicals with a different OCNS rating, sub-warning or non-OCNS rated chemicals are required, chemicals will be assessed in accordance with the guideline prior to use.	(described in Section 3.9) to ensure the impacts associated with use are ALARP and acceptable.	
	C 22.3 Contractor procedure for managing project fluids transfers onto, around and off the MODU, which requires: • emergency shutdown systems for stopping losses of containment (e.g., burst hoses) • break-away dry-break couplings for oil-based mud hoses • transfer hoses to have flotation devised to allow detection of a leak • the valve line-up checked prior to commencing mud transfers • constant monitoring of the transfer process • direct radio communications • completed PTW and JSA showing contractor procedures are implemented • recording and verification of volumes moved to identify any losses • mud pit dump valves locked closed when not in use for mud transfers and operated under a PTW.	**PS 22.3** Compliance with contractor procedures to limit accidental loss to the marine environment.	**MC 22.3.1** Records demonstrate drilling fluid transfers are performed in accordance with the applicable contractor procedures.
	C 22.4 Check for the functionality of: • additional SCE (augers and cuttings dryers) • mud tanks • mud tank room • transfer hoses • NWBM base fluid transfer lines • NWBM base fluid transfer station	**PS 22.4** Prevent the unacceptable use or discharge of NWBM/base oil.	**MC 22.4.1** Environmental inspection records demonstrate the presence and functionality of the specified equipment.

EPOs, EPSs and MC for Xena-03 Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	• base fluid storage.		
	C 13.5 Raising incident reports within event reporting system for unplanned releases.	**PS 13.5** Incident reports raised for unplanned releases and Recordable Incidents notified.	**MC 13.5.1** Records demonstrate incident reports raised for unplanned releases, and applicable Recordable Incident notifications completed.
	Refer to Appendix H for discussion around the ALARP assessment of controls related to hydrocarbon spill response.		

6.9.7 Unplanned Discharges: Hazardous and Non-hazardous Waste Management

Context		
Operational Details – Section 3.5 Xena-03 Drilling and Tie-back Activities – Section 3.11	Physical Environment – Section 4.4 Protected Species – Section 4.6	Consultation – Section 5

Impacts and Risks Evaluation Summary

Source of Risk	***Environmental Value Potentially Impacted***							***Evaluation***						
	Soil and Groundwater	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/Habitat	Species	Socio-economic	Decision Type	Consequence/Impact	Likelihood	Risk Rating	ALARP Tool	Acceptability	Outcome
Incorrect disposal or accidental discharge of non-hazardous and hazardous waste to the marine environment		x	x			x		A	E	2	M	LCS GP	Broadly Acceptable	EPO 24

Description of Source of Risk

Non-hazardous and Hazardous Waste

Normal operations on the facility, the MODU and support vessels generate a variety of hazardous and non-hazardous wastes. These materials could potentially impact the marine environment, if incorrectly disposed of, lost overboard or discharged in significant quantities.

Non-hazardous wastes include domestic and industrial wastes such as paper and cardboard, aluminium cans, bottles, polystyrene, organics and scrap steel. Hazardous wastes include recovered solvents, excess or spent chemicals, oil contaminated materials (e.g., sorbents, filters and rags), batteries and used lubricating oils and potentially material containing NORMs. Sand and sludges may be periodically generated during process and vessel maintenance. Many waste streams are only generated on the riser platform and support vessels during deployment of personnel to the facility for IMMR activities.

Equipment (small hand-held tools) and Personal Protective Equipment (PPE) may be accidentally lost overboard. Equipment that has been recorded as being lost on other similar facilities and vessels has primarily been windblown or dropped overboard and has included things such as hardhats, gloves, safety glasses and small tools or materials. Equipment (small hand-held tools) and PPE are not classified as waste as per the Woodside Offshore Facilities Waste Management Plan and are not included any further in this risk assessment. Equipment (small hand-held tools) and PPE lost overboard are recorded, investigated and corrective actions tracked as per requirements in Section 7.10.3 and Section 7.13.4. Loss of hazardous and non-hazardous wastes have occurred during backloading activities, periods of adverse weather and incorrect waste storage.

All waste materials not suitable for discharge to the environment, including hazardous wastes (i.e., liquid and solid wastes), generated during the PAP are transported to shore for disposal or recycling by Woodside's licenced waste contractor.

Material generated onshore from pigging of the export pipeline has been tested in accordance with the relevant procedures and determined not to be classified as NORMs; therefore, NORMs are not expected to be encountered.

Consequence Assessment

The potential impacts of hazardous or non-hazardous solid waste/equipment accidentally discharged to the marine environment include contamination of the environment as well as secondary impacts relating to potential contact of marine fauna with wastes. This could result in entanglement or ingestion and lead to injury and death of individual animals. The temporary or permanent loss of waste materials into the marine environment is not likely to have a significant environmental impact, based on the location of the PAA, the types, size and frequency of wastes that could occur, and species present.

Water and Sediment Quality

Hazardous solid wastes, such as paint cans, oily rags, etc, can cause localised contamination of the water and sediment through a release of toxins and chemicals. Given likely small volumes of any unplanned solid waste discharge, and the occasional nature of the event, these would result in temporary and highly localised changes to the water quality.

In the unlikely event of an object being dropped into the marine environment, potential environmental effects would be limited to slight physical impacts on benthic communities. In most cases, objects will be able to be recovered and therefore these impacts will also be temporary in nature. However, there may be instances where objects are unable to be recovered due to health and safety, operational constraints or other factors such as the difficulty of recovering dropped objects at depth. When dropped objects are unable to be recovered, the impact will continue to be slight but permanent.

Seabirds and Migratory Shorebirds, Fish, Marine Reptiles and Marine Mammals

The unplanned discharge of solid wastes can result in mortality to fauna, either through contamination or physical injury depending on the nature of the waste. Marine fauna, including fish, seabirds and shorebirds, marine mammals and marine reptiles may be impacted through ingestion or entanglement of waste or through exposure to toxic chemicals. Ingestion or entanglement of marine fauna has the potential for physical harm which may limit feeding/foraging behaviours and thus can result in mortalities. Injury and fatality to vertebrate marine life caused by ingestion of, or entanglement in, harmful marine debris was listed as a key threatening process under the EPBC Act in August 2003 (DoEE, 2018). The Threat Abatement Plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans (DoEE, 2018) identifies EPBC Act-listed species for which there are scientifically documented adverse impacts resulting from marine debris. Marine turtles and seabirds in particular may be at risk from plastics which may cause entanglement or be mistaken for food (e.g., DoEE, 2018; Commonwealth of Australia, 2017) and ingested causing damage to internal tissues and potentially preventing feeding activities. In the worst instance this could have a lethal effect to an individual. Marine debris has been identified as a threat in the Recovery Plan for Marine Turtles in Australia (2017–2027).

Impacts to species including fish, birds, marine mammals and marine reptiles from the unplanned discharge of solid waste is unlikely given low occurrence of unplanned discharges. Significant impacts are unlikely to occur at an individual level and will not occur at a population level, nor result in the decrease of the quality of the habitat such that the extent of these species is likely to decline.

The temporary or permanent loss of waste materials into the marine environment is not likely to have a significant environmental impact, based on the nature and scale of activities that may generate wastes, the types, size and frequency of wastes that could occur.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)***	***Benefit in Impact/ Risk Reduction***	***Proportionality***	***Control Adopted***
Legislation, Codes and Standards				
MODU, installation and support vessels complying with Marine Orders for safe vessel operations, Marine Order 94 (Marine pollution prevention – packaged harmful substances) 2014.	F: Yes. CS: Minimal cost. Standard practice.	Implementation of Marine Order 94 reduces the likelihood of a harmful substance being released to the environment. Implementation is standard practice for commercial vessels as applicable to vessel size, type and class.	Controls based on legislative requirements – must be adopted.	Yes C 24.1

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)***	***Benefit in Impact/ Risk Reduction***	***Proportionality***	***Control Adopted***
MODU, installation and support vessels complying with Marine Orders for safe vessel operations, Marine Order 95 (Pollution prevention – garbage).	F: Yes. CS: Minimal cost. Standard practice.	Implementation of Marine Order 95 reduces the likelihood of a harmful substance being released to the environment. Implementation is standard practice for commercial vessels as applicable to vessel size, type and class.	Controls based on legislative requirements – must be adopted.	Yes C 24.2
Good Practice				
Storing, handling and transporting wastes in accordance with the Waste Management Plan for Offshore Facilities.	F: Yes. CS: Minimal cost. Standard practice.	Reduces the likelihood of a release of waste to the environment by providing guidance on storage, handling and transport of waste streams.	Benefit outweighs cost/sacrifice.	Yes C 24.3
If safe and practicable to do so, using MODU, vessels, ROV or crane to attempt recovery of material[132] environmentally hazardous or non-hazardous solid object/waste container lost overboard.	F: Yes. CS: Minimal cost. Standard practice.	Potentially reduces consequence by recovering object/waste container from the environment.	Benefit outweighs cost/sacrifice.	Yes C 24.4
Incident reports are raised for unplanned releases within event reporting system.	F: Yes. CS: Minimal cost. Standard practice.	Good practice that operators identify, report and learn from unplanned release events. Supports compliance with regulatory reporting requirements.	Control based on Woodside standard and regulatory requirements.	Yes C 13.5

[132] For the purposes of this control/performance standard “material” is defined as unplanned releases of environmentally hazardous or non-hazardous solid object/waste events with an environmental consequence of >F.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)***	***Benefit in Impact/ Risk Reduction***	***Proportionality***	***Control Adopted***
Implement the Woodside Waste Management Plan, which requires: • dedicated space for waste segregation bins and skips provided on the MODU • records of all waste to be disposed, treated or recycled • waste streams handled and managed according to their hazard and recyclability class • all non-putrescible waste (excludes all food, greywater or sewage waste) to be transported from the MODU and disposed of onshore.	F: Yes. CS: Minimal cost. Standard practice.	Controls outlined in the management plan will reduce the likelihood of an unplanned release. The consequence is unchanged.	Benefit outweighs cost/sacrifice.	Yes C 24.5
Installation Vessel Waste Management Plan, which requires: • dedicated waste segregation bins • records of all waste to be disposed, treated or recycled • waste streams handled and managed according to their hazard and recyclability class.	F: Yes. CS: Minimal cost. Standard practice.	Reduces the likelihood of an unplanned release. The consequence is unchanged.	Benefit outweighs cost/sacrifice.	Yes C 24.6
Professional Judgement – Elimination				
None identified.				
Professional Judgement – Substitute				
None identified.				
Professional Judgement – Engineered Solution				
None identified.				

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)***	***Benefit in Impact/ Risk Reduction***	***Proportionality***	***Control Adopted***
ALARP Statement: On the basis of the environmental risk assessment outcomes and use of the relevant tools appropriate to the decision type, Woodside considers the adopted controls appropriate to manage the impacts and risks of accidental discharge of non-hazardous and hazardous wastes. As no reasonable additional/alternative controls were identified that would further reduce the impacts and risks without grossly disproportionate sacrifice, the impacts and risks are considered ALARP.				

Demonstration of Acceptability
Acceptability Statement: The consequence assessment has determined that, given the adopted controls, the accidental discharge of non-hazardous waste and hazardous waste represents a low risk rating and is unlikely to result in a consequence greater than localised impacts to water quality, marine sediment and marine species with no lasting effects. Woodside, across its operations (including this facility), has a well-established waste management culture which underpins a strong performance and limits the potential for accidental releases to the marine environment. Opportunities to reduce waste management impacts and risks are employed through standard practices such as job planning, implementation of Waste Management Plans and job hazard analysis practices. The adopted controls are considered good oil-field practice/industry best practice and meet requirements of Australian Marine Orders. The potential impacts and risks are considered broadly acceptable if the adopted controls are implemented. Therefore, Woodside considers the adopted controls appropriate to manage the impacts and risks of accidental discharge of non-hazardous and hazardous waste to a level that is broadly acceptable.

EPOs, EPSs and MC for Pluto Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 24 No unplanned release of solid hazardous or non-hazardous waste[133] to the marine environment.	**C 24.1** Support vessels complying with Marine Orders for safe vessel operations, Marine Order 94 (Marine pollution prevention – packaged harmful substances) 2014.	**PS 24.1** Vessels contracted whose practices comply with Marine Orders as applicable to vessel size, type and class (Marine Order 94).	**MC 24.1.1** Marine verification records demonstrate compliance with standard maritime safety procedure (Marine Order 94).
	C 24.2 MODU/ support vessels complying with Marine Order for safe vessel operations, Marine Order 95 (Pollution prevention – garbage).	**PS 24.2** Vessels contracted whose practices comply with Marine Order as applicable to vessel size, type and class (Marine Order 94).	**MC 24.2.1** Marine verification records demonstrate compliance with standard maritime safety procedure (Marine Order 94).
	C 24.3 Storing, handling and transporting wastes in accordance with the Waste Management Plan for Offshore Facilities.	**PS 24.3** Implementation of Waste Management Plan for Offshore Facilities, including: • waste segregation and storage • records of all waste to be disposed, treated or recycled are	**MC 24.3.1** Records demonstrate implementation of Waste Management Plan for Offshore Facilities.

[133] Waste as defined in the Woodside *Offshore Facilities Waste Management Plan*

EPOs, EPSs and MC for Pluto Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
		maintained, and shall include (though not limited to) quantity of waste, waste type and disposal/recycle location • waste streams appropriately handled, tested, monitored and managed according to their hazard and recyclability class.	
	C 24.4 If safe and practicable to do so, using MODU, vessels, ROV or crane to attempt recovery of material[134] environmentally hazardous or non-hazardous solid object/waste container lost overboard.	**PS 24.4** Material[170] solid waste/ equipment dropped to the marine environment will be recovered where safe and practicable to do so. Where retrieval is no practicable and/or safe, material items (property) that are lost to the marine environment will undergo an impact assessment and will be added to the inventory for the title.	**MC 24.4.1** Incident records detail the recovery attempt consideration and status of material environmentally hazardous or non-hazardous solid waste object/container lost to the marine environment.
		PS 24.7 Incident reports raised for unplanned loss of solid waste/equipment and recordable incidents notified for material[170] unplanned loss, regardless of whether the item/s are recovered.	
	Mitigation – Emergency and Hydrocarbon Spill Response.	Refer to Section 7 discussion around the ALARP assessment of controls related to hydrocarbon spill response.	

EPOs, EPSs and MC for Xena-03 Drilling and Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 24 No unplanned release of solid hazardous or non-hazardous waste[135] to the marine environment.	**C 13.5** Raising incident reports within event reporting system for unplanned releases. Refer Section 6.8.3.	**PS 13.5** Incident reports raised for unplanned releases and Recordable Incidents notified.	**MC 13.5.1** Records demonstrate incident reports raised for unplanned releases, and applicable Recordable Incident notifications completed.

[134] For the purposes of this control/performance standard, "material" is defined as unplanned releases of environmentally hazardous or non-hazardous solid object/waste events with an environmental consequence of > F.
[135] Waste as defined in the Woodside *Offshore Facilities Waste Management Plan*

EPOs, EPSs and MC for Xena-03 Drilling and Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
			Refer Section 6.8.3.
	C 24.1 MODU/ support vessels complying with Marine Orders for safe vessel operations, Marine Order 94 (Marine pollution prevention – packaged harmful substances) 2014.	**PS 24.1** Vessels contracted whose practices comply with Marine Orders as applicable to vessel size, type and class (Marine Order 94).	**MC 24.1.1** Marine verification records demonstrate compliance with standard maritime safety procedure (Marine Order 94).
	C 24.2 MODU/ support vessels complying with Marine Order for safe vessel operations, Marine Order 95 (Pollution prevention – garbage).	**PS 24.2** Vessels contracted whose practices comply with Marine Order as applicable to vessel size, type and class (Marine Order 94).	**MC 24.2.1** Marine verification records demonstrate compliance with standard maritime safety procedure (Marine Order 94).
	C 24.4 If safe and practicable to do so, using MODU, vessels, ROV or crane to attempt recovery of material[136] environmentally hazardous or non-hazardous solid object/waste container lost overboard.	**PS 24.4** Material[174] solid waste/ equipment dropped to the marine environment will be recovered where safe and practicable to do so. Where retrieval is no practicable and/or safe, material items (property) that are lost to the marine environment will undergo an impact assessment and will be added to the inventory for the title.	**MC 24.4.1** Incident records detail the recovery attempt consideration and status of material environmentally hazardous or non-hazardous solid waste object/container lost to the marine environment.
		PS 24.7 Incident reports raised for unplanned loss of solid waste/equipment and recordable incidents notified for material[174] unplanned loss, regardless of whether the item/s are recovered.	
	C 24.5 Implement the Woodside Waste Management Plan, which requires: • dedicated space for waste segregation bins and skips provided on the MODU • records of all waste to be disposed, treated or recycled	**PS 24.5** Hazardous and non-hazardous waste will be managed in accordance with the Waste Management Plan.	**MC 24.5.1** Records demonstrate implementation of Waste Management Plan.

[136] For the purposes of this control/performance standard, “material” is defined as unplanned releases of environmentally hazardous or non-hazardous solid object/waste events with an environmental consequence of > no lasting effect (see Section 2.6.3).

EPOs, EPSs and MC for Xena-03 Drilling and Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	• waste streams handled and managed according to their hazard and recyclability class • all non-putrescible waste (excludes all food, greywater or sewage waste) to be transported from the MODU and disposed of onshore.		
	C 24.6 Installation Vessel Waste Management Plan, which requires: • dedicated waste segregation bins • records of all waste to be disposed, treated or recycled • waste streams handled and managed according to their hazard and recyclability class • implementation of waste management procedures which provide for safe handling and transportation, segregation and storage and appropriate classification of all waste generated.	**PS 24.6** Hazardous and non-hazardous waste will be managed in accordance with the Installation Vessel Waste Management Plan.	**MC 24.6.1** Records demonstrate compliance against Installation Vessel Waste Management Plan.

6.9.8 Physical Presence: Seabed Disturbance from Dropped Objects or Loss of Station Keeping Leading to Anchor Drag

Context		
Support Vessel Operations – Section 3.8 Vessel-based Activities for the Xena-03 Tie-back – Section 3.12 Holding Station: Mooring Installation and Anchor Hold Testing/Soil Analysis – Section 3.12.5	Physical Environment – Section 4.4 Habitats and Biological Communities – Section 4.5	Consultation – Section 5

Impacts and Risks Evaluation Summary

Source of Risk	***Environmental Value Potentially Impacted***						***Evaluation***						
	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/Habitat	Species	Socio-economic	Decision Type	Consequence/Impact	Likelihood	Risk Rating	ALARP Tools	Acceptability	Outcome
Dropped objects resulting in the disturbance of benthic habitat	x			x		x	A	D	1	L	GP PJ	Broadly Acceptable	EPO 25a EPO 25b
Loss of station keeping of the MODU leading to anchor drag and the disturbance of benthic habitat	x			x		x							

Description of Source of Risk

The primary cause for unplanned seabed disturbance during the PAP is through dropped objects from the riser platform and support vessel operations or from installation of the Xena-03 mooring system, the MODU, subsea installation and support vessels. Additional unplanned disturbance to the seabed may occur from a loss of station keeping and subsequent anchor drag during MODU operations if a moored MODU is used. An assessment of the risks of loss of control of suspended loads from the platform, and waste/objects lost to sea is presented in Sections 0 and 6.9.7 and is not considered further here.

Dropped Objects

There is the potential for objects to be dropped overboard from the riser platform and support vessel operations or from installation of the Xena-03 mooring system, the MODU, installation and support vessels to the marine environment. Objects that have been dropped during previous offshore activities include small numbers of personal protective gear (e.g., glasses, gloves, hard hats), small tools (e.g., spanners) hardware fixtures (e.g., riser hose clamp) and drill equipment (e.g., drill pipe); however, there is also potential for larger equipment to also be dropped during the activity, particularly during recovery of infrastructure from the seabed. The spatial extent in which dropped objects can occur is restricted to the PAA.

Anchor Drag

The Xena-03 well may be drilled using a moored or hybrid MODU. If a moored MODU is used for drilling the Xena-03 well, it will be secured on station by an 8- to 12-point pre-laid mooring system deployed to the seabed, as dictated by the mooring analysis. High energy weather events such as cyclones, occurring while the MODU is on station, can lead to excessive loads on the mooring lines, resulting in failure (either anchor(s) dragging or mooring lines parting). A failure of mooring integrity may lead to the mooring lines and anchors attached to the MODU being trailed across the seabed. If mooring failure is sufficient, the MODU may move off station, increasing the likelihood of anchor drag across the seafloor. A hybrid MODU that uses DP in conjunction with a pre-laid mooring system to hold station, may be used to conduct the drilling. In this scenario, there may be an opportunity to disconnect the RAR (see Section 3.12), which would allow the rig to avoid the cyclone and for the anchor drag risk to be reduced.

For a moored MODU, personnel on-board are typically evacuated during cyclones. Woodside implements a risk-based assessment process to aid in decision-making for cyclone evacuations, with the well suspended prior to MODU

evacuation. Support vessels also demobilise from the PAA during the passage of a cyclone. While the MODU is temporarily abandoned, the position of the MODU is monitored remotely for any deviation. Support vessels and MODU personnel return to the Xena-03 Operational Area as soon as safe to do so after a cyclone evacuation. Operational experience indicates cyclone evacuations typically last for seven days.

Industry statistics from the North Sea show that a single mooring line failure for MODUs is the most common failure mechanism (33 × 10-4 per line per year), followed by a double mooring line failure (11 × 10-4 per line per year) (Petroleumstilsynet, 2014). Note that single and double mooring line failures do not typically result in the loss of station keeping. If partial or complete mooring failures are sufficient to result in a loss of station keeping, industry experience indicates that MODUs may drift considerable distances from their initial position (Offshore: Risk and Technology Consulting Inc., 2002). Partial mooring failures leading to a loss of station keeping resulted in smaller MODU displacements, due to the remaining anchors dragging along the seabed when compared to complete mooring failures; complete mooring failures resulted in a freely drifting MODU (Offshore: Risk and Technology Consulting Inc., 2002). NOPSEMA has recorded four cases of anchor drag due to loss of MODU holding station during cyclone activity between 2004 and 2015 (NOPSEMA, 2015). Seabed disturbance area size from anchor drag will depend on the extent of the drag.

Consequence Assessment

Potential Impacts to Environmental Values

In the unlikely event of an object being dropped into the marine environment or failed mooring, potential environmental effects would be limited to minor physical impacts on benthic communities. In most cases, objects will be able to be recovered and therefore these impacts will also be temporary in nature. However, there may be instances where objects are unable to be recovered due to health and safety, operational constraints or other factors such as the difficulty of recovering dropped objects at depth. When dropped objects are unable to be recovered, the impact will continue to be minor but permanent.

KEFs and Cultural Heritage

The temporary or permanent loss of dropped objects into the marine environment and mooring failure is likely to result in a minor impact only, as the benthic communities associated with the Pluto Facility and Xena-03 Operational Areas are of low sensitivity and are broadly represented throughout the NWMR. As described in Section 4.7, the Ancient Coastline at 125 m overlaps with the Pluto Facility Operational Area, and the Continental Slope Demersal Fish Communities KEF overlaps the Pluto Facility and Xena-03 Operational Areas. Benthic communities in these Operational Areas are representative of the deepwater soft sediment habitats reported in the wider region, and is likely to consist of soft sediment seabed habitat, characterised by sparse, widely represented epifauna and infauna (Woodside, 2004; Brewer et al., 2007).

Given the nature and scale of risks and consequences from dropped objects and mooring failure, slight impacts are expected to seabed sensitivities within the Pluto Facility and Xena-03 Operational Areas. Further, considering the types, size, scale and frequency of dropped objects that could occur, it is unlikely that a dropped object would have a significant impact on any benthic community.

The operational areas overlap a small proportion of the KEFs. Any unplanned seabed disturbance within the KEFs would be minor and relatively small compared to the size of the KEFs. Given the location of the MODU, and likely anchor placement locations outside of the KEFs, impacts from anchor drag are likely to be further reduced. On this basis, the risk to the KEFs from unplanned seabed disturbance during Facility Operations and Xena-03 Tie-back Activities is low and would result in consequences no greater than minor, short-term impacts.

Epifauna and Infauna

As a result of a change in water quality and change in habitat, injury or mortality to marine fauna resulting from an increase in turbidity may occur. Given a change to water quality is unlikely, the only receptors that would potentially be at risk of unplanned seabed disturbance are bottom dwelling species including epifauna and infauna. Benthic communities, including epifauna and infauna may be impacted by the dropped objects, or the drag of anchors on the seabed. If not recovered, dropped objects may result in the permanent loss of a small area under the object. Over time, these hard substrates are expected to be colonised by sessile benthic biota (e.g., sponges, gorgonians), which is consistent with other small areas of hard substrate throughout the region.

If anchor drag occurs, habitat impact will span the extent of the drag area, leading to a localised change in communities; however, substantial adverse effect is not anticipated, given the sparse marine life that are well represented elsewhere in the region.

Given generally sparse benthic communities in the operational areas, no threatened or migratory benthic species or ecological communities were identified, and those epifauna and infauna communities observed are likely to be well represented elsewhere in the region, impacts are expected to be restricted to a localised proportion of epifauna and infauna communities.

On this basis, the risk to epifauna and infauna from unplanned seabed disturbance during Xena-03 Tie-back activities is low and would result in consequences no greater than minor, short-term impacts.

Summary of Potential Impacts to Environmental Values(s)
Given the adopted controls, the predicted small footprint of a dropped object and the highly unlikely nature of anchor drag, it is considered that unplanned seabed disturbance will result in Minor, short-term impact (one to two years) on species, habitat (but not affecting ecosystems), physical or biological attributes, and cultural heritage, with an overall risk rating of Moderate.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[137]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Legislation, Codes and Standards				
No additional controls identified.				
Good Practice				
The MODU/installation vessel work procedures for lifts, bulk transfers and cargo loading, which require: • The security of loads shall be checked prior to commencing lifts. • Loads shall be covered if there is a risk of loss of loose materials. • Lifting operations shall be conducted using the PTW and JSA systems to manage the specific risks of that lift, including consideration of weather and sea state.	F: Yes. CS: Minimal cost. Standard practice.	Occurs after a dropped object event and therefore no change to the likelihood. Since the object may be recovered, a reduction in consequence is possible.	Benefits outweigh cost/sacrifice.	Yes C 25.1
MODU, installation vessel and support vessel inductions include control measures for dropped object prevention.	F: Yes. CS: Minimal cost. Standard practice.	By ensuring crew are appropriately trained in dropped object prevention, the likelihood of a dropped object event is reduced. No change in consequence will occur.	Benefits outweigh cost/sacrifice.	Yes C 25.2
Specifications and requirements for station keeping equipment (mooring systems), require that: • systems are tested and inspected in accordance with API RP 2I • systems have sufficient capability such that a failure of any single component will not cause progressive failure of the	F: Yes. CS: Minimal cost. Standard practice.	Reduces the likelihood of mooring failure leading to uncontrolled anchor drag. Should mooring failure occur, no significant reduction in consequence could occur.	Benefit outweighs cost/sacrifice.	Yes C 25.3

[137] *Qualitative measure*

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[137]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
remaining anchoring arrangement.				
Project-specific Mooring Design Analysis.	F: Yes. CS: Minimal cost. Standard practice.	By ensuring that a mooring analysis report is undertaken, the likelihood of mooring failure occurring is reduced. Although no reduction in consequence would occur, the overall risk is reduced.	Benefit outweighs cost/sacrifice.	Yes C 2.6
Mooring system is tested to recommended tension as per API RP 2SK.	F: Yes. CS: Minimal cost. Standard practice	Reduces the likelihood of anchor drag leading to seabed disturbance.	Benefit outweighs cost/sacrifice.	Yes C 25.4
AMSA/AHS/potentially affected relevant persons (as identified in Section 5 will be notified in the event significant equipment is unable to be recovered. Notification will allow for stakeholder to raise Notice to Mariners if necessary.	F: Yes. CS: Minimal cost. Standard practice.	Occurs after a dropped object event and therefore no change to the likelihood. Will ensure relevant persons are aware of dropped object locations to be avoided when necessary.	Benefit outweighs cost/sacrifice.	Yes C 25.5
Professional Judgement – Eliminate				
No additional controls identified.				
Professional Judgement – Substitute				
No additional controls identified.				
Professional Judgement – Engineered Solution				
If safe and practicable to do so, using MODU, vessels, ROV or crane to attempt recovery of material[138] environmentally hazardous or non-hazardous solid object/waste container lost overboard.	F: Yes. CS: Minimal cost. Standard practice.	Potentially reduces consequence by recovering equipment from the environment.	Benefit outweighs cost/sacrifice.	Yes C 24.4
ALARP Statement: On the basis of the environmental risk assessment outcomes and use of the relevant tools appropriate to the decision type, Woodside considers the adopted controls appropriate to manage the impacts and risks of unplanned seabed disturbance. As no reasonable additional/alternative controls were identified that would further reduce the impacts without grossly disproportionate sacrifice, the impacts and risks are considered ALARP.				

[138] For the purposes of this control/performance standard, “material” is defined as unplanned releases of environmentally hazardous or non-hazardous solid object/waste events with an environmental consequence of > F.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[137]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Demonstration of Acceptability				
Acceptability Statement: The impact assessment has determined that disturbance to seabed from dropped objects from the Pluto Facility Operations and the Xena-03 Tie-back activities, including a loss of station keeping of the MODU, represents a moderate current risk rating and is unlikely to result in a risk consequence greater than Minor. The adopted controls are considered industry good practice. The potential risks and consequences are considered broadly acceptable if the adopted controls are implemented. Therefore, Woodside considers the adopted controls appropriate to manage the risks of seabed disturbance from dropped objects/anchor drag to an acceptable level.				

EPOs, EPSs and MC for Pluto Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 25a No unplanned seabed disturbance from dropped objects.	**C 25.5** AMSA/AHS/potentially affected relevant persons (as identified in Section 5 will be notified in the event significant equipment is unable to be recovered. Notification will allow for stakeholder to raise Notice to Mariners if necessary.	**PS 25.10** Notification to AMSA/AHS/ potentially affected relevant persons to prevent activities interfering with other marine users.	**MC 25.10.1** Consultation records demonstrate that AMSA/ AHS/potentially affected relevant persons have been notified in the event of a significant equipment loss.
	C 25.7 If safe and practicable to do so, vessel, ROV, or crane will be used to attempt recovery of solid object/waste lost overboard.	**PS 25.7** Material[139] solid waste/equipment dropped to the marine environment will be recovered where safe and practicable to do so. Where retrieval is no practicable and/or safe, material[178] items (property) that are lost to the marine environment will undergo an impact assessment and will be added to the inventory for the title.	**MC 25.7.1** Records detail the recovery attempt consideration and status of any hazardous waste lost to the marine environment.
		Incident reports raised for unplanned loss of solid waste/equipment and recordable incidents notified for material[178] unplanned loss, regardless of whether the item/s are recovered.	

[139] For the purposes of this control/performance standard, “material” is defined as unplanned releases of environmentally hazardous or non-hazardous solid object/waste events with an environmental consequence of > F.

EPOs, EPSs and MC for Xena-03 Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 25b No unplanned seabed disturbance from dropped objects or loss of station keeping.	**C 25.1** The MODU/installation vessel work procedures for lifts, bulk transfers and cargo loading, which require: • the security of loads shall be checked prior to commencing lifts • loads shall be covered if there is a risk of loss of loose materials. Lifting operations shall be conducted using the PTW and JSA systems to manage the specific risks of that lift, including consideration of weather and sea state.	**PS 25.1** All lifts conducted in accordance with applicable MODU/installation vessel work procedures to limit potential for dropped objects.	**MC 25.1.1** Records show lifts conducted in accordance with the applicable MODU/installation vessel work procedures.
	C 25.2 MODU, installation vessel and support vessel inductions include control measures for dropped object prevention.	**PS 25.2** To ensure awareness of requirements for dropped object prevention.	**MC 25.2.1** Records show dropped object prevention training is provided to the MODU/ installation vessel.
	C 25.3 Specification and requirements for station keeping equipment (mooring systems) require that: • systems are tested and inspected in accordance with API RP 21 • systems have sufficient capability such that a failure of any single component will not cause progressive failure of the remaining anchoring arrangement.	**PS 25.3** MODU mooring system tested and in place to ensure no complete mooring failure.	**MC 25.3.1** Records demonstrate mooring system tests and inspection.
	C 2.6 Project-specific MODU Mooring Design Analysis.	**PS 2.6** Seabed disturbance from MODU mooring limited to that required to ensure adequate MODU station holding capacity.	**MC 2.6.1** Records demonstrate Mooring Design Analysis approved and implemented during anchor deployment.
	C 25.4 Mooring system is tested to recommended tension as per API RP 2SK.	**PS 25.4** Monitoring compliant with ISO 19901-7:2013.	**MC 25.4.1** Records confirm mooring system is tested to recommended tension as per API RP 2SK.

	C 24.4 If safe and practicable to do so, using MODU, vessels, ROV or crane to attempt recovery of material[140] environmentally hazardous or non-hazardous solid object/waste container lost overboard.	**PS 24.4** Material solid waste/equipment dropped to the marine environment will be recovered where safe and practicable to do so. Where retrieval is no practicable and/or safe, material* items (property) that are lost to the marine environment will undergo an impact assessment and will be added to the inventory for the title. Incident reports raised for unplanned loss of solid waste/equipment and recordable incidents notified for material* unplanned loss, regardless of whether the item/s are recovered.	**MC 24.4.1** Incident records detail the recovery attempt consideration and status of material environmentally hazardous or non-hazardous solid waste object/container lost to the marine environment.

[140] For the purposes of this control/performance standard, “material” is defined as unplanned releases of environmentally hazardous or non-hazardous solid object/waste events with an environmental consequence of > F.

6.9.9 Physical Presence: Interactions with Marine Fauna

Context		
Facility Operations – Section 3.7 Xena-03 Drilling and Tie-back Activities – Section 3.11	Protected Species – Section 4.6	Consultation – Section 5

Impacts and Risks Evaluation Summary

Source of Risk	***Environmental Value Potentially Impacted***							***Evaluation***						
	Soil and Groundwater	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/Habitat	Species	Socio-economic	Decision Type	Consequence/Impact	Likelihood	Risk Rating	ALARP Tool	Acceptability	Outcome
Physical presence of the Pluto Facility, MODU, ASV, installation and support vessels resulting in collision with marine fauna						x		A	E	1	L	LCS PJ	Broadly Acceptable	EPO 26

Description of Source of Risk

Activities associated with the PAP will require vessels IMMR activities, support operations and supply/transport as well as for tie-back activities. The type and number of vessels in the PAA at any one time, and the duration of presence, will differ depending on the activities being undertaken.

Vessels operating in and around the PAA may present a potential hazard to cetaceans and other protected marine fauna such as whale sharks and marine reptiles. Vessel movements can result in collisions between the vessel (hull and propellers) and marine fauna, potentially resulting in superficial injury, serious injury that may affect life functions (e.g., movement and reproduction) and mortality. The frequency and severity of impacts due to collisions vary greatly due to vessel type, vessel operation (specific activity, speed), physical environment (e.g., water depth), and the type of marine fauna potentially present and their behaviours.

Consequence Assessment

Marine Mammals, Reptiles and Sharks

The likelihood of vessel/whale collision being lethal is influenced by vessel speed; the greater the speed at impact, the greater the risk of mortality (Jensen and Silber, 2004; Laist et al., 2001). Vanderlaan and Taggart (2007) found that the chance of lethal injury to a large whale as a result of a vessel strike increases from about 20% at 8.6 knots to 80% at 15 knots. According to the data of Vanderlaan and Taggart (2007), it is estimated that the risk is less than 10% at a speed of four knots. Vessel–whale collisions at this speed are uncommon and, based on reported data contained in the US NOAA database (Jensen and Silber, 2004), there are only two known instances of collisions when the vessel was travelling at less than six knots. Both of these were from whale watching vessels that were deliberately placed among whales.

Support vessels undertaking the PAP within the PAA are likely to be travelling less than eight knots (and will often be stationary). Therefore, the risk of a vessel collision with protected species resulting in death is inherently low. No known key aggregation areas (resting, breeding or feeding) are located within or immediately adjacent to the PAA.

The PAA overlaps two recognised BIAs for cetaceans; the pygmy blue whale migration and distribution BIA and the humpback whale migration BIA (the humpback whale is considered to be at risk due to relatively slow movement and proportion of time spent at or near the sea surface) (refer to Section **Error! Reference source not found.**). Both humpback whales and PBW are only expected to be present during their seasonal migrations. Refer to Table 4-14 for information on migration timing.

Whale sharks are at risk from vessel strikes when feeding at the surface. Whale sharks may traverse offshore NWS waters including the PAA during their migrations to and from Ningaloo Reef, and a BIA for foraging whale sharks

overlaps the PAA. However, given the main aggregation area for whale sharks is approximately 340 km off the coast of Ningaloo (designated as a foraging BIA with high density prey) (Section 4.6.1), it is expected that whale shark presence within the PAA would not comprise significant numbers, and their presence would be transitory and of a short duration. There are no constraints preventing whale sharks from moving away from vessels to avoid injury (e.g. shallow water or shorelines).

Vessel strikes have also been identified as a threat to marine turtles; however, no explicit management actions are listed in relevant conservation advices or recovery plans (Table 4-3). The typical response from turtles on the surface to the presence of vessels is to dive (a potential "startle" response), which decreases the risk of collisions (Hazel et al., 2007). As with cetaceans, the risk of collisions between turtles and vessels increases with vessel speed (Hazel et al., 2007). Given the low speeds of vessels undertaking the Petroleum Activities Program, along with the expected low numbers of turtles within the Facility and Xena-03 Operational Areas, interactions between vessels and turtles are considered to be highly unlikely.

The facility section of the PAA overlaps a flatback internesting buffer BIA which extends for 40 km around a nesting BIA at the Montebello Islands and Dampier Archipelago during their summer nesting period. Given the water depth around the facility (between approximately 85 and 960 m) and absence of potential nesting or significant foraging habitat for turtles (i.e., no emergent islands, reef habitat or shallow shoals/banks), the Facility Operational Area is unlikely to represent important habitat for marine turtles.

The Export Pipeline Operational Area also overlaps the aforementioned flatback turtle internesting buffer BIA, as well as internesting BIAs for green, hawksbill and loggerhead turtles. The BIAs for flatback, green and hawksbill turtles have also been designated as habitat critical to the survival of the species in the Recovery plan for marine turtles in Australia 2017–2027 (Commonwealth of Australia, 2017); however, these areas are likely to hold the same significance as the existing BIAs with slightly differing spatial areas. The export pipeline lies in water depths of 40 to 85 m. No potential nesting or significant foraging habitat for turtles (i.e., no emergent islands, reef habitat or shallow shoals/banks) overlap the Export Pipeline Operational Area.

Given there are significant nesting sites along the mainland coast and islands in proximity to the Export Pipeline Operational Area, turtles are likely to transit this area. Individuals may also infrequently forage in some areas of the export pipeline (i.e., flatback turtles), although not in significant numbers given the lack of suitable habitat and distance from emergent land. As vessels are likely to only operate within the PAA infrequently during IMMR activities and when the facility is crewed, interactions with vessels during the PAP are highly unlikely. Given vessels will be moving at low speeds while in the PAA, turtles are likely to avoid collisions with vessels by diving or swimming away from the area. It is not deemed credible that vessel movement associated with the PAP could have a significant impact on marine fauna populations given (1) the low presence of transiting individuals, (2) avoidance behaviour commonly displayed by marine fauna, and (3) low operating speed of the activity support vessels (generally less than eight knots or stationary, unless operating in an emergency). Activities are considered unlikely to result in a consequence greater than slight, short-term disruption to individuals or a small proportion of the population, and no impact on critical habitat or fauna activity.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[141]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Legislation, Codes and Standards				
Implementing EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans to reduce the likelihood of collision with whales and dolphins.	F: Yes. CS: Minimal cost. Standard practice.	Reductions in speed around protected cetaceans reduce the likelihood of collision.	Controls based on legislative requirements – must be adopted.	Yes C 3.1

[141] Qualitative measure.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[141]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Good Practice				
Variation of the timing of the PAP to avoid whale migration periods.	F: No. Timing of activities is linked to MODU schedule. Timing of all activities is currently not determined, and due to MODU availability and operational requirements, undertaking activities during migration seasons may not be able to be avoided. CS: Not considered.	Not considered, control not feasible.	Not considered, control not feasible.	No
Professional Judgement - Elimination				
Not using vessels.	F: No. No alternative to the use of vessels during the PAP was identified. Given vessels must be used to undertake the Petroleum Activities Program, there is no feasible means to eliminate the source of risk. CS: Not assessed, control not feasible.	Not assessed, control not feasible.	Not assessed, control not feasible.	No
Professional Judgement – Substitute				
None identified.				
Professional Judgement – Engineered Solution				
None identified.				
ALARP Statement: On the basis of the environmental risk assessment outcomes and use of the relevant tools appropriate to the decision type, Woodside considers the adopted controls appropriate to manage the risk of interactions with marine fauna. As no reasonable additional/alternative controls were identified that would further reduce the impacts and risks without grossly disproportionate sacrifice, the impacts and risks are considered ALARP.				

Demonstration of Acceptability

Acceptability Statement:

The consequence assessment has determined that, given the adopted controls, interaction with marine fauna represents a low risk rating that is unlikely to result in a consequence greater than slight, short-term disruption to individuals or a small proportion of the population, and no impact on critical habitat or activity. Further opportunities to reduce the impacts and risks have been investigated above. The adopted controls are considered good oil-field practice/industry best practice and meet the requirements of Part 8 (Division 8.1) of the EPBC Regulations 2000. The management of interactions with marine fauna is consistent with the objectives of approved conservation advice and recovery plans for marine fauna, including cetaceans and whale sharks, where human interference has been identified as a threat.

EPOs, EPSs and MC for Xena-03 Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 26 No injury of, or mortality to, EPBC Act 1999 and listed marine fauna as a result of the Petroleum Activities Program.	**C 3.1** EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans, including the following measures[142]: • Project vessels will not travel greater than 6 knots within 300 m of a cetacean (caution zone) and not approach closer than 100 m from a whale. • Project vessels will not approach closer than 50 m for a dolphin and/or 100 m for a whale (with the exception of animals bow riding). • If the cetacean shows signs of being disturbed, support vessels will immediately withdraw from the caution zone at a constant speed of less than 6 knots.	**PS 3.1** Vessels will comply with the EPBC Regulations 2000 – Part 8 Division 8.1 (Regulation 8.05 and 8.06) Interacting with cetaceans to manage the risk of fauna collision.	**MC 3.1.1** Records demonstrate no breaches with EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans and Woodside Marine Charterers Instructions. **MC 3.1.2** Records demonstrate reporting cetacean ship strike incidents to DCCEEW.

The potential impacts and risks are considered broadly acceptable if the adopted controls are implemented. Therefore, Woodside considers the adopted controls appropriate to manage the impacts and risks of vessel collision with marine fauna to a level that is broadly acceptable.

EPOs, EPSs and MC for Pluto Operations and Xena-03 Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 26 No injury of, or mortality to, EPBC Act 1999 and listed	**C 3.1** EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans,	**PS 3.1** Vessels will comply with the EPBC Regulations 2000 – Part 8 Division 8.1	**MC 3.1.1** Records demonstrate no breaches with EPBC Regulations

[142] For safety reasons, the distance requirements below are not applied for a vessel holding station or with limited manoeuvrability, e.g., anchor handling, loading, back-loading, bunkering, close standby cover for overside working and emergency situations.

EPOs, EPSs and MC for Pluto Operations and Xena-03 Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
marine fauna as a result of the Petroleum Activities Program.	including the following measures[143]: • Project vessels will not travel greater than 6 knots within 300 m of a cetacean (caution zone) and not approach closer than 100 m from a whale. • Project vessels will not approach closer than 50 m for a dolphin and/or 100 m for a whale (with the exception of animals bow riding). • If the cetacean shows signs of being disturbed, support vessels will immediately withdraw from the caution zone at a constant speed of less than 6 knots.	(Regulation 8.05 and 8.06) Interacting with cetaceans to manage the risk of fauna collision.	2000 – Part 8 Division 8.1 Interacting with cetaceans and Woodside Marine Charterers Instructions. **MC 3.1.2** Records demonstrate reporting cetacean ship strike incidents to DCCEEW.

[143] For safety reasons, the distance requirements below are not applied for a vessel holding station or with limited manoeuvrability, e.g., anchor handling, loading, back-loading, bunkering, close standby cover for overside working and emergency situations.

6.9.10 Physical Presence: Introduction of Invasive Marine Species

Context		
Facility Operations – Section 3.4 Xena-03 Drilling and Tie-back Activities – Section 3.11	Regional Context – Section 4.2 Habitats and Biological Communities – Section 4.5 Protected Species – Section 4.6 Protected Places – Section 4.8 Socio-economic Environment – Section 4.9	Consultation – Section 5

Impacts and Risks Evaluation Summary

Source of Risk	***Environmental Value Potentially Impacted***							***Evaluation***						
	Soil and Groundwater	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems / Habitat	Species	Socio-economic	Decision Type	Consequence / Impact	Likelihood	Risk Rating	ALARP Tool	Acceptability	Outcome
Invasive species in vessel ballast tanks or on vessels/ submersible equipment					x	x	x	A	E	1	L	LCS GP PJ	Broadly Acceptable	EPO 27

Description of Source of Risk

During the Petroleum Activities Program, vessels will be transiting to and from the PAA, potentially including traffic mobilising from beyond Australian waters. Vessels include those servicing and supporting Pluto operations (Section 3.8) as well as the MODU, ASV, IMMR vessel, installation vessels or general support vessels (Section 3.12). Vessels may be sourced from the local area (Dampier, Port Hedland, etc) or from further afield, depending on the type of vessel required and availability. In addition, infrequent import of materials (e.g., spares) from international suppliers may be required. Vessels arriving from international waters typically call into Dampier, where quarantine clearance including ballast log reviews is conducted in accordance with Biosecurity Act 2015.

All vessels are inherently subject to some level of marine fouling. Organisms attach to the vessel hull, particularly in areas where organisms can find a good surface (e.g., seams, strainers and unpainted surfaces) or where turbulence is lowest (e.g., niches, sea chests). Organisms can also be drawn into ballast tanks during on-boarding of ballast water as cargo is unloaded or to balance vessels under load. Biofouling organisms can become established in an area through the release of propagules (e.g., eggs or larvae), or by attaching to substrate after becoming detached from the host vessel.

Non-indigenous Marine Species (NIMS) have been introduced into a region beyond their natural biogeographic range and have the ability to survive, reproduce and establish founder populations. Not all NIMS introduced into an area thrive or cause demonstrable impacts. Indeed, the majority of NIMS around the world are relatively benign and few have spread widely beyond sheltered ports and harbours. Only a subset of NIMS that become abundant and impact on social/cultural, human health, economic and/or environmental values can be considered Invasive Marine Species (IMS).

During the Petroleum Activities Program, vessel activities that have the potential to lead to the introduction of IMS are:

- discharge of ballast water from vessels
- vessel interactions with the facility
- cross contamination between vessels (e.g., when vessels need to be alongside each other).

Consequence Assessment

IMS have historically been introduced and translocated around Australia by a variety of human means including biofouling and ballast water. Species of concern are those that:

- are not native to the region
- are likely to survive and establish in the region
- are able to spread by human mediated or natural means.

Species of concern vary from one region to another, depending on various environmental factors such as water temperature, salinity, nutrient levels and habitat type. These factors dictate their survival and invasive capabilities.

Introducing IMS into the local marine environment may alter the ecosystem, as IMS have characteristics that make them superior (in a survival and/or reproductive sense) to indigenous species. They may prey upon local species (which had previously not been subject to this kind of predation and therefore not have evolved protective measures against the attack), they may outcompete indigenous species for food, space or light and can also interbreed with local species, creating hybrids such that the endemic species is lost.

IMS have also proven economically damaging to areas where they have been introduced and established. Such impacts include direct damage to assets (fouling of vessel hulls and infrastructure) and depletion of commercially harvested marine life (e.g., shellfish stocks). IMS have proven particularly difficult to eradicate from areas, once established. If the introduction is captured early, eradication may be effective but is likely to be expensive, disruptive and, depending on the method of eradication, harmful to other local marine life.

Despite the potential high consequence of the establishment of a marine pest within a high value environment as a result of introduction, unlike coastal or sheltered nearshore waters, the deep offshore open waters of the PAA are not conducive to the settlement and establishment of IMS (Geiling, 2016), due to the lack of light or suitable habitat to sustain growth or survival. Table 6-49 provides an assessment of the IMS impacts and risks associated with the Petroleum Activity Program.

Epifauna and Infauna

Epifauna and infauna are susceptible to impacts from IMS due to the risk of changes to the ecosystem dynamics such as competition for resources and predation.

Two KEFs also overlap the PAA: the Ancient Coastline at 125 m Depth Contour KEF and the Continental Slope Demersal Fish Communities KEF.

Discrete areas of hard substrate hosting sessile filter feeding communities such as sponges and gorgonians may be associated within the Ancient Coastline at the 125 m Depth Contour KEF, of which 9.1 km² overlaps the PAA. However, no areas of hard substrate characteristic of this KEF have been identified within the PAA (Jacobs, 2014).

Filter feeder communities within the PAA are present on the subsea infrastructure and Pluto platform, which provides hard substrate for attachment (Jacobs, 2014).

Vessels have the potential to introduce IMS into the PAA, however, the deep offshore open waters of the PAA (70 to 130 m) are not conducive to the settlement and establishment of IMS. Furthermore, the PAA are away from shorelines and/or critical habitat. The likelihood of IMS being introduced and establishing viable populations within the PAA or immediate surrounds is considered unlikely, with the potential settlement on subsea infrastructure not expected. Accordingly, impact to epifauna/infauna in the PAA is not considered credible. Receptor sensitivity for epifauna and infauna is low, leading to a Slight (E) risk consequence.

Industry, Shipping, Defence

The establishment of IMS has the potential to cause changes to the functions, interests or activities of other users through indirect impact such as changes to fisheries target species resulting in economic and social implications, or due to compromised reputation to the oil and gas industry.

Given the low likelihood of IMS translocation to, and colonisation of environments within the PAA, project activities will not result in establishment of IMS, and as such not adversely affect other marine user activities in the region.

Based on the impact evaluation, the magnitude of potential impacts of a change to the functions, interests or activities of other users is slight. Receptor sensitivity for industry, shipping and defence is medium, leading to a Slight (E) risk consequence. The likelihood of the risk event occurring is Remote, therefore the risk is assessed as Low.

Summary of Potential Impacts to Environment Values

In support of Woodside's assessment of the impacts and risks of IMS introduction associated with the Petroleum Activities Program, a risk and impact evaluation of the different aspects of marine pest translocation associated with the activity was conducted.

Given the adopted controls, the overall risk rating for unplanned introduction of invasive marine species is Low based on a Slight consequence (short-term impact (<1 year) on species, habitat (but not affecting ecosystem function), physical or biological attribute, or to a community or area/item of cultural significance community), and a highly unlikely likelihood.

Table 6-49: Assessment of the impacts and risks of invasive marine species introduction associated with the Petroleum Activity Program

IMS Introduction Aspect	Credibility of Introduction	Consequence of Introduction	Likelihood
Transfer of IMS from infected vessel to PAA and establishment on the seafloor or subsea infrastructure.	Not Credible The deep offshore open waters of the PAA away from shorelines and/or critical habitat, more than 12 nm from a shore and in waters 40–85 m deep, are not conducive to the settlement and establishment of IMS.		
Transfer of IMS from infected vessel to and subsequent establishment on the Pluto platform.	Credible There is potential for the transfer of marine pests to occur.	If IMS were to establish this would potentially result in fouling of intakes (depending on the pest introduced) and would likely result in the quarantine of the Pluto facility until eradication could occur (through cleaning and treatment of infected areas), which would be costly to undertake. Minor (D) – Reputation and Brand Such introduction would be expected to have Minor (D) impact to Woodside's reputation and brand, and close scrutiny of asset level operations or future proposals. Slight (E) – Environment Environmental consequence of introduction of IMS to the Pluto platform is considered Slight (E), localised and would relate to habitat directly on the facility.	Highly Unlikely (1) Interactions between the Pluto facility and support vessels is limited during the petroleum activity program, with a 500 m safety exclusion zone being adhered too. Spread of marine pests via ballast water or spawning in these open ocean environments is considered Highly Unlikely (1).
Introduced to PAA and establishment on a project vessel.	Credible There is potential for the transfer of marine pests between project vessels within the PAA.	Environment – Not Credible The translocation of IMS from a colonised MODU or project vessel to shallower environments via natural dispersion is not considered credible given the distances of the PAA from nearshore environments (i.e., greater than 12 nm/50 m water depth). There is therefore no credible environmental risk and the assessment is	Remote (0) Interactions between project vessel will be limited during the Petroleum Activities Program, with minimum 500 m safety exclusion zones being adhered to around the MODU and installation vessel, and interactions limited short periods of time alongside (i.e., during backloading, bunkering activities). There is also no direct contact (i.e., they are not

		limited to Woodside's reputation. Reputation – E If IMS were to establish on a project vessel (i.e., MODU, installation vessel, activity project vessels) this could potentially impact the vessel operationally through the fouling of intakes, result in translocation of an IMS into the PAA and, depending on the species, potentially transfer of an IMS to other project vessels, which would likely result in the quarantine of the vessel until eradication could occur (through cleaning and treatment of infected areas), which would be costly to perform. Such introduction would be expected to have slight impact to Woodside's reputation, particularly with Woodside's contractors, and would likely have a reputational impact on future proposals.	tied up alongside) during these activities. Spread of marine pests via ballast water or spawning in these open ocean environments is also considered remote.
Transfer of IMS from infected vessel to and subsequent establishment on riser platform, then transfer of IMS to a secondary vessel from the facility.	Not Credible Risk is considered so remote that it is not credible for the purposes of the Petroleum Activity Program. The transfer of a marine pest from an infected activity vessel to the facility is considered highly unlikely given the offshore open ocean environment. For a marine pest to then establish into a mature spawning population on the facility and then transfer to another support vessel is not considered credible (i.e., beyond the Woodside risk matrix). The facility is located in an offshore, open ocean, deep environment. Support vessels only spend short periods of time alongside the riser platform (i.e., during backloading or bunkering activities).		

	There is also no direct contact (i.e., they are not tied up alongside) during these activities. It is also noted that Woodside has been conducting marine vessel movements between the facility and WA ports (such as Dampier) for a long period of time, and no IMS has been detected in these ports (Department of Fisheries, 2017).		

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)***	***Benefit in Impact/ Risk Reduction***	***Proportionality***	***Control Adopted***
Legislation, Codes and Standards				
On arrival in Australia, all vessels will manage their ballast water using one of the approved ballast water management options, as specified in the Australian Ballast Water Management Requirements.	F: Yes. CS: Minimal cost. Standard practice.	Reduction in the likelihood that ballast water will host IMS.	Controls based on legislative requirements under the Biosecurity Act 2015 – must be adopted.	Yes C 27.1
Internationally sourced project vessels will manage their biosecurity risk associated with biofouling as specified in the Australian Biofouling Management Requirements.	F: Yes. CS: Minimal cost. Standard practice.	Reduces the likelihood of transfer of marine pests between vessels within the PAA. No change in consequence would occur.	Controls based on legislative requirements under the Biosecurity Act 2015 – must be adopted.	Yes C 27.2
Good Practice				
Woodside's IMS risk assessment process[144] will be applied to the MODU, and all vessels and relevant immersible equipment undertaking the Petroleum Activities Program. Assessment will consider these risk factors: For MODU and project vessels: • vessel/MODU/ type • recent IMS inspection and cleaning history,	F: Yes. CS: Minimal cost. Good practice implemented across all Woodside Operations.	Identifies potential risks and additional controls implemented accordingly. In doing so, the likelihood of transferring marine pests between project vessels within the PAA is reduced. No change in consequence would occur.	Benefits outweigh cost/sacrifice.	Yes C 27.3

[144] Qualitative measure
45 Woodside's IMS risk assessment process was developed with regard to the national biofouling management guidelines for the petroleum production and exploration industry and guidelines for the control and management of a ships' biofouling to minimise the transfer of invasive aquatic species (IMO Guidelines, 2011).

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)***	***Benefit in Impact/ Risk Reduction***	***Proportionality***	***Control Adopted***
including for internal niches • out-of-water period before mobilisation • age and suitability of antifouling coating at mobilisation date • internal treatment systems and history • origin and proposed area of operation • number of stationary/slow speed periods >7 days • region of stationary or slow periods • type of activity – contact with seafloor. For immersible equipment: • region of deployment since last thorough clean, particularly coastal locations • duration of deployments • duration of time out of water since last deployment • transport conditions during mobilisation • post-retrieval maintenance regime. Based on the outcomes of each IMS risk assessment, management measures commensurate with the risk (such as treating internal systems, IMS inspections or cleaning) will be implemented to minimise the likelihood of IMS being introduced.				
Diver based monitoring of the riser platform for IMS.	F: Potentially. Diver based surveys are technically feasible for the facility but are not approved under the in-force Safety Case. CS: Significant. IMS inspections of in-water assets typically require	Riser platform monitoring does not prevent the potential for translocation (i.e., only as a mitigation measure). Detection may facilitate subsequent development of options to manage	Disproportionate. Interactions between the facility and support/subsea vessels posing IMS translocation risk is limited, and the vessels involved will have been managed through the implementation of	No

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)***	***Benefit in Impact/ Risk Reduction***	***Proportionality***	***Control Adopted***
	vessel logistics and diver-based inspection teams to reliably detect IMS. This is a costly, time-consuming process that would likely require facility simultaneous operational constraints, and invariably introduces a series of significant safety risks in a hazardous offshore environment. Monetary cost of IMS survey for facility-sized infrastructure would be comparable to safe diver campaign arrangements in the order of $200,000/day plus mob/demob costs. Costs of ROV to support survey are in the order of $150,000/day plus mob/demob costs (based on subsea ROV hire costs). Health and safety exposure includes those of personnel while conducting diver-based surveys – four days of two to three people (based on subsea ROV surveys of similar size), as well as offshore vessel and facility simultaneous operations hazards.	IMS. Subsequent success may be limited due to structure complexity and hazardous environment.	Woodside's Invasive Marine Species Management Plan (IMSMP) (C 13.2), a verified process which provides Woodside confidence in the verification of EPO 13. Consequently, any additional benefit gained through the implementation of this control is considered disproportionate, given material execution safety risks and controls already adopted (and noting already incurred cost through implementation of IMSMP (i.e., inspections and cleaning where risk warrants)), and the unlikely likelihood of a translocation event.	
Professional Judgement – Elimination				
Not using MODU and project vessels.	F: No. No alternative to the use of vessels during the PAP was identified, given vessels must be used to undertake the Petroleum Activities Program. There is no feasible means to eliminate the source of risk.	Not assessed, control not feasible.	Not assessed, control not feasible.	No

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)***	***Benefit in Impact/ Risk Reduction***	***Proportionality***	***Control Adopted***
	CS: Not assessed, control not feasible.			
No discharge of ballast water during the Petroleum Activities Program.	F: No. Ballast water discharges are critical for maintaining vessel stability. Given the nature of the Petroleum Activities Program, the use of ballast (including the potential discharge of ballast water) is considered to be a safety critical requirement. CS: Not assessed, control not feasible.	Not assessed, control not feasible.	Not assessed, control not feasible.	No
Professional Judgement – Substitute				
Sourcing vessels based in Australia only.	F: Potentially. Limiting activities to only use local project vessels could potentially pose a significant risk in terms of time and duration of sourcing a vessel, as well as the ability of the local vessels to perform the required tasks. For example, there are limited installation vessels based in Australian waters. While the project will attempt to source project vessels locally it is not always possible. Availability cannot always be guaranteed when considered competing Oil and Gas activities in the region. In addition, sourcing Australian based vessels only will cause increases in cost due to pressures of vessel availability. CS: Significant cost and schedule impacts due to restrictions of vessel hire opportunities.	Sourcing vessels from within Australian will reduce the likelihood of IMS from outside Australian waters, however, it does not reduce the likelihood of introduction of species native to Australia but alien to the PAA and NWMR, or of IMS that have established elsewhere in Australia. The consequence is unchanged.	Disproportionate. Sourcing vessels from Australian waters may result in a reduction in the likelihood of IMS introduction to the PAA; however, the potential cost of implementing this control is grossly disproportionate to the minor environmental gain (or reducing an already remote likelihood of IMS introduction) potentially achieved by using only Australian based vessels, consequently this risk is considered not reasonably practicable.	No

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)***	***Benefit in Impact/ Risk Reduction***	***Proportionality***	***Control Adopted***
Inspecting all vessels for IMS.	F: Yes. Approach to inspect vessels is feasible. CS: Significant cost and schedule impacts. Thorough inspections require vessels to be removed from the sea (e.g., slipped or dry docked) and examined by an IMS expert. This process incurs significant financial and schedule sacrifices. Timely vessel-based support is integral to the safe and efficient operation of the facility and subsea infrastructure.	Reduction in the likelihood that a vessel will host IMS.	Disproportionate. The cost/sacrifice is grossly disproportionate to the benefit gained.	No
Professional Judgement – Engineered Solution				
None identified.				
ALARP Statement: On the basis of the environmental risk assessment outcomes and use of the relevant tools appropriate to the decision type, Woodside considers the adopted controls appropriate to manage the impacts and risks of IMS introduction and establishment. As no reasonable additional/alternative controls were identified that would further reduce the impacts and risks without grossly disproportionate sacrifice, the impacts and risks are considered ALARP.				
Demonstration of Acceptability				
Acceptability Statement: The risk assessment has determined that, given the adopted controls, introduction of IMS represent a moderate risk rating that has a remote likelihood to result in an environmental consequence greater than major long-term impact on marine communities within the PAA. Further opportunities to reduce the impacts and risks have been investigated above. The adopted controls are considered good oil-field practice/industry best practice and meet Australian legislative requirements, including the Biosecurity Act 2015. The potential impacts and risks are considered broadly acceptable if the adopted controls are implemented. Therefore, Woodside considers the adopted controls appropriate to manage the impacts and risks of invasive marine species to an acceptable level.				

EPOs, EPSs and MC for Pluto Operations and Xena-03 Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 27 No introduction and establishment of IMS into the PAA as a result of the Petroleum Activities Program.	**C 27.1** All vessels will manage their ballast water using one of the approved ballast water management options, as specified in the Australian Ballast Water Management Requirements.	**PS 27.1** Compliance with Australian Ballast Water Management Requirements (as defined under the Biosecurity Act 2015) (aligned with the International Convention for the Control and Management of Ships' Ballast Water and	**MC 27.1.1** Ballast water exchange records maintained by vessels which verify compliance against Ballast Water Management requirements.

EPOs, EPSs and MC for Pluto Operations and Xena-03 Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
		Sediments) to prevent the introduction of IMS.	
	C 27.2 Internationally sourced project vessels will manage their biosecurity risk associated with biofouling as specified in the Australian Biofouling Management Requirements.	**PS 27.2** Compliance with Australian Biofouling Management Requirements.	**MC 27.2.1** Records of implementation of biofouling management measure and pre-arrival reporting.
	C 27.3 Woodside's IMS risk assessment process[145] will be applied to all vessels and relevant immersible equipment undertaking the Petroleum Activities Program. Assessment will consider these risk factors: For all vessels: • vessel/MODU/ type • recent IMS inspection and cleaning history, including for internal niches • out-of-water period before mobilisation • age and suitability of antifouling coating at mobilisation date • internal treatment systems and history • origin and proposed area of operation • number of stationary/slow speed periods >7 days • region of stationary or slow periods • type of activity – contact with seafloor. For immersible equipment: • region of deployment since last thorough clean, particularly coastal locations • duration of deployments	**PS 27.3** Before entering the PAA, all vessels and relevant immersible equipment are determined to be low risk of introducing IMS of concern and maintain this low risk status to mobilisation.	**MC 27.3.1** Records of IMS Vessel Risk Assessments maintained for all vessels and relevant immersible equipment, as required by the management plan. **MC 27.3.2** Records maintained of management measures which have been implemented where identified through the IMS Vessel Risk Assessment process.

[140] Woodside's IMS risk assessment process was developed with regard to the national biofouling management guidelines for the petroleum production and exploration industry and guidelines for the control and management of a ships' biofouling to minimise the transfer of invasive aquatic species (IMO Guidelines, 2011).

EPOs, EPSs and MC for Pluto Operations and Xena-03 Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	• duration of time out of water since last deployment • transport conditions during mobilisation • post-retrieval maintenance regime. Based on the outcomes of each IMS risk assessment, management measures commensurate with the risk (such as treating internal systems, IMS inspections or cleaning) will be implemented to minimise the likelihood of IMS being introduced.		

6.9.11 Physical Presence (Unplanned): Interaction with Live Infrastructure

Context		
Project Vessels – Section 3.12 Subsea, Inspection, Maintenance and Repair Activities – Section 3.10 Support Vessel Operations – Section 3.8 Xena-03 Drilling and Tie-back Activities – Section 3.11 Vessel-based Activities for the Xena-03 Tie-back – Section 3.12	Socio-economic Environment – Section 4.10	Consultation – Section 5

Impact Evaluation Summary

Source of Risk	***Environmental Value Potentially Impacted***						***Evaluation***						
	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/Habitat	Species	Socio-economic	Decision Type	Consequence/Impact	Likelihood	Risk Rating	ALARP Tools	Acceptability	Outcome
Interaction with live infrastructure from dropped objects						X	A	E	1	L	LCS GP	Broadly Acceptable	EPO 28
Interaction with live infrastructure from anchor drag						X							

Description of Source of Impact

There is existing live subsea infrastructure in the PAA, which includes components of the Woodside Julimar Brunello Production Pipeline, Chevron Wheatstone Pipeline, Santos Reindeer Offshore Gas Supply Pipeline and Woodside Scarborough Export Pipeline. During the PAP, activities may be conducted that present a risk of dropped objects or anchor drag over the nearby live infrastructure.

Dropped Objects

There is the potential for objects to be dropped overboard from the MODU and project vessels to the marine environment. Objects that have been dropped during previous offshore activities include small numbers of personal protective gear (e.g., glasses, gloves, hard hats), small tools (e.g., spanners), hardware fixtures (e.g., riser hose clamp) and drill equipment (e.g., drill pipe). However, there is potential for larger equipment to be dropped during the activity, particularly during recovery of infrastructure from the seabed. The spatial extent in which dropped objects can occur is restricted to the PAA.

Anchor Drag

A moored/ hybrid MODU may be used for drilling the wells, secured on station by an 8- to 12-point mooring system deployed to the seabed, as dictated by the mooring analysis. High energy weather events such as cyclones, occurring while the MODU is on station, can lead to excessive loads on the mooring lines, resulting in failure (either anchor(s) dragging or mooring lines parting). A failure of mooring integrity may lead to the mooring lines and anchors attached to the MODU being trailed across the seabed and over live infrastructure.

For a moored MODU, personnel on-board are typically evacuated during cyclones. Woodside implements a risk-based assessment process to aid in decision making for cyclone evacuations, with the well suspended prior to MODU evacuation. Support vessels also demobilise from the PAA during the passage of a cyclone. While the MODU is temporarily abandoned, the position of the MODU is monitored remotely for any deviation. Support vessels and MODU personnel return to the PAA as soon as safe to do so after a cyclone evacuation. Operational experience indicates cyclone evacuations typically last for seven days.

Industry statistics from the North Sea show that a single mooring line failure for MODUs is the most common failure mechanism (33 × 10-4 per line per year), followed by a double mooring line failure (11 × 10-4 per line per year) (Petroleumstilsynet, 2014). Note that single and double mooring line failures do not typically result in the loss of

station keeping. If partial or complete mooring failures are sufficient to result in a loss of station keeping, industry experience indicates that MODUs may drift considerable distances from their initial position (Offshore: Risk and Technology Consulting Inc., 2002). Partial mooring failures leading to a loss of station keeping resulted in smaller MODU displacements, due to the remaining anchors dragging along the seabed when compared to complete mooring failures; complete mooring failures resulted in a freely drifting MODU (Offshore: Risk and Technology Consulting Inc., 2002).

NOPSEMA has recorded four cases of anchor drag due to loss of MODU holding station during cyclone activity between 2004 and 2015 (NOPSEMA, 2015).

Impact Assessment

Potential Impacts to Environmental Values

Interactions with Other Marine Users

In the unlikely event of an object being dropped on, or anchors dragging over, live infrastructure there is potential impacts to the infrastructure and the Operators of that infrastructure.

If interactions with live infrastructure were to occur, Woodside would notify the relevant operations team in accordance with the SIMOPS plan. This would trigger responses from the Operator to assess and respond to any damage caused in accordance with the relevant operations EP for the live infrastructure. Under Regulation 56 of the Environment Regulations, a titleholder may refer NOPSEMA to information previously given to NOPSEMA for another purpose under the OPGGS Act, the Environment Regulations or any other Regulations made under the Act, to comply with a requirement on the titleholder under the Environment Regulations to give NOPSEMA information or include information in a document. In accordance with Regulation 56, NOPSEMA is referred to the relevant operations EPs submitted by the Operators of the live infrastructure, and accepted by NOPSEMA, for the detail of the Operators' assessment and response in such a scenario. Potential impacts therefore include time and costs associated with inspecting the infrastructure and time and costs associated with any associated repair, which are expected to be slight and short-term in nature.

Potential Subsequent Loss of Containment

In the unlikely event of an object being dropped on, or anchors dragging over, live infrastructure, and in the further unlikely event of a severe interaction with the infrastructure, there is a possibility that live infrastructure could be ruptured releasing hydrocarbons into the marine environment in such a scenario. In accordance with Regulation 56, NOPSEMA is referred to the relevant operations EPs submitted by the Operators of the live infrastructure, and accepted by NOPSEMA, for the detail of potential impacts, receptors and the extent of the environment that may be affected in such a scenario, being:

- Julimar Operations EP (NOPSEMA Doc A771970, https://docs.nopsema.gov.au/A771970)
- Wheatstone Project Start-up and Operations EP (NOPSEMA Doc: A853704, https://docs.nopsema.gov.au/A853704)
- Reindeer Wellhead Platform and Offshore Gas Supply Pipeline Operations (NOPSEMA Doc: A738138, https://docs.nopsema.gov.au/A738138)
- Scarborough Seabed Intervention and Trunkline Installation (NOPSEMA Doc. A1027151, https://docs.nopsema.gov.au/A1027151).

As detailed in this section above and below, this EP addresses the risks and impacts (interaction with live infrastructure) that arise from the activities under this EP (interaction from dropped objects and interaction from anchor drag). This EP also contains controls to prevent such an event from occurring that are within the operational control of this EP. As detailed in this section, the operational control, maintenance and incident response associated with the live infrastructure and/or loss of containment from the live infrastructure is not within the operational control of this EP. As detailed below, the risks and impacts of the activities under this EP are managed to ALARP and an acceptable level by implementing the SIMOPS plan and notifying the relevant Operators in the instance of an interaction with live infrastructure to allow the relevant Operator's detailed response strategies under the relevant operations EPs to be triggered, if required. In the event of a loss of containment caused by an interaction with live infrastructure Woodside will follow direction from the relevant Operator and will respond as per the relevant Operator's requirements. In accordance with Regulation 56, NOPSEMA is referred to the relevant operations EPs submitted by the Operators of the live infrastructure, and accepted by NOPSEMA, for the detail of the operational control, maintenance and incident response associated with the live infrastructure and/or loss of containment from the live infrastructure.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[146]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Good Practice				
The MODU/PIV work procedures for lifts, bulk transfers and cargo loading, which require: • The security of loads shall be checked prior to commencing lifts. • Loads shall be covered if there is a risk of loss of loose materials. • Lifting operations shall be conducted using the PTW and JSA systems to manage the specific risks of that lift, including consideration of weather and sea state.	F: Yes. CS: Minimal cost. Standard practice.	Reduces the likelihood of an object being dropped during lifts, bulk transfers and cardo loading.	Benefits outweigh cost/sacrifice.	Yes C 25.1
Specifications and requirements for station keeping equipment (mooring systems), require that: • systems are tested and inspected in accordance with API RP 21 • systems have sufficient capability such that a failure of any single component will not cause progressive failure of the remaining anchoring arrangement.	F: Yes. CS: Minimal cost. Standard practice.	Reduces the likelihood of mooring failure leading to uncontrolled anchor drag.	Benefit outweighs cost/sacrifice.	Yes C 25.3
Project-specific Mooring Design Analysis.	F: Yes. CS: Minimal cost. Standard practice.	By ensuring that a mooring analysis report is undertaken, the likelihood of mooring failure occurring is reduced. The mooring design analysis report specifically considers proximity to live infrastructure and manages potential impacts on that infrastructure accordingly.	Benefit outweighs cost/sacrifice.	Yes C 2.6

[146] Qualitative measure.

Mooring system is tested to recommended tension as per API RP 2SK.	F: Yes. CS: Minimal cost. Standard practice	Reduces the likelihood of anchor drag.	Benefit outweighs cost/sacrifice.	Yes C 25.4
Professional Judgement – Eliminate				
No additional controls identified.				
Professional Judgement – Substitute				
No additional controls identified.				
Professional Judgement – Engineered Solution				
MODU tracking equipment operational when the MODU unmanned.	F: Yes. CS: Minimal cost. Standard practice.	Although no reduction in consequence would occur, the overall risk is reduced as the location of the MODU would be known at all times and the appropriate response could be deployed in the event of a loss of station keeping.	Benefit outweighs cost/sacrifice.	Yes C 28.1
Develop a SIMOPS Plan to manage MODU interactions with other facilities/vessels, where multiple campaigns occur within the PAA (i.e. during xmas tree installation). SIMOPS Plan will contain information on: • minimum separation distances • communications • MODU/vessels/ activities involved in SIMOPS • exclusion zone entry and exit processes • ROV operations • helicopter operations • key roles, responsibilities and emergency contacts • PTW arrangements • incident reporting and investigation • management of change.	F: Yes. CS: Minimal cost. Standard practice.	SIMOPS Plan contains detail such as communications requirements, exclusion zones and entry/exit requirements and roles and responsibilities – which can help reduce likelihood of interactions with live infrastructure, it also contains notification protocols in the event of an interaction with live infrastructure. The SIMOPS plan also requires notification in the event of an incident or interaction with infrastructure thus triggering response strategies in the relevant operations EPs. The detailed response is in the Operations EP and the implementation of that would be triggered by the SIMOPS plan and Woodside will support the response according to the other Operator's requests.	Benefits outweigh cost/sacrifice. Control is also Standard Practice.	Yes C 1.15
ALARP Statement: Woodside considers the adopted controls appropriate to manage the risks of a significant dropped object or anchor drag interacting with live infrastructure within the PAA. As no reasonable additional/alternative controls were identified that would further reduce the risks and consequences without disproportionate sacrifice, the risks and consequences are considered ALARP.				

Demonstration of Acceptability			
Acceptability Statement: The impact assessment has determined that interaction with live infrastructure from dropped objects or a loss of station keeping of the MODU represents a low current risk rating and is unlikely to result in a risk consequence greater than slight. The adopted controls are considered industry good practice. The potential risks and consequences are considered broadly acceptable if the adopted controls are implemented. Therefore, Woodside considers the adopted controls appropriate to manage the risks of seabed disturbance from dropped objects/anchor drag to an acceptable level.			
EPOs, EPSs and MC for Xena-03 Tie-back Activities			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
EPO 28 No interaction with live infrastructure as a result of the Petroleum Activities Program.	**C 1.15** Develop a SIMOPS Plan to manage MODU interactions with other facilities/vessels, where multiple campaigns occur within the PAA (i.e. during xmas tree installation). SIMOPS Plan will contain information on: • minimum separation distances • communications • MODU/vessels/ activities involved in SIMOPS • exclusion zone entry and exit processes • ROV operations • helicopter operations • key roles, responsibilities and emergency contacts • PTW arrangements • incident reporting and investigation management of change.	**PS 1.15** MODU and applicable vessels compliant with SIMOPS Plan.	**MC 1.15.1** Records demonstrate implementation of SIMOPS Management Plan when MODU working in vicinity of other facilities/vessels, i.e. during xmas tree installation.
	C 2.6 Project-specific MODU Mooring Design Analysis.	**PS 2.6** Seabed disturbance from MODU mooring limited to that required to ensure adequate MODU station holding capacity.	**MC 2.6.1** Records demonstrate Mooring Design Analysis approved and implemented during anchor deployment.
	C 25.1 The MODU/installation vessel work procedures for lifts, bulk transfers and cargo loading, which require: • the security of loads shall be checked prior to commencing lifts • loads shall be covered if there is a risk of loss of loose materials. • Lifting operations shall be conducted using the PTW and JSA systems to manage the specific risks of that lift,	**PS 25.1** All lifts conducted in accordance with applicable MODU/installation vessel work procedures to limit potential for dropped objects.	**MC 25.1.1** Records show lifts conducted in accordance with the applicable MODU/installation vessel work procedures.

	including consideration of weather and sea state.		
	C 25.3 Specification and requirements for station keeping equipment (mooring systems) require that: • systems are tested and inspected in accordance with API RP 21 • systems have sufficient capability such that a failure of any single component will not cause progressive failure of the remaining anchoring arrangement.	**PS 25.3** MODU mooring system tested and in place to ensure no complete mooring failure.	**MC 25.3.1** Records demonstrate mooring system tests and inspection.
	C 25.4 Mooring system is tested to recommended tension as per API RP 2SK.	**PS 25.4** Monitoring compliant with ISO 19901-7:2013.	**MC 25.4.1** Records confirm mooring system is tested to recommended tension as per API RP 2SK.
	C 28.1 MODU tracking equipment operational when the MODU unmanned.	**PS 28.1** Tracking of the MODU is possible when the MODU is unmanned.	**MC 28.1.1** Records show the moored MODU has functional tracking equipment for instances when MODU is unmanned.

6.10 Recovery Plan and Threat Abatement Plan Assessment

This section describes the assessment that Woodside has undertaken to demonstrate that the PAP is not inconsistent with any relevant recovery plans or threat abatement plans. For the purposes of this assessment, the relevant Part 13 statutory instruments (recovery plans and threat abatement plans) are:

- Recovery Plan for Marine Turtles in Australia 2017–2027 (Commonwealth of Australia, 2017).
- Conservation Management Plan for the Blue Whale 2015–2025 (Commonwealth of Australia, 2015a).
- National Recovery Plan for the Southern Right Whale (DCCEEW, 2024a)
- Recovery Plan for the Grey Nurse Shark (Carcharias taurus) 2014 (Commonwealth of Australia, 2014)
- Sawfishes and River Sharks Multispecies Recovery Plan (Commonwealth of Australia, 2015b).
- Threat Abatement Plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans 2018 (Commonwealth of Australia, 2018).

Table 6-50 lists the objectives and (where relevant) the action areas of these plans, and also describes whether these objectives/action areas are applicable to government, the Titleholder, and/or the Petroleum Activities Program. For those objectives/action areas applicable to the Petroleum Activities Program, the relevant actions of each plan have been identified, and an evaluation has been conducted as to whether impacts and risks resulting from the activity are not inconsistent with that action.

The assessment of potential impacts and risks to PBW from underwater noise emissions has taken into account the definitions of terminology in the CMP, as described in the DAWE and NOPSEMA guidance released in September 2021. Similarly, the assessment against relevant actions in the CMP in Table 6-52 has been undertaken in the context of the definitions included in the guidance note.

Table 6-50: Identification of applicability of recovery plan and threat abatement plan objectives and action areas

EPBC Act Part 13 Statutory Instrument	Applicable to:		
	Government	***Titleholder***	***Petroleum Activities Program***
Marine Turtle Recovery Plan			
Long-term Recovery Objective: Minimise anthropogenic threats to allow for the conservation status of marine turtles to improve so they can be removed from the EPBC Act threatened species list	Y	Y	Y
Interim Recovery Objectives			
Current levels of legal and management protection for marine turtle species are maintained or improved, both domestically and throughout the migratory range of Australia's marine turtles	Y		
The management of marine turtles is supported	Y		
Anthropogenic threats are demonstrably minimised	Y	Y	Y
Trends in nesting numbers at index beaches and population demographics at important foraging grounds are described	Y	Y	
Action Areas			
A. Assessing and addressing threats			
A1. Maintain and improve efficacy of legal and management protection	Y		
A2. Adaptatively manage turtle stocks to reduce risk and build resilience to climate change and variability	Y	Y	Y
A3. Reduce the impacts of marine debris	Y	Y	Y
A4. Minimise chemical and terrestrial discharge	Y	Y	Y
A5. Address international take within and outside Australia's jurisdiction	Y		
A6. Reduce impacts from terrestrial predation	Y		
A7. Reduce international and domestic fisheries bycatch	Y		
A8. Minimise light pollution	Y	Y	Y
A9. Address the impacts of coastal development/infrastructure and dredging and trawling	Y	Y	
A10. Maintain and improve sustainable Indigenous management of marine turtles	Y		
B. Enabling and measuring recovery			

EPBC Act Part 13 Statutory Instrument	Applicable to:		
	Government	***Titleholder***	***Petroleum Activities Program***
B1. Determine trends in index beaches	Y	Y	
B2. Understand population demographics at key foraging grounds	Y		
B3. Address information gaps to better facilitate the recovery of marine turtle stocks	Y	Y	Y
Blue Whale Conservation Management Plan			
Long-term recovery objective: Minimise anthropogenic threats to allow for their conservation status to improve so that they can be removed from the EPBC Act threatened species list	Y	Y	Y
Interim Recovery Objectives			
The conservation status of blue whale populations is assessed using efficient and robust methodology	Y		
The spatial and temporal distribution, identification of biologically important areas, and population structure of blue whales in Australian waters is described	Y	Y	Y
Current levels of legal and management protection for blue whales are maintained or improved and an appropriate adaptive management regime is in place	Y		
Anthropogenic threats are demonstrably minimised	Y	Y	Y
Action Areas			
A. Assessing and addressing threats			
A.1: Maintain and improve existing legal and management protection	Y		
A.2: Assessing and addressing anthropogenic noise	Y	Y	Y
A.3: Understanding impacts of climate variability and change	Y	Y	Y
A.4: Minimising vessel collisions	Y	Y	Y
B. Enabling and Measuring Recovery			
B.1: Measuring and monitoring population recovery	Y		
B.2: Investigating population structure	Y		
B.3: Describing spatial and temporal distribution and defining biologically important habitat	Y	Y	Y

EPBC Act Part 13 Statutory Instrument	Applicable to:		
	Government	***Titleholder***	***Petroleum Activities Program***
Southern Right Whale Recovery Plan			
Long-term vision: increase population to a level that the conservation status has improved and the species no longer qualifies for listing as threatened under any of the EPBC Act listing criteria	Y	Y	Y
Interim Recovery Objectives			
• Current levels of Commonwealth and State legislative and management protection for southern right whales are implemented, maintained, or improved, so threats continue to be managed and reduced over the life of the plan	Y		
• Anthropogenic threats are managed consistent with ecologically sustainable principles to facilitate recovery of southern right whales	Y	Y	Y
• Population dynamics, including demographics, distribution, residency, and coastal movement across the species range are monitored and quantified using robust, standardised, best-practice methodology to assess population recovery	Y		
• The population structure in Australian waters is clearly characterised to evaluate the degree to which the western and eastern populations are separate populations and inform the degree of connectivity with other southern right whale populations	Y		
• Capability of First Nation Australians, research, citizen science, and general community groups is improved to assist in addressing recovery actions of southern right whales in Australia	Y		
Action Areas			
<u>Assess and address key threats</u>			
A1: Maintain, implement and improve efficacy of current legislative and management protection for southern right whales	Y		
A2: Address habitat degradation impacts from coastal and offshore marine infrastructure developments within the species' range	Y	Y	Y
A3: Understand impacts of climate variability and anthropogenic climate change on the species biology and population recovery	Y	Y	Y
A4: Manage and mitigate the threat of entanglements from commercial active or discarded fishing gear throughout the species' range in Australian waters	Y		
A5: Assess, manage and mitigate impacts from anthropogenic underwater noise	Y	Y	Y

EPBC Act Part 13 Statutory Instrument	Applicable to:		
	Government	***Titleholder***	***Petroleum Activities Program***
A6: Manage, minimise and mitigate the threat of vessel strike	Y	Y	Y
Measure Recovery			
B1: Measure and monitor population demographic and recovery	Y		
B2: Characterise population structure	Y		
B3: Determine migratory paths and offshore distribution	Y		
B4: Improve capability of First Nation Australians, research, citizen science, and general community groups to assist management of southern right whales	Y		
Grey Nurse Shark Recovery Plan			
Overarching Objective			
To assist the recovery of the grey nurse shark in the wild, throughout its range in Australian waters, with a view to: • improving the population status, leading to future removal of the grey nurse shark from the threatened species list of the EPBC Act • ensuring that anthropogenic activities do not hinder the recovery of the grey nurse shark in the near future, or impact on the conservation status of the species in the future	Y	Y	Y
Specific Objectives			
Develop and apply quantitative monitoring of the population status (distribution and abundance) and potential recovery of the grey nurse shark in Australian waters	Y		
Quantify and reduce the impact of commercial fishing on the grey nurse shark through incidental (accidental and/or illegal) take, throughout its range	Y		
Quantify and reduce the impact of recreational fishing on the grey nurse shark through incidental (accidental and/or illegal) take, throughout its range	Y		
Where practicable, minimise the impact of shark control activities on the grey nurse shark	Y		
Investigate and manage the impact of ecotourism on the grey nurse shark	Y		
Manage the impact of aquarium collection on the grey nurse shark	Y		
Improve understanding of the threat of pollution and disease to the grey nurse shark	Y	Y	Y

EPBC Act Part 13 Statutory Instrument	Applicable to:		
	Government	***Titleholder***	***Petroleum Activities Program***
Continue to identify and protect habitat critical to the survival of the grey nurse shark and reduce the impact of threatening processes within these areas	Y	Y	
Continue to develop and implement research programs to support the conservation of the grey nurse shark	Y	Y	
Promote community education and awareness in relation to grey nurse shark conservation and management	Y		
Sawfish and River Sharks Recovery Plan			
Primary Objective			
To assist the recovery of sawfish and river sharks in Australian waters with a view to: • improving the population status leading to the removal of the sawfish and river shark species from the threatened species list of the EPBC Act • ensuring that anthropogenic activities do not hinder recovery in the near future, or impact on the conservation status of the species in the future	Y	Y	Y
Specific Objectives			
Reduce and, where possible, eliminate adverse impacts of commercial fishing on sawfish and river shark species	Y		
Reduce and, where possible, eliminate adverse impacts of recreational fishing on sawfish and river shark species	Y		
Reduce and, where possible, eliminate adverse impacts of Indigenous fishing on sawfish and river shark species	Y		
Reduce and, where possible, eliminate the impact of illegal, unregulated and unreported fishing on sawfish and river shark species	Y		
Reduce and, where possible, eliminate adverse impacts of habitat degradation and modification on sawfish and river shark species	Y	Y	Y
Reduce and, where possible, eliminate any adverse impacts of marine debris on sawfish and river shark species noting the linkages with the Threat Abatement Plan for the Impact of Marine Debris on Vertebrate Marine Life	Y	Y	Y
Reduce and, where possible, eliminate any adverse impacts of collection for public aquaria on sawfish and river shark species	Y		
Improve the information base to allow the development of a quantitative framework to assess the recovery of, and inform management options for, sawfish and river shark species	Y		
Develop research programs to assist conservation of sawfish and river shark species	Y	Y	

EPBC Act Part 13 Statutory Instrument	Applicable to:		
	Government	***Titleholder***	***Petroleum Activities Program***
Improve community understanding and awareness in relation to sawfish and river shark conservation and management	Y		
Marine Debris Threat Abatement Plan			
Objectives			
Contribute to long-term prevention of the incidence of marine debris	Y	Y	
Understand the scale of impacts from marine plastic and microplastic on key species, ecological communities and locations	Y	Y	Y
Remove existing marine debris	Y		
Monitor the quantities, origins, types and hazardous chemical contaminants of marine debris, and assess the effectiveness of management arrangements for reducing marine debris	Y		
Increase public understanding of the causes and impacts of harmful marine debris, including microplastic and hazardous chemical contaminants, to bring about behaviour change	Y		

Table 6-51: Assessment against relevant actions of the Marine Turtle Recovery Plan

Part 13 Statutory Instrument	Relevant Action Areas/Objectives	Relevant Actions	Evaluation	EPO, Controls and PS
Marine Turtle Recovery Plan	**Action Area A2:** Adaptively manage turtle stocks to reduce risk and build resilience to climate change and variability	**Action:** Continue to meet Australia's international commitments to address the causes of climate change.	Refer Section 6.7.10 **Not inconsistent assessment**: This PAP contributes to Australia meeting international commitments to address the causes of climate change primarily via compliance with Marine Order 97, the National Greenhouse and Energy Reporting Scheme (NGERS) and National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015.	EPO 10a, 10b, 10c, 10d, 10e C10.1, 10.2, 10.3, 10.9, 10.10, 10.14, 10.13, 10.15, 10.16 PS 10.1, 10.2, 10.3, 10.9.1, 10.9.2, 10.9.3, 10.10, 10.14, 10.15.1, 10.16.1
	Action Area A3: Reduce the impacts from marine debris	Action: Support the implementation of the Marine Debris Threat Abatement Plan (TAP) Priority actions at stock level: • G-NWS – Understand the threat posed to this stock by marine debris • LH-WA – Determine the extent to which marine debris is impacting loggerhead turtles • F-Pil – no relevant actions	Not inconsistent assessment: The assessment of the accidental release of solid hazardous and non-hazardous wastes has considered the potential risks to marine turtles. Controls have been implemented to reduce the likelihood of accidental release of solid wastes for the duration of the petroleum activities program.	EPO 24 C 24.1 , 24.2, 24.3, 24.4, 24.6 PS 24.1, 24.2, 24.3, 24.4, 24.6
	Action Area A4: Minimise chemical and terrestrial discharge	Action: Ensure spill risk strategies and response programs adequately include management for marine turtles and their habitats, particularly in reference to 'slow to recover habitats'; e.g., nesting habitat, seagrass meadows or coral reefs Priority actions at stock level: • G-NWS – Ensure that spill risk strategies and response programs include management for turtles and their habitats • LH-WA and F-Pil – Ensure that spill risk strategies and response programs include management for turtles and their habitats, particularly in reference to slow to recover habitats; e.g., seagrass meadows or corals	Not inconsistent assessment: The assessment of accidental release of chemicals/hydrocarbons has considered the potential risks to marine turtles. Spill risk strategies and response program include management measures for turtles and their nesting habitats.	Detailed oil spill preparedness and response performance outcomes, standards and measurement criteria for the PAP are present in Sections 6.8 and 6.9.

Part 13 Statutory Instrument	Relevant Action Areas/Objectives	Relevant Actions	Evaluation	EPO, Controls and PS
	Action Area A8: Minimise light pollution	Action: Artificial light within or adjacent to habitat critical to the survival of marine turtles will be managed such that marine turtles are not displaced from these habitats Priority actions at stock level: • G-NWS – as above • LH-WA – no relevant actions • F-Pil – Manage artificial light from onshore and offshore sources to ensure biologically important behaviours of nesting adults and emerging/dispersing hatchlings can continue	Not inconsistent assessment: The assessment of light emissions has considered the potential impacts to marine turtles. Internesting, mating, foraging or migrating turtles are not impacted by light from offshore vessels. Based on the frequency and nature of IMMR activities, the impacts to adult turtles moving through the PAA from vessel lighting are expected to be localised and temporary with no lasting effect.	EPO 12a, b, c C 12.1, 12.2, C 10.11 PS 12.1, 12.2, 10.11
	Action Area B1: Determine trends at index beaches	Action: Maintain or establish long-term monitoring programs at index beaches to collect standardised data critical for determining stock trends, including data on hatchling production Priority actions at stock level: • G-NWS – Continue long-term monitoring of index beaches • LH-WA – Continue long-term monitoring of nesting and foraging populations • F-Pil – no relevant actions	Not inconsistent assessment: Woodside contributes to Action Area B1 via its support of the Ningaloo Turtle Program1.	N/A
	Action Area B3: Address information gaps to better facilitate the recovery of marine turtle stocks	Action: Understand the impacts of anthropogenic noise on marine turtle behaviour and biology Priority actions at stock level: • G-NWS – Given this is a relatively accessible stock that is likely to be exposed to anthropogenic noise – Investigate the impacts of anthropogenic noise on turtle behaviour and biology and extrapolate findings from the North West Shelf stock to other stocks • LH-WA – no relevant actions • F-Pil – no relevant actions	Not inconsistent assessment: The assessment of acoustic emissions has considered the potential impacts to marine turtles. Noise related to the PAP is not expected to result in behavioural response, injury or mortality of individuals, or any other lasting effect.	EPO 3a, 3b, 4 C 3.3, 3.4, 4.1, 4.3, PS 3.3, 3.4, 4.1, 4.3,

Part 13 Statutory Instrument	Relevant Action Areas/Objectives	Relevant Actions	Evaluation	EPO, Controls and PS
Assessment Summary The Marine Turtle Recovery Plan has been considered during the assessment of impacts and risks, and the PAP is not considered to be inconsistent with the relevant actions of this plan.				

Table 6-52: Assessment against relevant actions of the Blue Whale Conservation Management Plan

Part 13 Statutory Instrument	Relevant Action Areas/Objectives	Relevant Actions	Evaluation	EPO, Controls and PS
Blue Whale Conservation Management Plan	Action Area A.2: Assessing and addressing anthropogenic noise.	Action 2: Assessing the effect of anthropogenic noise on blue whale behaviour Action 3: Anthropogenic noise in biologically important areas will be managed such that any blue whale continues to use the area without injury, and is not displaced from a foraging area	Not inconsistent assessment: The assessment of acoustic emissions has considered the potential impacts to pygmy blue whales. Acoustic emissions from project vessels will not cause injury to any pygmy blue whale. There are no known or possible foraging areas for PBW within or adjacent to the PAA. If the PAP within the PAA overlaps with an individual northbound or southbound migration, they may deviate slightly from the migratory route but will continue on their migration.	EPO 3a, 3b, 4 C 3.1, 3.2, 3.4, 4.1, 4.2 4.3, 4.4 PS 3.1, 3.2, 3.4, 4.1, 4.2 4.3, 4.4
	Action Area A.3: Understanding impacts of climate variability and change	**Action 1:** Continue to meet Australia's international commitments to reduce greenhouse gas emissions and regulate the krill fishery in Antarctica.	Refer Section 6.7.10 **Not inconsistent assessment**: This PAP contributes to Australia meeting international commitments to reducing greenhouse gas emissions primarily via compliance with Marine Order 97, the National Greenhouse and Energy Reporting Scheme (NGERS) and National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015. The Regulation of the krill fishery in Antarctica is not applicable to Woodside or this EP.	EPO 10a, 10b, 10c, 10d, 10e C10.1, 10.2, 10.3, 10.9, 10.10, 10.14, 10.13, 10.15, 10.16 PS 10.1, 10.2, 10.3, 10.9.1, 10.9.2, 10.9.3, 10.10, 10.14, 10.15.1, 10.16.1
	Action Area A.4: Minimising vessel collisions	Action 3: Ensure the risk of vessel strikes on blue whales is considered when assessing actions that increase vessel traffic in areas where blue whales occur and, if required, appropriate mitigation measures are implemented	Not inconsistent assessment: The assessment of vessel collision with marine fauna has considered the potential risks to pygmy blue whales. If the PAP within the PAA overlaps with an individual northbound or southbound migration, they may deviate slightly from the migratory route, but will continue on their migration. Vessel collisions with PBW are highly unlikely to occur, given the low operating speed of support vessels.	EPO 26 C 3.1 PS 3.1

Part 13 Statutory Instrument	Relevant Action Areas/Objectives	Relevant Actions	Evaluation	EPO, Controls and PS
	Action Area B.3: Describing spatial and temporal distribution and defining biologically important habitat	Action 2: Identify migratory pathways between breeding and feeding grounds Action 3: Assess timing and residency within Biologically Important Areas	Not inconsistent assessment: Woodside contributes to Action Area B3 via its support of targeted research initiatives (e.g., satellite tracking of pygmy blue whale migratory movements).	N/A
Assessment Summary The Blue Whale Conservation Management Plan has been considered during the assessment of impacts and risks, and the PAP is not considered to be inconsistent with the relevant actions of this plan.				

Table 6-53: Assessment against relevant actions of the Southern Right Whale Recovery Plan

Part 13 Statutory Instrument	Relevant Action Areas/Objectives	Relevant Actions	Evaluation	EPO, Controls and PS
National Recovery Plan for the Southern Right Whale	A2: Address habitat degradation impacts from coastal and offshore marine infrastructure developments within the species' range	Action 1: Coastal and offshore development actions are assessed according to principles of ecological sustainable development to ensure the risk of injury, auditory impairment and/or disturbance to southern right whales is maintained. Action 3: Current information on species' occurrence, particularly in HCTS, BIAs and historic high use areas, are used to inform planning, assessment, and decision-making on marine infrastructure development actions.	Not inconsistent assessment: This EP assesses the potential impacts of the petroleum activity do not result in the risk of injury, auditory impairment and/or disturbance to southern right whales, particularly within the HCTS and BIAs that are located over 250 km from the Operational Areas.	N/A

Part 13 Statutory Instrument	Relevant Action Areas/Objectives	Relevant Actions	Evaluation	EPO, Controls and PS
	Action Area A.3: Understand impacts of climate variability and anthropogenic climate change on the species biology and population recovery.	**Action 1:** Continue to meet Australia's international commitments to address causes of climate change, including greenhouse gas emissions.	Refer Section 6.7.10 **Not inconsistent assessment**: This PAP contributes to Australia meeting international commitments to address causes of climate change, including greenhouse gas emissions, primarily via compliance with Marine Order 97, the National Greenhouse and Energy Reporting Scheme (NGERS) and National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015.	EPO 10a, 10b, 10c, 10d, 10e **C10.1, 10.2, 10.3, 10.9, 10.10, 10.14, 10.13, 10.15, 10.16** **PS 10.1, 10.2, 10.3, 10.9.1, 10.9.2, 10.9.3, 10.10, 10.14, 10.15.1, 10.16.1**
	A5: Assess, manage, and mitigate impacts from anthropogenic underwater noise	Action 2: Actions within and adjacent to southern right whale BIAs and HCTS should demonstrate that it does not prevent any southern right whale from utilising the area or cause auditory impairment Action 3: Actions within and adjacent to southern right whale BIAs and HCTS should demonstrate that the risk of behavioural disturbance is minimised Action 4: Ensure environmental assessments associated with underwater noise generating activities include consideration of national policy (e.g., EPBC Act Policy Statement 2.1) and guidelines related to managing anthropogenic underwater noise and implement appropriate mitigation measures to reduce risks to southern right whales to the lowest possible level Action 5: Quantify risks of anthropogenic underwater noise to southern right whales, including studies aimed to measure physiological effects, behavioural disturbance, and changes to acoustic communication (e.g., masking of vocalisations) to whales	Not inconsistent assessment: The assessment of acoustic emissions has considered the potential impacts to southern right whales. The nearest BIAs and HCTS for the southern right whale being over 250 km from the Operational Areas therefore it is not expected that noise from the petroleum activity program will impact the southern right whales.	N/A

Part 13 Statutory Instrument	Relevant Action Areas/Objectives	Relevant Actions	Evaluation	EPO, Controls and PS
	A6: Manage, minimise and mitigate the threat of vessel strike	Action 1: Assess risk of vessel strike to southern right whales in BIAs Action 3: Ensure environmental impact assessments and associated plans consider and quantify the risk of vessel strike and associated potential cumulative risks in BIAs and HCTS	Not inconsistent assessment: The assessment of vessel collision with marine fauna has considered the potential risks to southern right whales. The nearest BIAs and HCTS for the southern right whale being over 250 km from the Operational Areas; therefore, it is not expected that there is a risk of vessel strike.	N/A
Assessment Summary The National Recovery Plan for the Southern Right Whale has been considered during the assessment of impacts and risks, and the PAP is not considered to be inconsistent with the relevant actions of this plan.				

Table 6-54: Assessment against relevant actions of the Grey Nurse Shark Recovery Plan

Part 13 Statutory Instrument	Relevant Action Areas/Objectives	Relevant Actions	Evaluation	EPO, Controls and PS
Grey Nurse Shark Recovery Plan	Objective 7: Improve understanding of the threat of pollution and disease to the grey nurse shark	Action 7.1: Review and assess the potential threat of introduced species, pathogens and pollutants	Not inconsistent assessment: This EP includes an assessment of the impacts from accidental release of solid wastes as well as planned discharges of drilling waste on marine species.	N/A.
			Not inconsistent assessment: The assessment of accidental release of chemicals / hydrocarbons has considered the potential risks to grey nurse sharks. Spill risk strategies and response program include management measures, as identified and required.	Detailed oil spill preparedness and response performance outcomes, standards and measurement criteria for the PAP are present in Sections 6.8 and 6.9.
Assessment Summary The Grey Nurse Shark Recovery Plan has been considered during the assessment of impacts and risks, and the PAP is not considered to be inconsistent with the relevant actions of this plan.				

Table 6-55: Assessment against relevant actions of the Sawfish and River Shark Recovery Plan

Part 13 Statutory Instrument	Relevant Action Areas/Objectives	Relevant Actions	Evaluation	EPO, Controls and PS
Sawfish and River Shark Recovery Plan	Objective 5: Reduce and, where possible, eliminate adverse impacts of habitat degradation and modification on sawfish and river shark species	Action 5c: Identify risks to important sawfish and river shark habitat and measures needed to reduce those risks	Not inconsistent assessment: The assessment of accidental release of chemicals/hydrocarbons has considered the potential risks to sawfish and river shark. Spill risk strategies and response program include management measures, as identified and required.	Detailed oil spill preparedness and response performance outcomes, standards and measurement criteria for the PAP are present in Appendix H
	Objective 6: Reduce and, where possible, eliminate any adverse impacts of marine debris on sawfish and river shark species noting the linkages with the Threat Abatement Plan for the Impact of Marine Debris on Vertebrate Marine Life	Action 6a: Assess the impacts of marine debris including ghost nets, fishing gear and plastics on sawfish and river shark species	Not inconsistent assessment: The assessment of the accidental release of solid hazardous and non-hazardous wastes has considered the potential risks to sawfish. Controls have been implemented to reduce the likelihood of accidental release of solid wastes for the duration of the petroleum activities program.	N/A
Assessment Summary The Sawfish and River Shark Recovery Plan has been considered during the assessment of impacts and risks, and the PAP is not considered to be inconsistent with the relevant actions of this plan.				

Table 6-56: Assessment against relevant actions of the Marine Debris Threat Abatement Plan

Part 13 Statutory Instrument	Relevant Action Areas/Objectives	Relevant Actions	Evaluation	EPO, Controls and PS
Marine Debris TAP	Objective 2: Understand the scale of marine plastic and microplastic impact on key species, ecological communities and locations	Action 2.04: Build understanding related to plastic and microplastic pollution	Not inconsistent assessment: The assessment of the accidental release of solid hazardous and non-hazardous wastes has considered the potential risks to the marine environment. Controls have been implemented to reduce the likelihood of accidental release of solid wastes for the duration of the petroleum activities program.	N/A
Assessment Summary The Marine Debris TAP has been considered during the assessment of impacts and risks, and the PAP is not considered to be inconsistent with the relevant actions of this plan.				

6.11 First Nations Cultural Features and Heritage Values Assessment

As described in Section 4.9, the identification of cultural features and heritage values of the environment as well as the social, economic and cultural features important to First Nation's people is integral to understanding the environment and any potential impacts and risks to the environment.

In line with Woodside's First Nations Communities Policy (December 2023), Woodside seeks to avoid damage or disturbance to cultural heritage (including intangible heritage) and, if avoidance is not possible, minimise and mitigate the impacts, in consultation with First Nation communities and Traditional Custodians. Mitigation can include any measure or control aimed at ensuring the viability of the intangible cultural heritage and its intergenerational transmission. This can include reducing impacts and risks to environmental features that are associated with intangible cultural heritage (UNESCO, 2003; ICOMOS, 2013).

It is important to note that not all topics raised by First Nations groups and individuals through consultation are considered values for the purpose of the cultural features and heritage values impact assessment below. A number of topics were raised in the context of a general interest in environmental management and ecosystem health (i.e., natural environment interest), where the group/individual was seeking further information about potential impacts and risks from the PAP on a receptor. As these interests relate to the maintenance of the natural environment, these are adequately addressed through impact and risk assessments and not further assessed in Table 6-57.

Table 6-57: First Nations cultural features and heritage values assessment

Aspect	Cultural Features and Heritage Values
Description of Source Impact/ Risk	***Physical Presence of Vessels*** The PAP involves operation of the Pluto Facility and the drilling and tie-back of one new production well (Xena-03). The MODU will be present within the Xena-03 Operational Area for ~60 days to drill the Xena-03 well. When underway, activities will be 24 hours per day, seven days per week. Subsea installation vessels will be used to install and cold commission the flowlines and subsea infrastructure following the completion of drilling the new well. This is expected to take approximately three weeks. Temporary exclusion zones will be established around the MODU. ***Acoustic Emissions from Vessels*** MODUs, installation vessels and support vessels (including ASV and AHVs) undertaking the PAP will generate noise both in the air and underwater. During drilling operations, the MODU will produce low-intensity continuous sound. In addition, the PAP will be supported by DP capable vessels. These noises will contribute to and can exceed ambient noise levels which range from around 90 dB re 1 µPa (root square mean sound pressure level (RMS SPL)) under very calm, low wind conditions, to 120 dB re 1 µPa (RMS SPL) under windy conditions. ***Unplanned Hydrocarbon Release from Loss of Well Containment (Basis of EMBA)*** For each source of risk, the credible worst-case scenario in conjunction with impact thresholds is used to determine the spatial extent of the EMBA. The worst-case unplanned event is considered to be an unplanned hydrocarbon release. The stochastic modelling approach to determining the EMBA involves numerous simulations covering a range of metocean conditions representing currents and winds that typically prevail over the course of a year. The EMBA is generated from a composite of outcomes of each simulation and therefore covers a larger area than the area that could be affected during any one single spill event. In the event of a spill, the area that would be affected would be much smaller than the EMBA. The EMBA is driven by the distribution of entrained hydrocarbon above ecological thresholds and hence although Islands such as Barrow and Montebello Islands, and mainland coastlines are within the EMBA, these are not expected to be affected unless there is shoreline contact above thresholds. While the EMBA is driven by predictions of entrained hydrocarbons, the scenario associated with the most significant consequence involves shoreline contact, which is predicted from the scenario of subsea equipment loss of containment.

<table>
<tr><th>Aspect</th><th colspan="4">Cultural Features and Heritage Values</th></tr>
<tr><td></td><td colspan="4">Refer to Section 6.8.3 and 6.8.4 for more details.</td></tr>
<tr><td>Receptor Sensitivity</td><td colspan="4">Cultural features and heritage values: High value.
Marine mammals: High value species.
Marine reptiles: High value species.
Fish: High value species.</td></tr>
<tr><td rowspan="5">Planned Activities</td><td colspan="4">The potential environmental impact to species that have a cultural feature or heritage value have been summarised below to provide the context of a potential impact significance level to those species to understand any cumulative impact on the cultural feature or heritage value.</td></tr>
<tr><td>Aspect</td><td colspan="3">Impact Significance Level</td></tr>
<tr><td>Environmental Impact Assessment to Marine Species</td><td>Marine Mammals</td><td>Marine Reptiles</td><td>Fish</td></tr>
<tr><td>6.6.7 Routine Light Emissions: External Lighting on Project Vessels</td><td>N/A</td><td>Slight (E)</td><td>N/A</td></tr>
<tr><td>6.6.3 Routine Acoustic Emissions: Generation of Noise from Project Vessels and Positioning Equipment</td><td>No Lasting (F)</td><td>No Lasting (F)</td><td>No Lasting (F)</td></tr>
<tr><td>6.6.5 Routine and Non-Routine Discharges: Utility Systems</td><td>No Lasting (F)</td><td>No Lasting (F)</td><td>No Lasting (F)</td></tr>
<tr><td rowspan="15">Unplanned Activities</td><td colspan="4">The potential environmental risks to species considered to have cultural value to Traditional Owners have been summarised below and attributed a risk rating to understand cumulative impacts on them as a cultural feature or heritage value.</td></tr>
<tr><td>Aspect</td><td colspan="3">Risk Rating</td></tr>
<tr><td>Environmental Risk Assessment to Marine Species</td><td>Marine Mammals</td><td>Marine Reptiles</td><td>Fish</td></tr>
<tr><td>6.7.1 Unplanned Discharge: Release of Hydrocarbons or Chemicals During Transfer, Storage and Use</td><td>Moderate</td><td>Moderate</td><td>Moderate</td></tr>
<tr><td>6.7.2 Unplanned Discharge: Hazardous and Non-hazardous Waste Management</td><td>Moderate</td><td>Moderate</td><td>Moderate</td></tr>
<tr><td>6.7.3 Physical Presence: Interaction with Marine Fauna</td><td>Low</td><td>Low</td><td>Low</td></tr>
<tr><td>6.8.3 Unplanned Hydrocarbon Release: Loss of Well Containment</td><td>Moderate</td><td>Moderate</td><td>Moderate</td></tr>
<tr><td>6.8.4 Unplanned Hydrocarbon Release: Subsea Flowline and Riser Loss of Containment</td><td>High</td><td>High</td><td>High</td></tr>
<tr><td>6.8.5 Unplanned Hydrocarbon Release: Topside Loss of Containment</td><td>High</td><td>High</td><td>High</td></tr>
<tr><td>6.8.6 Unplanned Hydrocarbon Release: Offloading Equipment Loss of Containment</td><td>Moderate</td><td>Moderate</td><td>Moderate</td></tr>
<tr><td>6.8.7 Unplanned Hydrocarbon Release: Cargo Tank Loss of Containment</td><td>Moderate</td><td>Moderate</td><td>Moderate</td></tr>
<tr><td>6.8.8 Unplanned Hydrocarbon Release: Loss of Structural Integrity</td><td>High</td><td>High</td><td>High</td></tr>
<tr><td>6.8.9 Unplanned Hydrocarbon Release: Loss of Marine Vessel Separation</td><td>High</td><td>High</td><td>High</td></tr>
<tr><td>6.8.10 Unplanned Discharge: Loss of Suspended Load</td><td>Moderate</td><td>Moderate</td><td>Moderate</td></tr>
</table>

Aspect	Cultural Features and Heritage Values
Impact and Risk Assessment	The PAP has the potential to impact cultural features and heritage values through the following ways: ***Intangible Cultural Heritage*** Songlines: Songlines can become lost, fragmented, or broken when there is a loss of Country or forced removal from Country (Neale and Kelly, 2020:30). Physical sites that have been identified as comprising a component of a songline are important to protect to prevent the fragmenting or breaking apart of songlines and loss of sacred cultural knowledge. It is noted that oil and gas infrastructure exists in many areas of the North West Shelf, and that songlines are still acknowledged and recognised. It is inferred that if there were to be any impacts to surviving songlines these would be significantly more likely to be described as qualitative (i.e., "weaken" a songline) rather than binary or absolute (i.e., destroy a songline). Creation/dreaming sites; sacred sites; ancestral beings: Activities that physically alter landscape features may be assumed to potentially impact values of creation/dreaming sites, sacred sites or ancestral beings. Cultural obligations to care for Country: Environmental impacts may be assumed to impact rights and obligations to care for Sea Country. Exclusion of Traditional Custodians from Sea Country (e.g., by restricting access) or decision-making processes (e.g., by not conducting ongoing consultation) are other potential sources of impact. Knowledge of Country/customary law and transfer of knowledge: Direct impact to communities practicing these skills will inherently occur when relevant aspects of the environment disappear, are displaced or suffer a reduction in population. Therefore, the transmission of these skills is expected to be impacted where there are impacts at the species/population level. Limitations on access to sites or disruption/relocation of First Nations communities may have implications for the preservation of First Nations knowledge. Connection to Country: Where people are displaced or disrupted (e.g., during colonisation) or where there is a loss of technical skills or environmental knowledge this may damage connection to Country (McDonald and Phillips, 2021). Access to Country: Impacts to access to Country may be classified as temporary (e.g., where exclusion zones exist around activities for safety reasons) or permanent (e.g., where infrastructure obstructs access or navigation). Impacts to access to Country can only occur in areas that were traditionally accessed by Traditional Custodians. This is anticipated to be focussed on areas adjacent to the coast. Restrictions on Access to Country: Access to the operational area has not been identified as a cultural issue, however some areas within the EMBA may not be culturally appropriate to access. Impacts to this value may occur where spill response access areas that are not appropriate, or in ways that are not consistent with traditional law. Kinship systems and totemic species: It is assumed that marine species may have kinship/totemic relationships to Traditional Custodians, but it is understood that these relationships do not prohibit people outside of that "skin group" from hunting or eating that same species (Juluwarlu, 2004). It is therefore inferred that the management of totemic or kinship species applies at the species/population level and not to individual plants and animals. Resource collection: Direct impact to communities using these resources will inherently occur when the resource disappears, is displaced or suffers a reduction in population. Therefore, marine species (as resources) will be impacted where there is an impact at the species/population level. ***Marine Ecosystems and Species*** Marine ecosystems may hold both cultural and environmental value with cultural and environmental values intrinsically linked (DCCEEW, 2023; MAC, 2021 as cited in Woodside, 2023a). It necessarily follows that an impact to marine ecosystems has the potential to impact cultural features where the impact is detectable within Sea Country – the seascape which Traditional Custodians view, interact with or hold knowledge of. ***Coastal Landforms*** Coastal landforms may have cultural values either through association with intangible values described above (e.g., as features of a songline, physical manifestations of ancestor beings) or as archaeologically prospective locations (e.g., water sources with increased habitation/use, dunes used for burials) ***Intangible Values*** <u>Songlines</u> Management of intangible cultural heritage can include reducing impacts and risks to tangible features that are associated with intangible cultural heritage (UNESCO, 2003; ICOMOS, 2013).

Aspect	Cultural Features and Heritage Values
	Impacts to marine plants, animals and other cultural features associated with songlines might impact the intergenerational transmission of knowledge of songlines when individuals can no longer witness or interact with the cultural features tied to songlines on Country. Therefore, managing songlines may require environmental controls to minimise potential impact to marine fauna at a population level, including migratory routes. Refer to species-specific assessment below for further information. Physical features comprising a component of a songline are important to protect to prevent the fragmenting or breaking apart of songlines and loss of sacred cultural knowledge. Songlines can become lost, fragmented, or broken when there is a loss of Country or impact to culturally important physical features (Neale and Kelly, 2020:30). No specific details of songlines within the EMBA have been provided by relevant persons during consultation for this Activity, and no landforms typical of songlines (e.g., rocks, mountains, rivers, caves and hills (Higgins, 2021:724)) are anticipated to be impacted by the PAP. <u>Creation/Dreaming Sites; Sacred Sites; Ancestral Beings</u> Woodside has undertaken all reasonable steps to identify creation and dreaming sites, sacred sites, and places associated with ancestral beings within the EMBA. No such sites have been identified. A review of relevant literature has been undertaken which has identified creation, dreaming and ancestral narratives related to the sea more broadly without confirming where (if anywhere) these overlap the EMBA. These references are of a general nature, and do not identify any features or values requiring specific protection or management from the proposed activities. In the literature reviewed, sea serpents or water serpents are common in Aboriginal creation narratives, and several references were identified. The majority of these refer to serpents residing within inland rivers or pools outside of the EMBA (Barber and Jackson, 2011; Hayes v Western Australia [2008] FCA 1487; Juluwarlu, 2004; Water Corporation, 2019). In some versions, the serpent originates from the sea or coast and creates the rivers as it heads inland. Areas of the current coastline and past coastlines at various points along the Ancient Landscape – where the Serpent would have emerged onto the land – are within the EMBA. Areas of the broader ocean where the serpent may have originally lived are not specified. Barber and Jackson (2011) also recount a story where a freshwater serpent pushes a sea serpent back into the ocean where it presumably continues to reside. This does not provide the specificity required to determine the location of sea serpents within the sea, and it is possible that the ocean as a whole (out to and beyond other continents) should be viewed generally as housing the sea serpent(s). Consultation with Traditional Custodians and ethnographic surveys have not identified impacts on sea serpents from the PAP. However, by analogy to other water serpent narratives across Australia, possible impact pathways may include interruption of its path by blocking or reducing flows of water, damaging sacred sites such as Thalu or rock art sites or depleting water sources. No impacts to water flows (either tidal movement or ocean currents) or depletion of water sources are anticipated from this PAP. <u>Cultural Obligations to Care for Country</u> Caring for Country collectively refers to the cultural obligations of individuals and groups, as well as rituals and ceremonies required for the physical and spiritual health of the environment. Lack of access to coastally located cultural sites that carry songlines or remain ceremonially important can impact First Nations people's livelihoods and impact their ability to carry out cultural obligations on Country. <u>Knowledge of Country/Customary Law and Transfer of Knowledge</u> Cultural knowledge about Sea Country/customary law and the intergenerational transmission of knowledge are important values identified through consultation, assessments and the literature review. Transfer of knowledge includes continuing traditional practices to pass on practical skills. Direct impact to communities practicing these skills will inherently occur when relevant aspects of the environment disappear, are displaced or suffer a reduction in population – for example, traditional fishing methods require the survival of traditional fish resources. Therefore, ensuring the transmission of cultural knowledge may require environmental controls protecting species and migratory pathways at a population level. Refer to species-specific assessment below for further information. <u>Connection to Country</u> Connection to Country describes the multi-faceted relationship between First Nations people and the landscape, which is envisioned as having personhood and spirit. No impacts to connection to country are anticipated as a result of exclusion or displacement of Aboriginal communities. Access to Country is discussed below. <u>Access to Country</u>

Aspect	Cultural Features and Heritage Values
	Access to Country, including Sea Country, is necessary for the continuation of other values including caring for Country and the transfer of traditional knowledge. Access is also a value in its own right, as a continuation of traditional Sea Country access and use. Access to areas within the Operational Area may be limited where exclusion zones are established around vessels for safety purposes. Further the exclusion zones around drilling activities are temporary and presence of subsea infrastructure are not anticipated to affect navigation, particularly given the water depth. Access to Country within the EMBA is also not expected to be affected in the highly unlikely event of an unplanned hydrocarbon release. However relevant cultural authorities will be engaged in the event of a spill that may affect them. Restrictions on Access to Country No information was received which suggested any part of the Operational Area cannot be accessed in a culturally appropriate way. However, some areas of the EMBA may be subject to cultural restrictions on access or may be culturally dangerous to access in any respect. Access to these areas would only be required in response to an unplanned impact. Kinship Systems and Totemic Species Individuals may have kinship to specific species (Smyth, 2008; Juluwarlu, 2004) and/or a responsibility to care for species (Muller, 2008). These relationships are understood to impose obligations on Traditional Custodians. It is understood that these obligations do not impose restrictions on other people generally, but it is considered that impacts to species at a population level may inhibit Traditional Custodians with kinship relationships' ability to perform their obligations where this results in reduced or displaced populations. It is therefore considered that the management of totemic or kinship species applies at the species/population level and not to individual plants and animals. As such, impacts to individual marine fauna is not expected to impact on the totemic or kinship cultural connection. Refer to species-specific assessment below for further information. Resource Collection A number of marine species are identified through consultation and literature as important resources, particularly as food sources. In addition to their immediate value as sustenance, the gathering and preparation of these resources are informed by cultural knowledge, and an inability to use these resources may result in a loss of ability to transfer that knowledge to future generations. Direct impact to communities using these resources will inherently occur when the resource disappears, is displaced or suffers a reduction in population. Therefore, these communities may be impacted where there is an impact at the species/population level. Refer to species-specific assessment below for further information. Relevant cultural authorities will be engaged in the event of a spill that may affect them. ***Marine Species*** Marine Mammals There are increase ceremonies/rituals for species of animals and plants, important to First Nations, to enhance or maintain populations. Thalu are places where these increase ceremonies are performed. All mentions of active ceremonial sites were confined to onshore locations, though the values may extend offshore where, for example, the Thalu relates to marine species populations. As Thalu ceremonies are performed to maintain and increase populations of marine species, it is considered that management applies at the species/population level and not to individuals – for example, the Thalu site on Murujuga which "brings in whales to beach" will continue to serve its purpose so long as whales continue to migrate through Mermaid Sound. Related intangible cultural heritage may include the transmission of cultural knowledge about whales and whale behaviour, including birthing areas, whale communication and migratory patterns. Such cultural knowledge may be associated with various cultural functions and activities that support the social and economic life of a community (Fijn, 2021). First Nations groups have expressed interest about whale migratory routes and studies. Inter-generational transmission of cultural knowledge (including songlines) relating to marine mammals may be impacted where changes to population or behaviour at a population level results in reduced sightings (e.g., through population decline, changes to migration routes or changes to migration seasonality). This transfer of knowledge may be integral to managing a group's intangible cultural heritage (UNESCO, 2003). As described in the relevant environmental impact and risk assessment, potential impacts to whales are limited to behavioural disturbance to transient individuals, which are not considered to be ecologically significant at a population level, and hence not expected to impact the value of marine mammals, including the transmission of cultural knowledge. The Operational Area does overlap the BIAs for migration for the pygmy blue whale and humpback whale. As such, cultural

Aspect	Cultural Features and Heritage Values
	values and intangible cultural heritage associated with these species are expected to be maintained. <u>Marine Reptiles</u> Turtles and their eggs have been identified through consultation and existing literature as an important resource, particularly as food sources. Direct impact to communities using these resources will inherently occur when the resource disappears, is displaced or suffers a reduction in population. Therefore, these species (as resources) will be impacted where there is an impact at the species/population level. Intangible cultural heritage may also include the transmission of cultural knowledge about marine reptiles, such as nesting areas, hunting areas and migratory patterns. Such cultural knowledge may be associated with various cultural functions and activities that support the social and economic life of a community (Fijn, 2021). First Nations groups have expressed an interest regarding turtle monitoring programs and migration patterns. Activities that impact turtle populations and their marine environment may have an indirect impact on some Aboriginal communities as this can limit access to cultural sites or deplete hunting areas that would threaten local food security (Delisle et al., 2018:251). Inter-generational transmission of cultural knowledge (including songlines) relating to marine reptiles may be impacted where changes results in reduced sightings (e.g., through population decline, changes to migration routes or changes to migration seasonality). This transfer of knowledge may be integral to managing a group's intangible cultural heritage (UNESCO, 2003). As described in the relevant environmental impact and risk section, potential impacts to marine reptiles are predicted to be at an individual level, which are not considered to be ecologically significant at a population level. Impacts will not occur to significant proportions of the populations of the species, nor result in a decrease of the quality of the habitat such that the extent of these species is likely to decline. Further, the Operational Area and EMBA do not overlap marine turtle BIAs. As such, cultural values and intangible cultural heritage associated with these species are expected to be maintained. <u>Fish</u> Fish have been identified through consultation and existing literature as an important resource, particularly as food sources. Direct impact to communities using these resources will inherently occur when the resource disappears, is displaced or suffers a reduction in population. Therefore, these species (as resources) will be impacted where there is an impact at the species/population level. During consultation, fish were identified as important agents in the management of the broader ecosystem in Mermaid Sound, and generally to marine environments. Inter-generational transmission of cultural knowledge relating to fish may be impacted where changes to population/behaviour results in reduced sightings (e.g., through population decline). This transfer of knowledge may be integral to managing a group's intangible cultural heritage (UNESCO, 2003). Intangible cultural heritage associated with fish, including inter-generational knowledge regarding fishing techniques and migratory patterns, can be managed by reducing impacts to fish in nearshore marine environments to which this cultural knowledge is intrinsically connected. As described in the relevant environmental impact and risk sections, it is expected that fish, sharks and rays may demonstrate avoidance or attraction behaviour; however, potential impacts are not considered to be ecologically significant at a population level. As such, cultural values and intangible cultural heritage associated with these species are expected to be maintained. ***Benthic Habitats (Coral, Seagrass)*** Through consultation, First Nations groups identified benthic habitats as valuable for their ecological values, including corals attracting fish and seagrass providing shelters for fauna, as well as an important habitat for dugongs. Additionally, coral is valued by MAC for its aesthetic values. As described in the relevant environmental impact assessments, the potential impacts from the PAP on benthic habitats is assessed to be no lasting effect. In terms of risk, a change in habitat may occur due to a change in water or sediment quality following an unplanned hydrocarbon release. Given hydrocarbon characteristics, rapid weathering, short-term exposure, as well as the response strategies planned to be deployed, an unplanned release is not expected to result in a level of exposure to coral and seagrass that would cause an adverse impact on marine ecosystem functioning or integrity results. As such, cultural values and intangible cultural heritage associated with benthic habitats are expected to be maintained. ***Shoreline Habitats (Coastal Vegetation, Mangroves)*** Through consultation, First Nations groups identified shoreline habitats as valuable for their ecological values, including coastal vegetation such as mangroves which provide shelter to marine

Aspect	Cultural Features and Heritage Values
	invertebrates, which are identified resources, and potential nursery for turtles. Literature also notes that mangroves are also valued for the flora and fauna they are associated with and support (Commonwealth of Australia, 2002), and Smyth (2007) reports that mangrove seeds are used as a resource by Ngarda-Ngarli. There is no overlap between the Operational Area and shoreline habitats, and no planned impacts to shoreline habitats from the PAP. In terms of risk, a change in habitat may occur due to a change in water or sediment quality following an unplanned hydrocarbon release. Given hydrocarbon characteristics, rapid weathering, as well as the response strategies planned to be deployed, an unplanned release is not expected to have a substantial adverse impact on marine ecosystem functioning or integrity. As such, cultural values and intangible cultural heritage associated with shoreline habitats are expected to be maintained. ***Coastal Landforms*** There is no overlap between the Operational Area and coastal landforms, and no planned impacts to coastal landforms from the PAP. For coastal landforms beyond the Operational Area, the EMBA is driven by an unplanned hydrocarbon release. There is no anticipated impact pathway from the presence of marine diesel on the physical existence of coastal landforms such as hills, waterways or dune systems. Access to Country within the EMBA is also not expected to be affected in the highly unlikely event of an unplanned hydrocarbon release. However, relevant cultural authorities will be engaged in the event of a spill that may affect them. As such, cultural values and intangible cultural heritage associated with shoreline habitats are expected to be maintained. ***Conclusion*** The impact and risk assessment has determined that the planned activities are unlikely to result in an impact greater than negligible[147] (F) and unplanned activities are assessed to have a residual risk rating of moderate (or lower). Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process.
Impact and Risk Assessment	The PAP has the potential impact cultural features and heritage values through the following ways: ***Archaeological Heritage*** Places that are identified in the literature for their value as archaeological sites can be assumed to be impacted where there is an impact to the archaeological or scientific values of its tangible elements. This could include damage or disturbance of archaeological material or to the archaeological context. <u>Intangible Cultural Heritage</u> Songlines: Songlines can become lost, fragmented, or broken when there is a loss of Country or forced removal from Country (Neale and Kelly, 2020:30). Physical sites that have been identified as comprising a component of a songline are important to protect to prevent the fragmenting or breaking apart of songlines and loss of sacred cultural knowledge. It is noted that oil and gas infrastructure exists in many areas of the North West Shelf, and that songlines are still acknowledged and recognised. It is inferred that if there were to be any impacts to surviving songlines these would be significantly more likely to be described as qualitative (i.e., “weaken” a songline) rather than binary or absolute (i.e., destroy a songline). Creation/dreaming sites; sacred sites; ancestral beings: Activities that physically alter landscape features may be assumed to potentially impact values of creation/dreaming sites, sacred sites or ancestral beings. Ceremonial sites: Activities that prevent the performance of ceremony at these sites will directly impact its values. Cultural obligations to care for Country: Environmental impacts may be assumed to impact rights and obligations to care for Sea Country. Exclusion of Traditional Custodians from Sea Country (e.g., by restricting access) or decision-making processes (e.g., by not conducting ongoing consultation) are other potential sources of impact. Knowledge of Country/customary law and transfer of knowledge: Direct impact to communities practicing these skills will inherently occur when relevant aspects of the environment disappear, are displaced or suffer a reduction in population. Therefore, the transmission of these skills is expected to be impacted where there are impacts at the species/population level. Limitations on

[147] Noting that as the receptor sensitivity is high, the impact significance level is Slight (E).

Aspect	Cultural Features and Heritage Values
	access to sites or disruption/relocation of First Nations communities may have implications for the preservation of First Nations knowledge. Cultural Safety refers to respecting local Lore and culturally significant areas to protect individuals from cultural harm. There are many cultural implications for those (Aboriginal and non-Aboriginal) who do not follow cultural advice or access Country in culturally inappropriate ways. Connection to Country: Where people are displaced or disrupted (e.g., during colonisation) or where there is a loss of technical skills or environmental knowledge this may damage connection to Country (McDonald and Phillips, 2021). Access to Country: Impacts to access to Country may be classified as temporary (e.g., where exclusion zones exist around activities for safety reasons) or permanent (e.g., where infrastructure obstructs access or navigation). Impacts to access to Country can only occur in areas that were traditionally accessed by Traditional Custodians. As described in Section 4.9 this is anticipated to be focussed on areas adjacent to the coast. Kinship systems and totemic species: It is assumed that marine species may have kinship/totemic relationships to Traditional Custodians, but it is understood that these relationships do not prohibit people outside of that "skin group" from hunting or eating that same species (Juluwarlu, 2004). It is therefore inferred that the management of totemic or kinship species applies at the species/population level and not to individual plants and animals. Resource collection: Direct impact to communities using these resources will inherently occur when the resource disappears, is displaced or suffers a reduction in population. Therefore, marine species (as resources) will be impacted where there is an impact at the species/population level. ***Marine Ecosystems and Species*** Marine ecosystems may hold both cultural and environmental value (see Section 4.9), with cultural and environmental values intrinsically linked (DCCEEW, 2023; MAC, 2021 as cited in Woodside, 2023a). It necessarily follows that an impact to marine ecosystems has the potential to impact cultural features where the impact is detectable within Sea Country – the seascape which Traditional Custodians view, interact with or hold knowledge of. ***Archaeological Heritage*** <u>Onshore/Intertidal Archaeological Sites</u> No coastal areas or islands exist within the Operational Area. A review of DPLH's Aboriginal Heritage Inquiry System identified 55 Registered Aboriginal Sites and Other Heritage Places in the EMBA. These were mainly comprised of sites at Barrow Island, the Ningaloo coast, the Pilbara and then north to the Kimberly. These locations do exist within the EMBA boundary, however given the EMBA is driven by an unplanned hydrocarbon spill there is no anticipated impact pathway from this activity to onshore archaeological sites above highest astronomical tide (HAT). Archaeological sites may exist in intertidal landscapes within the EMBA and may be exposed to hydrocarbon from an unplanned spill, however there is no anticipated impact pathway from the presence of hydrocarbons on archaeological values, as this is not expected to impact the fabric or context of sites on an exposed shoreline site. Impacts to the heritage value of fish traps from hydrocarbons in an unplanned spill may occur indirectly through impacts to fish. However, it is expected that continued use of fish traps beyond their archaeological value will be preserved where fish species and distribution are maintained at a population level. With regard to fish, refer to species-specific assessment below for further information. <u>Submerged Archaeological Sites</u> No submerged archaeological sites have been identified beyond terrestrial or intertidal areas, with the exception of two sites at Murujuga in Cape Bruguieres channel and Flying Foam Passage (Benjamin et al., 2020; Benjamin et al., 2023), which are outside of the EMBA. Nevertheless, there is the potential for submerged archaeological sites on the Ancient Landscape. Submerged archaeological sites (locations undefined) may exist on the Ancient Landscape within the broader EMBA. However, given the EMBA is driven by an unplanned hydrocarbon spill, it is not expected to impact the seabed or archaeological material on or within it. Therefore, there is no anticipated impact pathway to submerged archaeological sites in the broader EMBA from the Petroleum Activities Program. <u>Rivers, Waterholes, Tidal Channels and Seeps</u> Oceanographic studies indicate that both the open ocean and coastal zone off Western Australia are well-mixed and saline. Submerged former water sources (e.g., river beds) may exist within the EMBA which are archaeologically prospective or culturally significant. The EMBA is driven by an unplanned hydrocarbon spill, which is not expected to impact the seabed or features on it. As such, there is no anticipated impact pathway from this activity to

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	submerged water sources in the broader EMBA. In the highly unlikely and unmitigated worst case, unplanned hydrocarbons may contact shorelines and receptors such as mangroves, and shoreline habitats. These habitats may contain brackish or fresh water due to runoff from land. Given hydrocarbon characteristics and rapid weathering, an unplanned release is expected to have no lasting effect on any freshwater sources along the shoreline. ***General Intangible Values*** Songlines Management of intangible cultural heritage can include reducing impacts and risks to environmental features that are associated with intangible cultural heritage (UNESCO. 2003; ICOMOS, 2013). Impacts to marine plants, animals and other cultural features associated with songlines might impact the intergenerational transmission of knowledge of songlines when individuals can no longer witness or interact with the cultural features tied to songlines on Country. Therefore, managing songlines may require environmental controls protecting species at a population level, including migratory routes. Refer to species-specific assessment below for further information, in addition to the impact and risk assessment in Sections 6.7 and 6.8, respectively. Energy lines have also been raised during consultation. Energy lines are understood by Woodside to be the same as songlines. Physical features comprising a component of a songline are important to protect to prevent the fragmenting or breaking apart of songlines and loss of sacred cultural knowledge. Songlines can become lost, fragmented, or broken when there is a loss of Country or impact to culturally important physical features (Neale and Kelly, 2020:30). No specific details of songlines within the EMBA have been provided by relevant persons during consultation for this Activity, and no landforms typical of songlines (e.g., mountains, rivers, caves and hills (Higgins, 2021)) are anticipated to be impacted by the PAP. In publicly available literature, Murujuga is acknowledged as a starting point for songlines, including the flying fox songline (MAC, 2023a). Precise location of this songline, and features of this songline that might be impacted, are not clearly articulated in the reviewed sources, but it is stated that “the sea is a source of creation for flying foxes” (DEC, 2013). Although this does not provide the specificity required to determine the location of the flying fox songline or associated sites. Consultation with MAC and other Traditional Custodians has not identified the flying fox songline as overlapping the EMBA, and flying foxes do not occur within the EMBA. Kearney et al. (2023) notes a connection between the Kangaroo songline and a pair of submerged waterholes identified through seabed mapping by the Deep History of Sea Country project, which later found submerged artefacts in Flying Foam passage. Noted that due to the water depth it is not expected that active or former freshwater sources that may connect to the Kangaroo or other songlines would be within the Operational Area. Consultation with MAC and other Traditional Custodians has not identified these songlines as overlapping the EMBA, and these species do not occur within the EMBA. In publicly available literature, Murujuga is acknowledged as the starting point for the seven sisters songline (Bainger, 2021). Precise location of this songline, and features of this songline that might be impacted, are not clearly articulated in the reviewed sources. Consultation with MAC and other Traditional Custodians has not identified the seven sisters songline as overlapping the EMBA. While the presence of songlines is generally raised in the literature across several relevant communities, no specific details have been identified. The literature review has also identified culturally important features, which are known to be commonly associated with songlines (e.g., marine species and landforms; Section 4.8), and these have been separately assessed. Further assessment of intangible values and marine species are provided below, in addition to the impact and risk assessment in Sections 6.7 and 6.8, respectively. Creation/Dreaming Sites; Sacred Sites; Ancestral Beings Woodside has undertaken all reasonable steps to identify creation and dreaming sites, and places associated with ancestral beings within the EMBA. No such sites have been identified. A review of relevant literature has been undertaken which has identified creation, dreaming and ancestral narratives related to the sea more broadly without confirming where (if anywhere) these overlap the EMBA. These references are of a general nature, and do not identify any features or values requiring specific protection or management from the proposed activities. Sea serpents or water serpents are common in Aboriginal creation narratives, and several references were identified in the reviewed literature. The majority of these refer to serpents residing within inland rivers or pools outside of the EMBA (Barber and Jackson, 2011; Dury v Western Australia [2018] FCA 1849; Hayes v Western Australia [2008] FCA 1487; Juluwarlu, 2004; Kalbarri Visitor Centre, 2023; Water Corporation, 2019; Zaunmayr, 2016; Department of Parks and Wildlife, 2014; Yu, 1999; DBCA, 2020). In some versions, the serpent originates from

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	the sea or coast and creates the rivers as it heads inland. Barber and Jackson (2011) also recount a story where a freshwater serpent pushes a sea serpent back into the ocean where it presumably continues to reside. This does not provide the specificity required to determine the location of sea serpents within the sea, and it is possible that the ocean as a whole (out to and beyond other continents) should be viewed generally as housing the sea serpent(s). Consultation with Traditional Custodians has not identified activities of this PAP as having an impact on sea serpents. However, by analogy to other water serpent narratives across Australia, possible impact pathways may include interruption of its path by blocking or reducing flows of water, damaging sacred sites such as Thalu or rock art sites or depleting water sources. While there is potential for shoreline accumulation of hydrocarbons within the EMBA, relevant cultural authorities will be engaged in the event of a spill that may affect them, as specified in Appendix I. No impacts to water flows (either tidal movement or ocean currents) or depletion of water sources are anticipated from this Petroleum Activities Program. Features of the landscape with the potential for connection to creation/dreaming stories and ancestral beings are likely within the EMBA on the Ancient Landscape. However, there are no anticipated impact pathways to submerged landscape features within the broader EMBA from the Petroleum Activities Program. <u>Ceremonial Sites</u> All mentions of active ceremonial sites were confined to onshore locations and no direct impacts to onshore ceremonial sites are anticipated from the Petroleum Activities Program. However, indirect impacts may occur where ceremonies cannot be performed due to limitations on access, loss of knowledge or impacts to the environment, which are further described below. <u>Cultural Obligations to Care for Country</u> Caring for Country collectively refers to the cultural obligations of individuals and groups, as well as rituals and ceremonies required for the physical and spiritual health of the environment. Lack of access to coastally located cultural sites that carry songlines or remain ceremonially important can impact First Nations people's livelihoods and impact their ability to carry out cultural obligations on Country. While there is potential for shoreline accumulation of hydrocarbons within the EMBA, relevant cultural authorities will be engaged in the event of a spill that may affect them, as specified in Appendix I. <u>Knowledge of Country/Customary Law and Transfer of Knowledge</u> Cultural knowledge about Sea Country/customary law and the intergenerational transmission of knowledge are important values identified through consultation, assessments and the literature review. Transfer of knowledge includes continuing traditional practices to pass on practical skills. Direct impact to communities practicing these skills will inherently occur when relevant aspects of the environment disappear, are displaced or suffer a reduction in population – for example, traditional fishing methods require the survival of traditional fish resources. Therefore, ensuring the transmission of cultural knowledge may require environmental controls protecting species and migratory pathways at a population level. Refer to species-specific assessment below for further information, in addition to the impact and risk assessment in Section 6.7 and 6.8 respectively. <u>Connection to Country</u> Connection to Country describes the multi-faceted relationship between First Nations people and the landscape, which is envisioned as having personhood and spirit. Connection to Country may be damaged where people are displaced or disrupted (e.g., during colonisation) or where there is a loss of technical skills or environmental knowledge (McDonald and Phillips, 2021). No impacts of this nature are considered to arise from this Petroleum Activities Program. Access to Country is discussed below. <u>Access to Country</u> Access to Country, including Sea Country, is necessary for the continuation of other values including caring for Country and the transfer of traditional knowledge. Access is also a value in its own right, as a continuation of traditional Sea Country access and use. Access to areas within the Operational Area may be limited where exclusion zones are established around vessels for safety purposes. However, due to the location offshore, this is not expected to impact on Access to Country. Access to Country within the EMBA would be limited to temporary exclusion in areas where there are hydrocarbons present, including shoreline accumulation. However relevant cultural authorities will be engaged in the event of a spill that may affect them, as specified in Appendix I. <u>Cultural Safety</u> Cultural Safety refers to respecting local Lore and culturally significant areas to protect individuals from cultural harm. There are many cultural implications for those (Aboriginal and non-Aboriginal)

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	who do not follow cultural advice or access Country in culturally inappropriate ways. Cultural safety may include observing gender restricted areas, respecting significant places and restricted areas as well as following the advice from those with cultural authority. Therefore, relevant cultural authorities will be engaged in the event of a spill that may affect them, as specified in Appendix I. Kinship Systems and Totemic Species Individuals may have kinship to specific species (Smyth, 2008; Juluwarlu, 2004) and/or a responsibility to care for species (Muller, 2008). These relationships are understood to impose obligations on Traditional Custodians. It is understood that these obligations do not impose restrictions on other people generally, but it is considered that impacts to species at a population level may inhibit Traditional Custodians with kinship relationships' ability to perform their obligations where this results in reduced or displaced populations. It is therefore considered that the management of totemic or kinship species applies at the species/population level and not to individual plants and animals. As such, impacts to individual marine fauna is not expected to impact on the totemic or kinship cultural connection. Totemic species identified during consultation include whales, fish, stingrays and octopuses. In the highly unlikely event of a hydrocarbon spill relevant cultural authorities will be engaged in the event of a spill that may affect them, as specified in Appendix I. Resource Collection A suite of marine species have been identified through consultation and literature as important resources, particularly as food sources. For example, Sea Country resources of noted relevance to Thalanyji people which may be present in the vicinity of the Montebello Islands include dugongs, majun (marine turtles), turtle eggs, fish and shellfish. Other resource species include marine mammals, fish, molluscs including bivalves, gastropods and cephalopods and seabirds, sea urchins and mangrove seeds. In addition to their immediate value as sustenance, the gathering and preparation of these resources are informed by cultural knowledge, and an inability to use these resources may result in a loss of ability to transfer that knowledge to future generations. Direct impact to communities using these resources will inherently occur when the resource disappears, is displaced or suffers a reduction in population. Therefore, these communities may be impacted where there is an impact at the species/population level. As assessed Section 6.7, impacts from planned activities on the marine environment, including resources important to First Nations people, is expected to be limited to negligible or slight and therefore impacts that result in population effects (e.g., population decline, changes in migration routes) are not expected. Impacts to potential resources within the EMBA, in the highly unlikely event of hydrocarbon spill, are described and risk assessed in Section 6.8 and are not expected to result in species/population level impacts. There may be potential impacts to resource collection along the coastlines where there is shoreline accumulation of hydrocarbons. Given hydrocarbon characteristic and rapid weathering, an unplanned release is not expected to have a substantial adverse impact resulting in population level changes. Therefore, impacts to resource collection would be limited to temporary exclusion in areas where there are hydrocarbons present, including shoreline accumulation. Further relevant cultural authorities will be engaged in the event of a spill that may affect them, as specified in Appendix I. ***Marine Ecosystems and Species*** Marine Mammals (Whale, Dolphins, Dugongs) There are increase ceremonies/rituals for species of animals and plants important to First Nations, to enhance or maintain populations. Thalu are places where these increase ceremonies are performed. All mentions of active ceremonial sites in the reviewed literature were confined to onshore locations, though the values may extend offshore where, for example, the Thalu relates to marine species populations. As Thalu ceremonies are performed to maintain and increase populations of marine species, it is inferred that management applies at the species/population level and not to individuals. Reviewed literature (Deloitte, 2020) also includes information that is marked as information that cannot be copied, reproduced or used without consent. The values described in the literature are environmental in nature, apply to marine mammal behaviours at a population level and are managed through existing environmental controls in Sections 6.7, 6.8 and 6.9. Related intangible cultural heritage may include the transmission of cultural knowledge about whales and whale behaviour, including birthing areas, whale communication and migratory patterns. Such cultural knowledge may be associated with various cultural functions and activities that support the social and economic life of a community (Fijn, 2021). Whale symbology expressed through stories, music, and dance can reflect a group's connections with the sea, as well as marine fauna, which then comprise a group's cultural values (Ardler, 2021; Bursill et al., 2007;

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	Cressey, 1998). Whales also speak to a broader connection that exists between First Nation people and their surrounding environment. Beyond mythology and symbolism, whales can be connected with various economic and social functions associated with everyday life. Cultural knowledge of whales, whale migration, behaviour and the related marine environment may all be important in ensuring the continuation of these socio-economic functions and other related activities that remain valuable to First Nations people (Fijn, 2021). No impacts to communities' ability to perform or transmit stories, music or dance are anticipated from the Petroleum Activities Program. Where timing or performance is linked to sighting or engaging with these species, impacts may occur where numbers or migration behaviours are impacted at a population level. First Nations groups have expressed interest about whale migratory routes and studies. Inter-generational transmission of cultural knowledge (including songlines) relating to marine mammals may be impacted where changes to population or behaviour at a population level results in reduced sightings (e.g., through population decline, changes to migration routes or changes to migration seasonality). This transfer of knowledge may be integral to managing a group's intangible cultural heritage (UNESCO, 2003). As described in the relevant environmental impact and risk assessments in Sections 6.7, 6.8 and 6.9, respectively, potential impacts to cetaceans from planned activities are limited to behavioural impact, which may include temporary and localised deviations from migratory pathways for cetaceans. However, no permanent impacts preventing cetaceans from entering or occupying the areas have been identified. These impacts and risks are not considered to be ecologically significant at a population level, and hence are not expected to impact the value of marine mammals, including the transmission of cultural knowledge. As such, cultural values and intangible cultural heritage associated with these species are expected to be maintained. <u>Marine Reptiles (Turtles, Sea Snakes, Crocodiles)</u> Turtles and crocodiles have been identified through consultation and existing literature as an important resource, particularly as food sources. Direct impact to communities using these resources will inherently occur when the resource disappears, is displaced or suffers a reduction in population. Therefore, these species (as resources) will be impacted where there is an impact at the species/population level. Intangible cultural heritage may also include the transmission of cultural knowledge about marine reptiles, such as nesting areas, hunting areas and migratory patterns. Cultural knowledge may also be conveyed through stories, such as the turtle being trapped in the sea as a result of its greed for berries as recounted by Capewell (2020). Such cultural knowledge may be associated with various cultural functions and activities that support the social and economic life of a community (Fijn, 2021). First Nations groups have expressed an interest regarding turtle monitoring programs and migration patterns. Activities that impact turtle/crocodile populations and their marine environment may have an indirect impact on some Aboriginal communities, as this can limit access to cultural sites or deplete hunting areas that would threaten local food security (Delisle et al., 2018:251). Inter-generational transmission of cultural knowledge (including songlines) relating to marine reptiles may be impacted where changes to population or behaviour results in reduced sightings (e.g., through population decline, changes to migration routes or changes to migration seasonality). This transfer of knowledge may be integral to managing a group's intangible cultural heritage (UNESCO, 2003). As described in the relevant environmental impact and risk assessments in Sections 6.7, 6.8 and 6.9, potential impacts to marine reptiles from planned activities are likely to be restricted to temporary behavioural changes, which are not considered to be ecologically significant at a population level, and hence not expected to impact the value of marine reptiles, including the transmission of cultural knowledge or use as a resource. As such, cultural values and intangible cultural heritage associated with these species are expected to be maintained. <u>Fish and Cephalopods</u> Fish and squid have been identified through consultation and existing literature as an important resource, particularly as food sources. Direct impact to communities using these resources will inherently occur when the resource disappears, is displaced or suffers a reduction in population. Therefore, these species (as resources) will be impacted where there is an impact at the species/population level. Through consultation, fish were identified as important agents in the management of the broader ecosystem. It may be assumed that inter-generational transmission of cultural knowledge relating to fish may be impacted where changes to population or behaviour results in reduced sightings (e.g., through population decline). In additional MIAC (2019) identified whale sharks as a culturally important species associated with stories which describe them as guardians of the sea. This transfer of knowledge may be integral to managing a group's intangible cultural heritage

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	(UNESCO, 2003). Intangible cultural heritage associated with fish and whale sharks, including inter-generational knowledge regarding fishing techniques and migratory patterns, can be managed by reducing impacts to fish in nearshore marine environments to which this cultural knowledge is intrinsically connected. The octopus is an important totem to Ngarla People and features in the creation story of Solitary Island. There are increase ceremonies/rituals for species of squid and octopus to enhance or maintain populations. Thalu are places where these increase ceremonies are performed. All mentions of active ceremonial sites in the reviewed literature were confined to onshore locations, though the values may extend offshore where, for example, the Thalu relates to marine species populations. As Thalu ceremonies are performed to maintain and increase populations of marine species, it is inferred that management applies at the species/population level and not to individuals. As described in the relevant environmental impact and risk assessments in Sections 6.7, 6.8 and 6.9, respectively, the potential impacts from planned activities on fish[148] are considered to be localised and with slight, short-term (<1 year) impact potential on species (or lower), but not affecting ecosystem function, physical or biological attributes. Impact potential is not considered to be ecologically significant at a population level. As such, cultural values and intangible cultural heritage associated with these species are expected to be maintained. <u>Seabirds</u> Seabirds, specifically shags, have been identified through literature as a culturally significant species (Malgana Land and Sea Management et al., 2021), as well as a resource (seabird eggs; Smyth, 2007). Direct impact to communities using these resources will inherently occur when the resource disappears, is displaced or suffers a reduction in population. Therefore, these species (as resources) will be impacted where there is an impact at the species/population level. Intangible cultural heritage may also include the transmission of cultural knowledge about seabirds, such as nesting areas, hunting areas and migratory patterns. Such cultural knowledge may be associated with various cultural functions and activities that support the social and economic life of a community (Fijn, 2021) Inter-generational transmission of cultural knowledge relating to seabirds may be impacted where changes to population or behaviour results in reduced sightings (e.g., through population decline, changes to migration routes or changes to migration seasonality). This transfer of knowledge may be integral to managing a group's intangible cultural heritage (UNESCO, 2003). As described in the relevant environmental impact assessments in Section 6.7, the potential impacts from the PAP on seabirds is limited to slight. The potential for temporary behavioural disturbance localised around vessels from light is not expected to result in a substantial adverse effect on species' population, and light emissions will not seriously disrupt the lifecycle of an ecologically significant proportion any migratory bird species. In terms of risk, as described in Section 6.8 and 6.9, a change in marine fauna behaviour or injury/mortality to seabirds and migratory shorebirds may occur due to a change in water or sediment quality following an unplanned hydrocarbon release. Given hydrocarbon characteristics, expected rapid weathering to below impact thresholds, and the mobile transient nature of individuals, unplanned hydrocarbon releases are not expected to substantially modify important habitat for migratory species. As such, cultural values and intangible cultural heritage associated with these species are expected to be maintained. <u>Benthic Habitats (Coral, Seagrass)</u> Through consultation, First Nations groups identified benthic habitats as valuable for their ecological values, including corals attracting fish and seagrass providing shelters for fauna, as well as an important habitat for dugongs. There is no overlap between the Operational Area and coral / seagrass habitats as water depth is more than 170 m, and no planned impacts to coral / seagrass habitats from the Petroleum Activities Program. In terms of risk, as described in Section 6.8 and 6.9, a change in habitat may occur following an unplanned hydrocarbon release. Given hydrocarbon characteristics, rapid weathering, short-term exposure, as well as the response strategies planned to be deployed, an unplanned release may result in localised impacts coral and seagrass habitats. As such, cultural values and intangible cultural heritage associated with benthic habitats are expected to be maintained. ***Shoreline Habitats (Mangroves/Salt Marshes)***

[148] Squid and octopus are considered to be impacted through similar impact pathways as fish, and hence the conclusion represented here are considered appropriate for cephalopods.

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	Through consultation, First Nations groups identified shoreline habitats as valuable for their ecological values, including mangroves for providing shelter to marine invertebrates, which are identified resources, and potential nursery for turtles. Literature also notes that mangroves are also valued for the flora and fauna they are associated with and support (Commonwealth of Australia, 2002) and Smyth (2007) reports that mangrove seeds are used as a resource by Ngarda-Ngarli. There is no overlap between the Operational Area and mangrove/salt marsh habitat, and no planned impacts to mangroves from the Petroleum Activities Program. In terms of risk, as described in Section 6.8 and 6.9, a change in habitat may occur due to a change in water or sediment quality following an unplanned hydrocarbon release. Given hydrocarbon characteristics, rapid weathering, as well as the response strategies planned to be deployed, an unplanned release may result in localised impacts coral and seagrass habitats. As such, cultural values and intangible cultural heritage associated with shoreline habitats are expected to be maintained. ***Marine Park/Coastal Reserves*** A number of marine parks (e.g., Barrow Island Marine Park, Montebello Islands Marine Park, Ningaloo Marine Park) are jointly managed with First Nation groups. The groups are responsible for sharing management decisions and also for sharing in the overall responsibility of making sure the marine park fulfils its purpose. There is no overlap between the Operational Area and any marine parks. In terms of risk, as described in Section 6.8 and 6.9, shoreline accumulation may occur in some of these marine parks. The relevant cultural authorities will be engaged in the event of a spill that may affect them, as specified in Appendix I. ***Nearshore Islands*** Nearshore islands (including Rosemary Island and Solitary Island) have been raised in consultation as of interest, for cultural values and for their ecological benefit. There is no overlap between the Operational Area and any islands. Solitary Island is outside the EMBA. In terms of risk, as described in Section 6.8 and 6.9, shoreline accumulation may occur on some islands. The relevant cultural authorities will be engaged in the event of a spill that may affect them, as specified in Appendix I. ***Murujuga*** Cultural features and heritage values associated with Murujuga petroglyphs are outlined in Section 4.9.6 and consideration of potential for indirect impact from atmospheric emissions associated with onshore processing of Pluto gas presented in Section **Error! Reference source not found.**. Onshore processing of LNG from the PAP will occur onshore on Murujuga, which has a high concentration of rock art sites (estimated to exceed a million examples (DBCA & MAC, 2024)) with significant local cultural and spiritual values in addition to their inclusion on Australia's National Heritage List and Tentative World Heritage List. PLP's publicly available Air Quality Management Plan has been reviewed and approved by the Western Australian Environment Protection Authority as meeting the requirement for best available practicable and efficient technologies to be used to minimise and monitor air emissions from the plant as described in Section **Error! Reference source not found.**. Woodside onshore operations at Pluto LNG facility and KGP are managed via Cultural Heritage Management Plans as implementation conditions required by EPA Act (Pt IV) Ministerial Conditions. • Ministerial Statement 757 – for the Pluto LNG Development includes Condition 10 for Indigenous Heritage management to develop and implement a CHMP prepared in liaison with the Department of Indigenous Affairs. The Pluto LNG Aboriginal Cultural Heritage Management Plan - Commissioning and Operations Phase (2012) is implemented at the facility. • Ministerial Statement 1233 (North West Shelf Project Extension Proposal) Condition section 4 set out Cultural Heritage Outcomes and Objectives to be achieved including (but not limited to); – allowing traditional owner and custodian access to enable traditional activities and connection to culturally significant heritage areas within the development envelopes – avoid where possible, and otherwise minimise direct impacts to social, cultural, heritage and archaeological values within the development envelopes

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	• Conditions require implementation of the North West Shelf Project Extension Cultural Heritage Management Plan (2021), including further revision in consultation with Murujuga Key Stakeholders. The plan is required to include elements (not limited to); a framework for ongoing consultation, and operational environmental management activities, monitoring, targets, management actions and reporting relevant to cultural heritage. Related air quality management conditions in MS1233 are outlined in Section **Error! Reference source not found.**. • These conditions support the management and recognition of Murujuga Cultural Values related to the NWS Operations. The NWS CHMP (2021) provides management provisions and actions including provide access for Traditional Owners to Aboriginal cultural heritage sites within the Proposal development envelope when requested [MA2], the adoption of technologies to prevent impacts to terrestrial and nearshore vegetation of heritage and conservation value [MA4] and support the implementation of, and participate in, the DWER Murujuga Rock Art Strategy [MA6] (see Section **Error! Reference source not found.**). ***Conclusion*** The impact and risk assessment for cultural features and heritage values has determined that the planned activities are unlikely to result in an impact greater than negligible (F) and unplanned activities are assessed to have a residual risk rating of High (or lower).

Demonstration of ALARP				
As marine ecosystems may hold both cultural and environmental value (see Section 4.9.1), with cultural and environmental values intrinsically linked, in addition to the specific controls for cultural features and heritage values, the controls and performance standards in Sections 6.7 and 6.8 will reduce impacts to cultural features and heritage values, including marine species and habitats.				
Control Considered	***Feasibility (F) and Cost/ Sacrifice (Cs)***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Adopted***
Apply a 'living heritage'[149] management approach. Woodside seeks advice and incorporates Traditional Custodian cultural knowledges across our activities. Cultural safety considerations are factored for our workforce and the Traditional Custodian community.	F: Yes. CS: Minimal.	Implementation of the 'living heritage' approach pays acknowledgement and respect to Traditional Custodian communities. It supports the transfer of cultural knowledges and is an effective strategy to manage intangible cultural values.	Benefits outweigh cost/ sacrifice.	Yes C 29.1
Project inductions to all relevant marine crew, prior to the individual commencing the activity, will include information on cultural features and heritage values, including tangible and intangible cultural heritage.	F: Yes. CS: Minimal.	Ensures workforce is suitably aware of cultural features and heritage values in the area they are operating.	Benefits outweigh cost/ sacrifice.	Yes C 29.2

[149] Living heritage supports community and individual identity. Intangible cultural heritage is 'living heritage' that is inherited from ancestors and passed on to their descendants. It is comprised of many influences, including oral traditions, art, social practices, rituals and ceremonies, cultural knowledge and practices. It is transmitted from generation to generation, and evolves in response to the environment. Woodside applies a 'living heritage' approach to its cultural heritage management. This includes ensuring that Traditional Custodians are given voice to identify interests, transmit information and express concerns. Woodside works with Traditional Custodians to support and follow appropriate cultural protocols, including calling to Country, conducting smoking ceremonies (in areas where this custom is appropriate) and undertaking cultural awareness. Woodside will collaborate and provide relevant information it holds to groups such as Heritage Management Committees where they are established.

Should it be identified that relevant cultural authorities may be affected in the unlikely event of a spill, Woodside will engage with those parties as appropriate and in alignment with the FSP.	F: Yes. CS: Minimal.	Engaging with relevant cultural authorities that may be impacted by a spill will allow the Traditional Custodians to identify areas of concern.	Benefits outweigh cost/sacrifice.	Yes C 29.3

ALARP Statement

On the basis of the impact and risk assessment outcomes and use of the relevant tools appropriate to the decision type (i.e., Decision Type A, Section 2.6.1), Woodside considers the adopted controls appropriate to manage the potential impacts and risks to cultural features and heritage values. As no reasonable additional/alternative controls were identified that would further reduce the impacts without grossly disproportionate sacrifice, the impacts are considered ALARP.

Acceptability Statement

The impact and risk assessment has determined that, given the adopted controls, planned activities are unlikely to result in an impact greater than negligible and unplanned activities are assessed to have a residual risk rating of moderate (or lower).

The PAP and the EMBA are not expected to have a significant impact (e.g., changes in population levels) on MNES including marine fauna with a First Nations connection with, or traditional use in nearshore areas as defined in Section 4.8. While the EMBA may overlap the Ancient Landscape no impacts are predicted as hydrocarbons are expected to remain within the upper water column.

Woodside has engaged with Traditional Custodians adjacent to the EMBA to understand the cultural features and heritage values that may occur and potential impacts from the activity. In the event of an unplanned loss of hydrocarbons Woodside has committed to engaging with relevant cultural authorities that may be affected (Appendix I).

Woodside supports the ongoing management of heritage values under listings; Murujuga Cultural Landscape, Murujuga National Park and Dampier Archipelago (Including Burrup Peninsula) National Heritage Place. Planned activities under the PAP are not inconsistent with relevant heritage legislation, management plans and agreements under which these values are protected.

Management of risks and impacts related to cultural features and heritage values were noted as material issues for relevant persons consulted in the course of preparing this EP. All feedback, claims or objections from Relevant Persons has been appropriately responded to and addressed (see Appendix F), and controls proposed have been assessed in Sections of this EP as referenced in Table 6-57.

Further opportunities to reduce the impacts have been investigated above. The potential impacts and risks are considered acceptable if the adopted controls are implemented. Therefore, Woodside considers the adopted controls appropriate to manage the impacts and risks to cultural features and heritage values to a level that is acceptable, if ALARP.

Key Environmental Performance Outcomes, Standards and Measurement Criteria Related to Cultural Features and Heritage Values[150]

Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 29 No adverse impact to cultural features and heritage values without a permit from the Petroleum Activities Program.	**C 29.1** Apply a 'living heritage' management approach. Woodside seeks advice and incorporates Traditional Custodian cultural knowledge across our activities. Cultural	**PS 29.2.1** Woodside will continue to give voice to Traditional Custodians to identify interests, transmit information and express concern.	**MC 29.2.1** Records demonstrate Change Management and Management of Knowledge processes have been followed where new controls or management measures identified.

[150] As marine ecosystems may hold both cultural and environmental value (see Section 4.9.1), with cultural and environmental values intrinsically linked, in addition to the specific controls for cultural features and heritage values, the controls and performance standards in Sections 6.6 and 6.7 will reduce impacts to cultural features and heritage values including marine species and habitats.

	safety considerations are factored for our workforce and the Traditional Custodian community.	**PS 29.1.2** Woodside will assess and where deemed practicable will implement appropriate cultural protocols where requested by Traditional Custodians.	**MC 29.1.2** Records demonstrate Woodside implemented cultural protocols as requested.
	C 29.2 Project inductions to all relevant marine crew, prior to the individual commencing the activity, will include information on cultural features and heritage values, including tangible and intangible cultural heritage.	**PS 29.2.1** All relevant marine crew have completed Project inductions that include information on cultural values, including tangible and intangible cultural heritage for awareness.	**MC 29.2.1** Records demonstrate all relevant marine crew have completed inductions that include cultural material.
	C 29.3 Should it be identified that relevant cultural authorities may be affected in the unlikely event of a spill, Woodside will engage with those parties as appropriate and in alignment with the FSP	**PS 29.3.1** In the event of an spill, Woodside's emergency response protocols (Section 7.14) include review of potentially impacted stakeholders - which includes Traditional Owners depending on the nature and scale of the event; to support identification and management of potential cultural heritage areas of concern.	**MC 29.3.1** In the event of a spill, emergency response records include Traditional Owner stakeholder engagement for applicable events.
	C 11.3 Implement the PAP in a manner that is not inconsistent with the objectives of the Murujuga National Park Management Plan 78, through execution of the Conservation Agreement and Deep Gorge Joint Statement.	**PS 11.3.1** Comply with relevant commitments and obligations under the Conservation Agreement and Deep Gorge Joint Statement	**MC 11.3.1** Records demonstrate compliance with relevant commitments and obligations under, the Conservation Agreement and 'Deep Gorge' Joint Statement
		PS11.3.2 Ensure Onshore Processing Facilities comply with relevant facility Cultural Heritage Management Plan(s)	**MC11.3.2** Onshore processing facilities Annual Compliance Reports demonstrate compliance with facility Cultural Heritage Management Plan(s).
EPO 30 No adverse impact to Underwater Cultural	**C 30.1** Unexpected finds of potential Underwater Cultural Heritage sites/features, including First Nations UCH are managed in accordance with an Unexpected Finds Procedure set out in Section 7.8.	**PS 30.1** In the event that an Underwater Cultural Heritage site or feature is identified, implement an Unexpected Finds Procedure set out in Section 7.8.	**PS 30.1.1** In the event that an Underwater Cultural Heritage site or feature is identified, implement an Unexpected Finds Procedure set out in Section 7.8.

Heritage[151] without a permit[152].	**C 30.2** Report any potential UCH finds to relevant stakeholders and authorities in accordance with the Unexpected Finds Procedure, Underwater Cultural Heritage Act 2018 and the ATSIHP Act.	**PS 30.2** Report any finds of potential UCH in accordance with the Unexpected Finds Procedure (b) including to the Australasian Underwater Cultural Heritage Database.	**MC 30.2.1** Records of potential UCH finds reported to relevant authorities and stakeholders.
	C 30.3 Relevant vessel crew, USV remote operators and ROV operators will be advised in an induction of the potential to encounter UCH, and of their requirement to follow the Unexpected Finds Procedure.	**PS 30.3** Relevant vessel crew (including ROV operators) are made aware of the requirements of the Unexpected Finds Procedure through an induction.	**MC 30.3.1** Records demonstrate vessel crew are made aware of potential to encounter UCH.

[151] Underwater Cultural Heritage is defined as any trace of human existence that has a cultural, historical or archaeological character and is located under water, in accordance with the UCH Act

[152] Permit for Entry into a Protected Zone or to Impact Underwater Cultural Heritage would be acquired under the UCH Act.

7. IMPLEMENTATION STRATEGY

7.1 Overview

Regulation 22 of the Environment Regulations requires an EP to contain an implementation strategy for the activity. The implementation strategy for the PAP confirms fit for purpose systems, practices and procedures are in place to direct, review and manage the activities so that environmental risks and impacts are continually being reduced to ALARP and are acceptable, and that EPOs and EPSs outlined in this EP are achieved.

Woodside, as Operator, is responsible for ensuring that the PAP is managed in accordance with this implementation strategy and the WMS (see Section 1.8).

7.2 Systems, Practice and Procedures

All operational activities are planned and performed in accordance with relevant legislation and internal environment standards and procedures identified in this EP (Section 6).

Processes are implemented to verify controls to manage environmental impacts and risks to:

- a level that is ALARP and acceptable
- meet EPOs
- comply with EPSs defined in this EP.

The systems, practices and procedures that are implemented are listed in the EPSs contained in this EP. Document names and reference numbers may be subject to change during the statutory duration of this EP and is managed through a Change Register and update process. Further information regarding some of the key systems, practices and procedures relevant to implementation of this EP is provided below.

7.2.1 Woodside Management System Operate Processes

Under the WMS Operate Activity (see Section 1.8 for an overview of the WMS), there are four overarching processes; those directly relevant to the implementation of this EP and environmental management during the PAP are described below (Operate Plant Process and the Maintain Assets Process).

7.2.1.1 Operate Plant

The objective of the Operate Plant Process is for production to be carried out in a safe, efficient, reliable and economic manner, and that all required process variables are within allowable limits. This is so that the potential for unplanned (accident/incident) events that may impact the environment are minimised.

The Operate Plant Process develops key activities to support ongoing production activities so that the facility is operated within the Basis of Design. The process also identifies required production routines, routine execution, recording of data gathered and formulation of remedial activities. The Operate Plant Process includes the Integrated Safe System of Work (ISSoW) system (described below).

In addition, the Operating Practice MSPS (M02) is in place to assure operating practices are in place, such that:

- integrity critical operating procedures are available, accurate, up to date, understood and used
- safe operating and technical integrity limits are defined, understood and the process is managed within these limits.

7.2.1.1.1 Integrated Safe System of Work

The ISSoW Procedure outlines the key activities required to achieve effective management of permit-controlled work on the facility. The ISSoW process is a management system for all work and is a key element in ensuring the safety of personnel, protection of the environment and technical integrity of the facility.

Work within the facility 500 m PSZ and operations within the vicinity of the connected flowlines is controlled in accordance with ISSoW.

The ISSoW system takes a risk-based approach to activities, thus tasks with higher levels of risk are subjected to greater scrutiny and control. The ISSoW system also allows for low-risk, routine tasks to be carried out with adequate but minimal administration. The prime objective of ISSoW is to ensure work other than normal operations is properly planned, risk assessed, controlled, coordinated and safely executed. It provides a methodical approach to identifying hazards, assessing risks, and creating and supporting permits to work and associated certificates.

In keeping with ALARP principles, this system is critical to ensuring the appropriate level of hazard identification and risk assessment is carried out for activities performed on the facility.

In addition, the Safe Work Control MSPS (M04) is in place to assure effective safe work control, permit to work and task risk management arrangements are in place and followed to control the risks arising from work activities.

7.2.1.2 Maintain Assets

The Maintain Assets Process aims to improve the reliability and availability of plant and equipment (which includes that required for safe operation) through well managed and planned execution of maintenance that promotes a proactive maintenance culture.

Maintenance, inspection and testing systems and procedures are in place to safeguard the integrity of the facility. The maintenance strategy for the facility is based on optimising safety, minimising environmental impact and maximising production. Maintenance practices used to establish well managed maintenances strategies, planned execution and improvement are described in the Maintenance of Assets Procedure.

A risk-based approach is used as the basis for establishing and prioritising inspection, maintenance and testing requirements at the facility. Equipment is assessed to establish equipment criticality with respect to the consequences and likelihood of equipment failure. This informs determination of appropriate maintenance and inspection activities. Maintenance activities are allocated risk rankings according to the criticality of equipment, so that high risk maintenance work orders are completed as a priority.

A computerised maintenance management system (CMMS) provides a database called SAP-PM that contains facility registers, equipment details, spare parts data and associated planned maintenance tasks. This system is used to plan, monitor and record maintenance activities. The system provides a variety of reports that enable monitoring and assessment of maintenance activities.

SCE Technical Performance Standards identify SCEs and associated assurance activities. These activities are identified in the CMMS and given the appropriate priority (Technical Integrity status). Refer to Sections 2.7.5 and 7.4 for more detail on SCE Technical Performance Standards and how they differ from EPSs required by the Environment Regulations. SCE Technical Performance Standards form a key component in the processes and systems implemented by Woodside to maintain safety and environment critical plant and equipment.

In addition, the Maintenance and Inspection MSPS (M03) is in place to assure that the necessary inspection and maintenance requirements are identified and carried out to maintain the integrity of SCEs and SCCs.

7.2.2 Process Safety Management

So that Woodside protects the safety, security and health of its employees, contractors, the environment and assets, Woodside has adopted the Energy Institute's Process Safety Management (PSM) framework within its Process Safety Management Procedure which sets out a disciplined framework for managing the integrity of systems and processes that handle hazardous substances over the production (and exploration) lifecycle. It deals with the prevention and control of events that have potential to release hazardous materials and energy.

PSM consists of four main focus areas. Each focus area contains a number of PSM requirements that define key aspects required so that PSM is integrated through the organisation. There are twenty PSM requirements. The focus areas and requirements are shown in Figure 7-1.

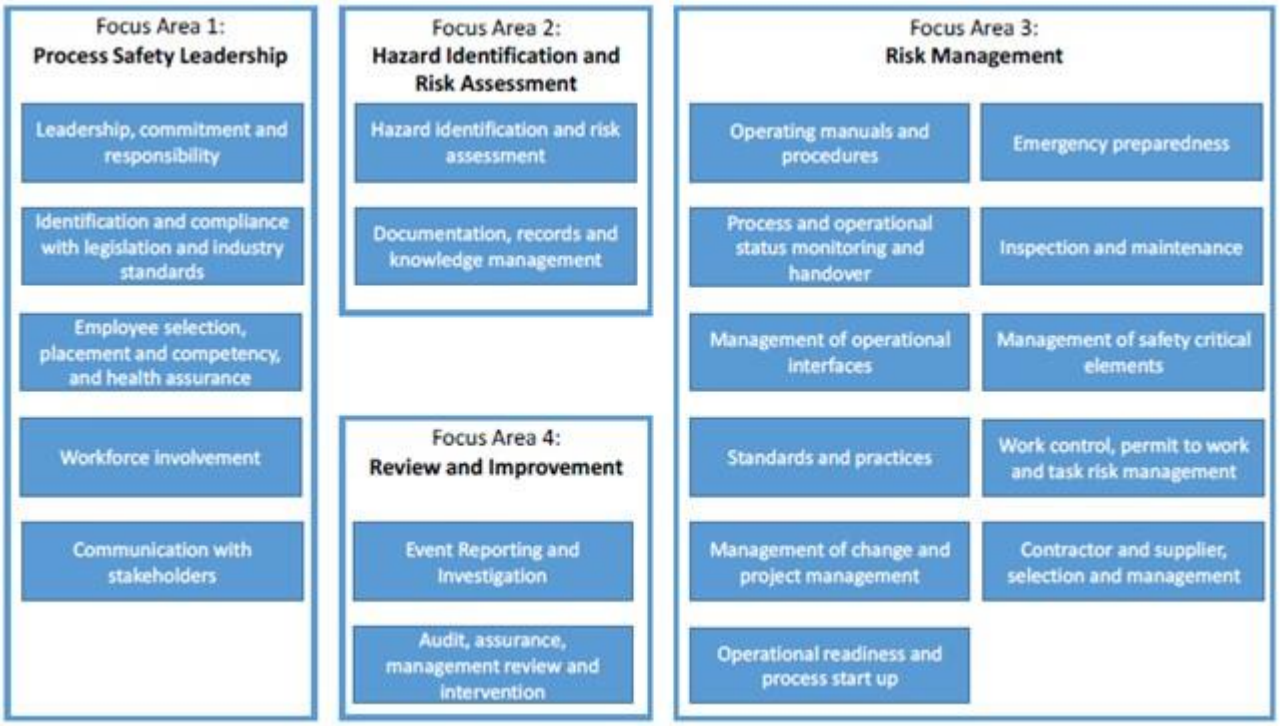

Figure 7-1: Process safety management focus area

7.2.2.1 Woodside Safety Culture Framework

Woodside's 'Our Safety Culture' framework (shown in Figure 7-2) promotes a strong HSE culture and is a key enabler for effective process safety management. This framework outlines the expected behaviours for everyone including supervisors and managers/executives, and is openly discussed as part of inductions, training and development.

Figure 7-2: Woodside 'Our Safety Culture' framework

7.2.3 Offshore Marine Discharge Adaptive Management Plan

7.2.3.1 Overview

The Offshore Marine Discharges Adaptive Management Plan (OMDAMP) has been developed to manage routine discharges to the marine environment from applicable offshore production facilities.

The objectives of the OMDAMP are to:

- Manage marine discharges in a way that reduces the environmental risks and potential environmental impacts to As Low As Reasonably Practicable (ALARP) and of an acceptable level.
- Define monitoring measures to determine whether routine marine discharges comply with regulatory requirements and Woodside's Environmental Performance Procedure.
- Detail verification assessment and non-routine monitoring to be undertaken when routine monitoring identifies a change in discharge characteristics which have the potential to alter existing compliance with the Environmental Performance Procedure or relevant facility Operations Environment Plans (EPs).

The OMDAMP defines a process and rational for management of routine discharges such as produced water (PW), cooling water, and brine to the marine environment. The OMDAMP considers applicable technical guidance (including the Commonwealth ANZG for fresh and marine water quality, National Water Quality Management Strategy and Technical Guidance: Protecting the quality of Western Australia's marine environment (EPA, 2016)) as well as relevant internal procedures and asset specific EP commitments. In addition, the OMDAMP is based on Woodside's experience managing PW at multiple northwest shelf offshore facilities and considers monitoring data collected over 20-30 years; allowing the application of appropriate controls and any lessons learnt to ensure impacts are acceptable and reduced to ALARP.

7.2.3.2 Routine Monitoring and Management

Monitoring changes in water quality as well as investigating potential toxicity via whole effluent toxicity (WET) testing and implementing management to maintain acceptable levels of changes is standard industry practice in Commonwealth and State waters. By limiting the changes to water quality and therefore the pathway to impact sediment quality and biota there is high confidence that no environmental impact has occurred outside the approved mixing zone boundary.

The OMDAMP details DGV's (ANZG 2018), routine monitoring assessment against trigger values, analytical methods and actions when a trigger value is exceeded. The trigger values are applied through a risk-based approach that is intended to capture uncertainty around the level of impact by staging monitoring and management responses according to the degree of risk of environmental impact. This approach provides a level of confidence that management responses are not triggered too early (i.e. when there is no actual impact) or too late after significant or irreversible damage to the surrounding ecosystem (EPA 2016). Changes in discharge contaminants and PW toxicity can be detected early and can indicate the potential for an impact prior to an impact occurring allowing for timely management. WET testing confirms if there is a potential for impact on biota.

PW samples should be representative of normal operations, hence timing of sampling coincides with a period of normal operating circumstances for a facility, as well as also considering when wells have begun to cut water, which formation water producing wells are online and chemicals that may be present in the discharge stream. Ensuring samples are representative of normal operations may require deferring sampling within the calendar year if required. Samples are analysed by a NATA accredited laboratory (where applicable) for key physio-chemical parameters and chemical analytes.

WET tests are undertaken on a broad range of taxa of ecological relevance for which accepted standard test protocols are well established. WET tests mainly focus on the early life stages of test organisms, when organisms are typically most sensitive to contaminants; the tests are designed to represent local trophic level receptors. For WET testing, a range of tropical and temperate Australian marine species were selected based on their ecological relevance, known sensitivity to contaminants, availability of robust test protocols, and known reproducibility and sensitivity as test species. The dilutions required to protect 99% and 95% of species are calculated using the Warne et al. (2018) methodology. If a trigger value is not met, it indicates uncertainty around whether the environmental value is being protected and further investigation is required (Figure 7-3).

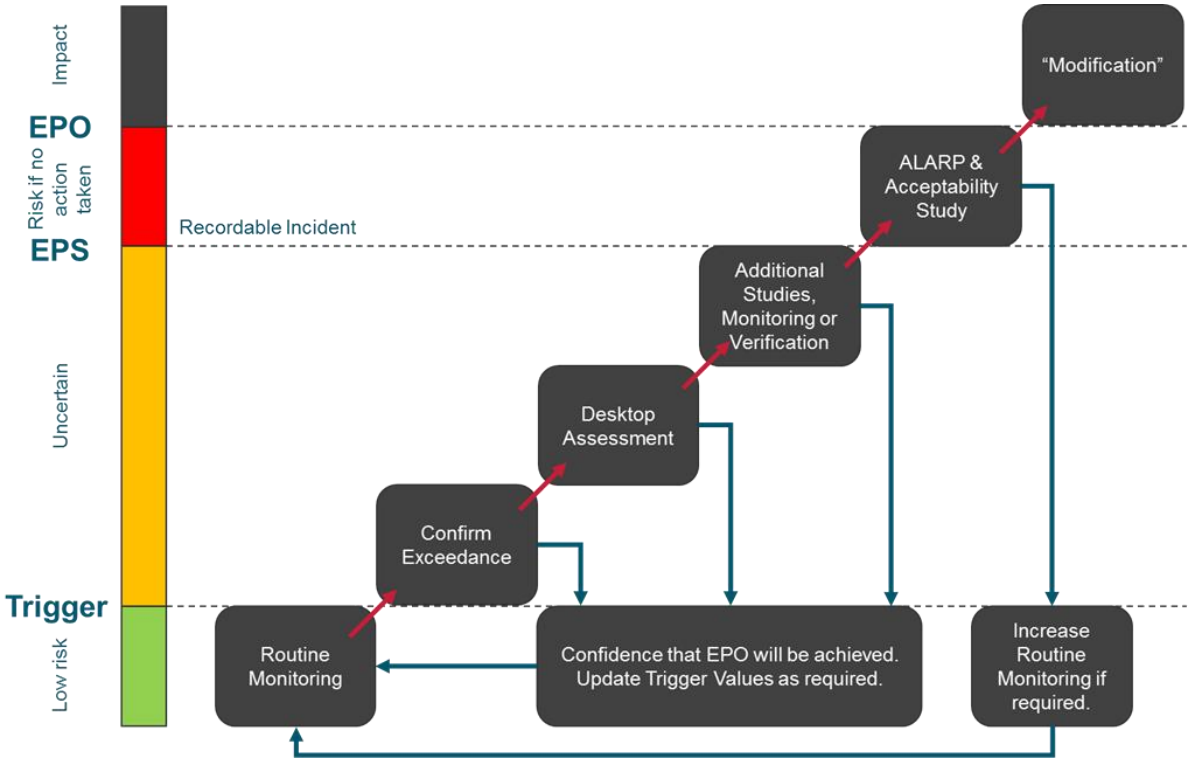

Figure 7-3: Routine monitoring and adaptive management framework for produced water

7.2.3.3 Further Investigations

Detectable exceedances in trigger values may occur without impacting the environment. Once data has been validated to be correct (QA/QC process) operational measures may be action, if appropriate, to limit spatial and temporal impacts based on the nature and scale of potential impact. To provide confidence that environmental impact has not occurred outside the approved mixing zone boundary, further investigation would be required using multiple lines of evidence (Figure 7-3) in the form of a desktop study to initially assess the exceedance in context of available data and confirm if there is potential for impact to the environment. Additional routine sampling may occur at this point to assess for natural variability in the discharge characteristics. A desktop assessment is necessary before undertaking in-field monitoring. This ensures monitoring programs are designed and implemented to provide robust findings based on good survey design.

A range of methods can be used to detect trigger value exceedances (e.g. relative percentage difference, control charts, multivariate analysis, etc.) depending on the dataset available. An appropriate method is selected as described in the OMDAMP due to the variable nature of environmental data. If critical data is not available, the desktop study identifies potential data gaps and may recommend additional non-routine studies and/or monitoring to ensure the assessment is appropriately undertaken. The purpose of the 'further investigations' step is to provide certainty that the EPO has been achieved, if a trigger value has been exceeded. The key investigation steps are described below:

- **Confirm the trigger value has been exceeded** – Review quality assurance and quality control, methodology and possible sources of contamination to determine if the results are reliable, or if any factors have occurred that may compromise the integrity of the monitoring or data.
- **Desktop assessment to understand whether the EPO is at risk** – If a trigger value is confirmed to be exceeded, multiple lines of evidence are considered including historical and current data from routine and non-routine monitoring and studies. This assessment shall consider whether there is adequate evidence to demonstrate that acceptability criteria have been met (EPO not breached) and if the desktop assessment determines that the existing body of evidence is insufficient, it shall outline what additional monitoring or studies are required. Potential additional monitoring/studies may include but is not limited to:
  - single species test (collected annually in parallel with routine chemical characterisation should further investigation be required)
  - dilution modelling and or studies
  - flocculation, sedimentation, settling velocity and/or dispersion analysis
  - metal bioavailability
  - scanning electron microscopy and particle size distribution analyses
  - in-situ monitoring (water quality and/or sediments).

Routine monitoring activities may be required ahead of schedule and additional monitoring not listed may be undertaken as appropriate. Field monitoring is undertaken in accordance with a plan that details timing, locations and objectives of monitoring.

- Conduct additional studies to confirm the EPO is not at risk – Monitoring results provide additional lines of evidence to determine whether there is a risk of environmental impact at the mixing zone boundary due to unacceptable changes in water quality resulting in changes to sediment, or biological indicators. Given the significant health, safety and technical risks, logistics and planning required, monitoring of the receiving environment is typically only considered when all other sources of evidence are insufficient to demonstrate that the EPO is not at risk. The OMDAMP provides detailed guidance on the steps and actions required to be undertaken if a trigger value is exceeded and this may include additional non-routine

monitoring to verify that environmental impacts have not occurred outside the boundary of the mixing zone.

If triggers are being exceeded but no impact on the environment is predicted to occur the desktop assessment may consider development of site-specific guideline values in line with ANZG. For example, if chemical characterisation identified copper as exceeding guideline value - ANZG 99% DGV but further investigations concluded levels observed were consistent with baseline and naturally occurring in the region. If potential impacts to the environment are identified, an ALARP/Acceptability Study is required to determine what additional controls can be implemented to ensure the impacts are not realised.

7.2.3.4 ALARP/Acceptability Study

An ALARP/Acceptability study is conducted once it has been determined, as a result of further investigations, that there is potential for an impact that exceeds the acceptable limits of change. The ALARP/Acceptability study shall be conducted in accordance with the ALARP Demonstration Procedure, to determine additional controls that may be necessary to reduce the potential impacts. Additional management measures (controls) may include technology, process upgrades or reservoir management. Woodside will implement the additional controls identified in the ALARP/Acceptability study that are required to give confidence that the acceptable limits of impact can be achieved.

In the event WET testing identifies a higher-than-expected effluent toxicity the study would need to consider discharge volumes, duration, well line up, potential drivers of toxicity. The ALARP study may recommend the following:

- non routine WET testing,
- operational discharge limits,
- change out of process chemicals if appropriate or reduced dosing rates,
- well management,
- *Insitu* monitoring,
- technology or process upgrades.

7.2.3.5 Review and revision

This OMDAMP is typically reviewed annually to incorporate the following:

- Completion of the annual OMDAMP compliance review – incorporating any recommendations for further assessment and/or updates to the monitoring framework
- Recently accepted EPs – incorporating any new/amended monitoring commitments/triggers
- Regulatory inspections – incorporating any relevant findings or recommendations
- Updates to key guidelines, guideline values or changes to recommended sampling/ methodologies.

7.2.4 Woodside Invasive Marine Species Risk Assessment Process

7.2.4.1 Objective and Scope

To minimise the risk of introducing IMS as a result of the Petroleum Activities Program, all applicable vessels and immersible equipment will be subject to Woodside's IMS risk assessment process (unless exempt as outlined below).

The objective of the risk assessment process is to identify the level of threat a contracted vessel, or immersible equipment poses if no additional risk reduction management measures are implemented.

This allows Woodside (and its contractors) to apply management options that are commensurate to the identified level of risk.

In context of the activities specified in Section 3, the IMS risk assessment process does not apply to:

- vessels or immersible equipment that do not plan to enter the IMS Management Area (IMSMA)[153] or PAAs defined in environmental approvals
- 'new build' vessels launched less than 14 days prior to mobilisation
- vessels or immersible equipment that have been inspected by a suitably qualified IMS inspector who has classified the vessels or immersible equipment as acceptably low risk no more than 14 days prior to mobilisation
- locally sourced vessels or immersible equipment from within the Pilbara locally sourced zone[154]. Vessels and immersible equipment are defined as locally sourced when the same supply facilities/port have been used since their last IMS inspection, full hull clean in dry dock or application of antifouling coating (AFC[155]).

7.2.4.2 Risk Assessment Process

Woodside's IMS risk assessment process was developed with regard to the national biofouling management guidelines for the petroleum production and exploration industry and guidelines for the control and management of a ships' biofouling to minimise the transfer of invasive aquatic species (IMO Guidelines, 2011).

In order to effectively evaluate the potential for vessels and immersible equipment to introduce IMS, a risk assessment process has been developed to score and evaluate the risk posed by each Project vessel, or immersible equipment planning to undertake activities within the IMSMA/PAA. The risk assessment process considers a range of factors, as listed in Table 7-1 and Table 7-2.

The IMS risk assessments will be undertaken by a trained environment adviser who has completed relevant Woodside IMS training or by a qualified and experienced IMS inspector. A QA/QC process is implemented for all Woodside conducted IMS risk assessments where a secondary trained environment adviser verifies the assessment to minimise the risk of misapplication and errors within the risk assessment process.

Table 7-1: Key factors considered as a part of the risk assessment process for vessels

Factors	Details
Vessel type	The risk of IMS infection varies depending on the type of vessel undertaking the activity. A higher risk rating is applied for more complex, slow-moving vessels (e.g., dredges) in comparison to simple vessels (e.g., crew transfer vessel).

[153] MSMA is based on current legal framework and includes all nearshore waters around Australia, extending from the lowest astronomical tide (LAT) mark to 12 nm from land (including Australian territorial islands). The IMSMA also includes all waters within 12 nm from the 50-metre depth contour outside of the 12 nm boundary (i.e. Submerged reefs and atolls).

[154] The Pilbara Zone includes Port, nearshore and offshore movements between Exmouth and Port Hedland (excluding high environmental value areas, World Heritage Areas, Commonwealth Marine Reserve Sanctuary Zones and State Marine Management Areas and Marine Parks).

[155] Vessels and immersible equipment can still be classified as locally sourced even if the AFC application occurred in a different port provided the amount of time between AFC application and departure to the locally sourced area (i.e. period of time in waters <12 nm/50 m water depth) did not exceed a consecutive seven days or the period of time the vessel or immersible equipment has spent within the locally sourced zone exceeds one year (i.e., the risk of introducing a species from a different location has already passed).

Factors	Details
Recent IMS inspection and cleaning history, including for internal niches	In the case of biofouling on external hull niches, different risk ratings are applied dependant on whether out-of-water or in-water IMS inspections by qualified IMS inspectors and cleaning (if required) have been undertaken prior to contract commencement. If an IMS inspection (and clean if required) has not been undertaken in the past six months (from the time of contract commencement), the highest risk factor is applied. The risk factor then lessens for vessels as the time between inspection and mobilisation reduces.
Out-of-water period before mobilisation	A risk reduction factor can be applied for vessels that are hauled out and then mobilised as deck cargo or by road during mobilisation, therefore becoming air dried over an extended period. Risk reduction factor increases with exposure time out of water.
Age and suitability of AFC at mobilisation date	AFC manufacturers provide a range of coatings, each designed to avoid premature coating failure if it is correctly applied and matched to the vessel's normal speeds and activity profile (i.e., proportion of time spent stationary or below three knots), and its main operational region (i.e., tropical, sub-tropical temperate). If the AFC type is deemed to be unknown, unsuited or absent, the highest risk value is applied. If the AFC type is suitable the risk factor applied reduces with age since application.
Internal treatment systems	A risk reduction factor applied if the vessel has an internal biological fouling control system in place at the time of assessment, or evidence of manual dosing.
Vessel origin and proposed area of operation	Differing risk ratings are assigned in relation to the climatic relationship between the vessel's origin and the proposed climatic region of the proposed area of operation. Highest risk rating is applied to similar climatic regions.
Number of stationary/slow speed periods >7 days	A risk factor is calculated based on the number of 7-day periods that the vessel has operated at stationary or at low speed (less than three knots) in port or coastal waters which is any waters less than 50 metres deep outside 12 nautical miles from land or any waters within 12 nautical miles of land. The greater the number of periods the higher the risk factor applied.
Region of stationary or slow periods	A further multiplier is applied depending on the location of the stationary/slow speed periods. The highest risk rating applied if the stationary or slow speed periods occurred within ports or coastal waters of the same climatic region,
Type of activity – contact with seafloor	The potential for the introduction of IMS varies on the planned vessel activity taking place. Those activities that come in contact with sediments and thus have the potential to accumulate and harbour IMS in areas such as hoppers (dredges) and spud cans (drilling rigs) are considered to have a greater risk of infection.

Table 7-2: Key factors considered as a part of the risk assessment process for immersible equipment

Factors	Details
Region of deployment since last thorough clean, particularly coastal locations	Climatic region of use since last overhaul, thorough cleaning or prolonged period out of water (>28 day). Highest risk rating is applied to similar climatic regions. Activities occurring in nearshore areas (less than 50 meters deep and/or within 12 nautical miles from land) are given the highest risk rating.
Duration of deployments	Maximum duration of deployment (maximum time in water) since last overhaul or thorough cleaning. The longer the period of immersion the higher the risk rating applied.
Duration of time out of water since last deployment	A further risk reduction factor can be applied for immersible equipment that has been out of the water for an extended period.
Transport conditions during mobilisation	If the equipment is stored in damp conditions, then a high risk factor is applied, while if equipment is stored in dry and well ventilated (low humidity) conditions, then a low risk factor is applied.
Post-retrieval maintenance regime	A risk reduction factor is applied if the equipment/item of interest is routinely washed, cleaned, checked and/or dissembled between project sites. While a higher risk rating is applied where no routine cleaning occurs.

Following implementation of the risk assessment process, vessels and/or immersible equipment are classified as one of three risk categories, as defined below:

- 'Low'– Low risk of introducing IMS of concern and hence no additional management required, or management options have been applied to reduce the risk.
- 'Uncertain'– Risk of introducing IMS is not apparent and as such the precautionary approach is adopted, and additional management options may be required.
- 'High'– High risk of introducing IMS means additional management options are required prior to this vessel mobilising to the PAA.

Following the allocation of a 'low' risk rating for a vessel or immersible equipment, the information provided by the vessel operator for the purposes of risk assessment must be confirmed prior to mobilisation. For vessels or equipment classified as posing an 'uncertain' or 'high' theoretical risk, a range of management options are presented to reduce this theoretical risk to acceptable levels and achieve a low risk status. These management options have been developed with the intention of reducing IMS risk to levels that are as low as reasonably practicable (i.e., ALARP). It is a flexible approach that allows for a range of management actions to be tailored for a specific vessel movement. These will be assessed on a case-by-case basis and may include, but are not limited to, the following:

- Inspection (desktop, in-water or dry dock) by a suitably qualified and experienced IMS inspector to verify risk status. Where practicable, the inspection shall occur within seven days (but not more than 14 days) prior to final departure to the PAA.
- In-water or dry dock cleaning of the hull and other niche areas. This is typically applied where the risk assessment outcome is High, driven by the age of the AFC on the vessel and its time spent in similar climatic region ports.
- Treatment of vessels internal seawater systems. This is typically applied in isolation for vessels with AFC applied to their hull within the last 12 months and where subsequent assessment through the process achieves a low risk rating.
- Limiting the duration that the vessel spends within the IMSMA to a maximum of 48 hours (cumulative entries). This is applicable for Uncertain risk vessels only.
- The vessel is rejected.
- Project vessels and immersible equipment are required to be a low risk of introducing IMS prior to entering the PAA.

7.2.5 Risk Management

Risk management processes and practices are applied on an ongoing basis to design, production and maintenance activities at the Pluto facility to manage risks to personnel, assets and the environment.

Potential environmental consequences and impacts from the Pluto facility are risk assessed and controlled in accordance with the Woodside risk management processes described in Section 2 of this EP (Environmental Risk Management Methodology).

The results of the Pluto facility ENVID are described in Section 6 and in the facility Environmental Impacts and Risk Register. This register, in conjunction with the EP, provides a demonstration that environmental risks have been identified, and that appropriate controls are in place to manage those risks to a level that is acceptable and ALARP throughout the life of the facility.

A number of other risk management tools and techniques are used by the Pluto facility to manage environmental and other risks on a routine basis during operational, maintenance and inspection tasks. Examples include:

- the processes outlined in Section 2.2
- risk management tools, including ISSoW tools, such as Hazard Identification and Risk Assessments, Level 2 Risk Assessments, Operational Risk Assessments, the technical Management of Change (MoC) system (Section 7.3.2), and Step back 5 × 5.
- integrity review studies, HAZIDs and Hazard Operability studies.

These tools, risk and integrity management practices are described further in the Pluto Facility Safety Case, WOMP, and the Control of Operational Risk Procedure.

In addition, other risk sub-processes and practices are also applied within Woodside on an ongoing basis to manage different types of risk. A summary of those relevant to the PAP is provided below. Woodside's risk management processes (refer to Section 2.2.1), along with the supporting risk sub-processes and practices discussed in the following sections, so that the environmental impacts and risks of the activity continue to be identified and reduced to a level that is ALARP.

7.2.6 Management of Risks – Contracting and Procurement

Suppliers and contractors play a significant role in meeting the resource needs of Woodside's operations, including the facility operations. Effective management of environmental risks in contracts is achieved by setting clear expectations and managing environmental risks throughout the duration of the contract. Environmental risks in contracts are managed under the Contracting and Procurement Procedure supported by the Health, Safety and Environment in Contracting Guideline. The guideline provides a risk-based approach to contractor selection and management and is aligned with 'HSE Management – Guidelines for Working Together in a Contract Environment' (International Association of Oil and Gas Producers, Report No. 423).

The Engineering Standard: Quality Requirements for Supply of Products and Services defines specific quality requirements for engineering contracts and purchase orders. The specified quality control requirements in the Standard are required to be complied with as applicable to the scope of supply.

7.2.7 Management of Risks – Subsea Activities

Subsea activities are managed in line with the Subsea and Pipelines Integrity Management Procedure which defines the practices and technical requirements that must be applied to deliver and safeguard integrity of the subsea equipment and pipelines during the facility lifecycle. It provides the relationship between the PSM Framework (including management of change) and Subsea and Pipelines Group services processes.

IMMR activities are managed under the Manage IMMR Work Procedure. Risk assessments are conducted as required under this procedure.

These requirements are supported by implementation of the Subsea Construction and Inspection, Maintenance and Repair Environment Screening Questionnaire tool. The screening questionnaire is used to understand the scope of the activity, potential environmental impact and if additional regulatory approvals are required. To achieve this, the questionnaire captures key project information such as seabed disturbance, chemical use and waste. This information is used by an environment focal point to determine if further assessment is required. For projects that have the potential for environmental impact, an assessment is undertaken against this EP and other Woodside environmental requirements. If determined by the Subsea and Pipeline Environment Screening Questionnaire process, an EP MoC review (as per Section 7.3.2) is undertaken to confirm if the level of environmental risk warrants revision and resubmission of an EP.

Key environmental requirements and regulatory commitments are communicated to project teams and incorporated into key project documentation where applicable and required (i.e. not addressed via existing Woodside practices).

7.2.8 Management of Risks – Major Projects

Major projects are required to follow the Appraise and Develop Management Procedure and the Investment Management Framework. This procedure defines the requirements to deliver a commercially valuable production facility or modify to an existing facility. The process workflow requires integration of work from various functions utilising their people and processes, including Environment, for example HSE philosophy and regulatory approval requirements.

These requirements are supported by implementation of the Brownfields Environment Screening Questionnaire tool. The screening tool is used to determine if a project has the potential for environmental impact or requires additional regulatory approvals. For projects that have the potential for environmental impact, an environmental focal point is assigned and the risks and impacts assessed against the facility EP and other Woodside environmental requirements.

Key environmental requirements and regulatory commitments are communicated to project teams and incorporated into key project documentation where applicable and required (i.e. not addressed via existing Woodside practices). Where it is identified that the project scope has the potential to result in modification or change to the facility description provided in the EP, or where potential new environmental risks or impacts or increases in an existing environmental risk or impact are identified, an EP MoC review (as per Section 7.3.2) is undertaken to confirm if the level of environmental risk warrants revision and resubmission of an EP.

7.2.9 Management of Risks – Well Integrity

Wells are managed throughout their lifecycle in line with the Well Lifecycle Management Procedure. This procedure provides the basis for ensuring well integrity in accordance with the Process Safety Management Procedure.

In addition, wells are required to have a regulator accepted WOMP to demonstrate that well integrity risks are managed to ALARP levels. Wells tied back to the facility are managed under a WOMP.

7.2.10 Management of Risks – Marine Services

Woodside's Marine Services Function provides a platform for the conduct of safe and efficient Marine Operations across Woodside through the Marine Services Management. A set of procedures that support vessel assurance and management (including HSE and quality [HSEQ] management) are in place to ensure marine operations are conducted in a safe and efficient manner, and in accordance with regulatory requirements.

Vessel masters are required to request clearance from the facility OIM or delegate prior to entering the 500 m PSZ.

7.2.11 Management of Risks – Emissions and Energy Management

Emissions generation and energy use is managed in line with the GHG Emissions and Energy Management Procedure which defines the minimum mandatory requirements to manage and deliver continuous improvement in energy efficiency and reduction in GHG emissions. The procedure supports the implementation of the Climate Policy and aligns with the requirements of Woodside's Environmental Performance Procedure, applicable to assets in Operate phase. It supports the "operate out" component of limiting net emissions, as shown in the Woodside Climate Policy.

Implementation of the GHG Emissions and Energy Management Procedure assists in meeting external expectations, such as Woodside's net equity Scope 1 and 2 greenhouse gas emissions reduction targets of 15% by 2025 and 30% by 2030, and our aspiration for net zero equity Scope 1

and 2 greenhouse gas emissions by 2050 or sooner[156]. These targets apply across Woodside's portfolio and progress against targets are reported in annual corporate disclosures. No specific reduction targets are set for individual assets as part of the corporate target. Meeting these corporate reduction targets may mean additional net voluntary abatement beyond that required by the SGM.

The GHG Emissions and Energy Management Procedure also maintains consistency with the principles of current corporate initiatives, such as the Zero Routine Flaring Initiative for oil assets, the OGMP 2.0, OGCI Near-Zero, and Methane Guiding Principles. These initiatives aim to improve methane emissions inventorisation, methane materiality assessments, evaluation, reduction implementation and increased transparency through reporting. The Woodside Flare Framework is a WMS tool that seeks to improve awareness of flaring-related issues and influence for reduced flaring.

The GHG Emissions and Energy Management Procedure links to the annual review of opportunities to improve energy performance through identification and evaluation as described in the Production Optimisation and Opportunity Management Procedure. It also requires measurement, analysis and communication of energy performance across the Operations Division and consideration of actual or potential impacts to energy efficiency in Woodside decision making, such as management of change, operational decisions, issue resolution options analysis and facility optimisation plans.

The Environmental Performance Procedure requires that assets measure, monitor or estimate direct air and GHG emissions, and that such emissions and energy intensities are minimised to ALARP in design. The requirement to set, measure and track flare and emissions targets for assets, help to manage the emissions to meet the EPS requirements in Section 6.7.10.

7.2.11.1 Production Optimisation and Opportunity Management

Woodside's Production and Opportunity Management Procedure (POOMP) outlines the process for identification, prioritisation and management of production opportunities that maximise production revenue or reduce emissions intensity across Woodside operated assets. Opportunities are identified throughout the year in various meetings, forums and teams. In addition, formal opportunity identification takes place through annual workshops, which complement the identification of improvement opportunities. These opportunities are prioritised and managed according to the workflow shown in Figure 7-4.

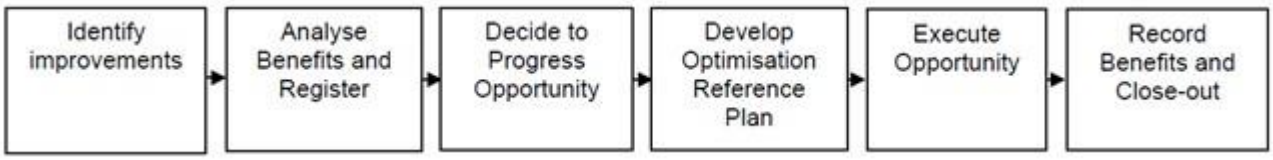

Figure 7-4: Opportunity management workflow

Production opportunities are evaluated and progressed, based on value and confidence of return, within the constraints of technical feasibility, cost and other factors. Implemented opportunities are validated and recorded before close out.

7.2.11.2 Flare and Emissions Target Setting

In demonstrating the risks and impacts relating to flaring have been reduced to ALARP, flare and emissions targets for the Pluto facility are set annually. Targets are estimated based on operating

[156] Targets and aspiration are for net equity Scope 1 and 2 greenhouse gas emissions relative to a starting base of 6.32 Mt CO2 -e which is representative of the gross annual average equity Scope 1 and 2 greenhouse gas emissions over 2016-2020 and which may be adjusted (up or down) for potential equity changes in producing or sanctioned assets with a final investment decision prior to 2021. Net equity emissions include the utilisation of carbon credits as offsets.

experience and forecast activities; e.g., shutdowns. Consideration is also given to the flaring estimates contained within this EP.

The flare target is tracked against flare performance through the year. Where achieving a flare target is in question, an internal flare target deviation is developed, which requires an ALARP justification. A flare target deviation considers the EP flare estimate. If the estimate is likely to be exceeded, an EP MoC assessment (see Section 7.3.2) is undertaken to determine if a revision and resubmission is required.

Annual emissions targets (expressed as tCO2e) are set for the integrated Pluto facility concurrent with annual forecasting practices. Key streams are tracked as provisional values in monthly governance reporting, and are supported by operational energy efficiency monitoring tools such as multi-variate turbine power efficiency curves. Fuel and other emissions intensity values can vary diurnally, and seasonally (associated with ambient environmental operating conditions) and are also highly dependent on facility activity integrated plans, reservoir outcomes, availability, utilisation and reliability across the system. As such, monthly emissions tracking is reviewed in this context to support identification of potential excursions and opportunities.

Values are finalised for financial-year annual regulatory reporting (such as NGERS and NPI submissions), and calendar year tracking.

7.2.11.3 Methane Management

Woodside's methane management strategy aligns with the principles of OGMP 2.0 and OGCI's Aiming for Zero Methane Emissions Initiative, in order to:

- Deliver appropriate and proportional identification and reduction efforts of methane based on facility nature and scale;
- Align with recommended reporting framework levels and timelines; and
- Assess the suitability of best practice proven techniques, technologies, and operational practices (OGMP 2.0).

The methane management strategy is implemented via execution of asset specific Methane Action Plans.

7.2.12 Management of Risks – Indirect Greenhouse Gas Emissions Management

As stated in the Climate Policy, Woodside's objective is to thrive in this energy transition as a low cost, lower carbon energy provider. To support this policy Woodside undertakes the following measures:

- Set science-based[157] near, mid, and long-term net emissions reduction targets that are consistent with Paris-aligned[158] scenarios, covering equity Scope 1 and 2 emissions, both operated and non-operated.[159]

[157] Woodside is using the draft Prototype IFRS Sustainability Disclosure Standard definition of "science-based" (published 2021) which states "targets are considered 'science-based' if they are in line with what the most recent climate science sets out is necessary to meet the goals of the Paris Agreement – limiting global warming to below 2 degrees Celsius above pre-industrial levels and pursuing efforts to limit warming to 1.5 degrees Celsius." See https://www.ifrs.org/content/dam/ifrs/groups/trwg/trwg-climate-related-disclosures-prototype.pdf.

[158] Woodside is using the draft Prototype IFRS Sustainability Disclosure Standard definition of "Paris-aligned scenarios" (published 2021) which states "scenarios consistent with limiting global warming to below 2 degrees Celsius above pre-industrial levels and pursuing efforts to limit warming to 1.5 degrees Celsius." See https://www.ifrs.org/content/dam/ifrs/groups/trwg/trwg-climate-related-disclosures-prototype.pdf.

[159] Equity emissions means the share of the total emissions arising from an activity that are attributable to Woodside in proportion to Woodside's ownership interest in the activity, irrespective of whether Woodside operates the activity. Operated emissions are the total emissions arising from an activity that Woodside operates, irrespective of Woodside's ownership interest.

- Develop and operate oil and gas projects in a manner that is consistent with these targets. This includes the deployment of lower-emission technologies (Design Out), supporting efficient operations (Operate Out) and use of robust offsets (Offset) as methods to reduce and offset greenhouse gas emissions.
- Invest in new energy products and lower carbon services to reduce customers' emissions (part of Woodside's Scope 3 emissions), including but not limited to hydrogen, ammonia and carbon capture, utilisation and storage.
- Publish transparent climate-related disclosures aligned to the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD) or other recognised global reporting standards.
- Align our advocacy to the principles of this Climate Policy.

Woodside's Scope 3 targets includes the introduction of new products and services into our portfolio, like hydrogen, ammonia, and carbon capture, utilisation and storage (CCUS). These products and services can help our customers avoid or reduce their Scope 1 or 2 emissions and therefore reduce the life cycle (Scopes 1, 2 and 3) emissions intensity of Woodside's portfolio.

Woodside's initial Scope 3 target was an investment target, to invest $5 billion in new energy products and lower carbon services by 2030[160][161]. In 2023, Woodside reviewed our approach to Scope 3 targets in response to investor feedback and supplemented the existing investment target with a new complementary emissions abatement target, to take final investment decisions on new energy products and lower carbon services by 2030, with total abatement capacity of 5 Mtpa CO2-e[162].

The investment target tracks Woodside's work at a corporate level to develop these projects and bring them to market. The emissions abatement target will track the potential impact of these projects on customer emissions. The customers for these products and services may be the same as the customers of our oil and gas business, directly substituting their energy for new products or directly abating the associated emissions. They may also be customers of the new products and services, without also being customers of oil and gas. Progress against these targets is reported annually in Woodsides annual disclosures. Targets are not set for individual projects, including Pluto, but are assessed corporately.

7.2.12.1 Annual Review

An annual review of the implementation and outcomes associated with Woodside working with the natural gas value chain to reduce emissions in third party systems via corporate activities will be undertaken. Additionally, progress against corporate Scope 3 investment and abatement targets will be reported annually in relevant Woodside annual disclosures. If they are deemed to be effective at a Corporate implementation level, then it will also be deemed that specific impacts and risks at an

[160] Scope 3 targets are subject to commercial arrangements, commercial feasibility, regulatory and Joint Venture approvals, and third party activities (which may or may not proceed). Individual investment decisions are subject to Woodside's investment targets. Not guidance. Potentially includes both organic and inorganic investment. Timing refers to financial investment decision, not start-up/operations.

[161] Includes pre-RFSU spend on new energy products and lower carbon services that can help our customers decarbonise by using these products and services. It is not used to fund reductions of Woodside's net equity Scope 1 and 2 emissions which are managed separately through asset decarbonisation plans.

[162] Includes binding and non-binding opportunities in the portfolio, subject to commercial arrangements, commercial feasibility, regulatory and Joint Venture approvals, and third party activities (which may or may not proceed). Individual investment decisions are subject to Woodside's investment targets. Not guidance.

Asset contribution level (i.e., proportion attributable to Pluto production) is also being managed appropriately.

If the annual review deems the controls are not effective, an EP management of change assessment (see Section 7.3.2) is undertaken to determine if a revision and resubmission is required.

7.2.13 Management of Human Factor Related Risks

The term 'human factors' is used to describe the consideration of people as part of complex systems. Woodside defines 'human factors' as follows: 'human factors uses what we know about people, organisation and work design to influence performance'.

As outlined in Section 6.8.8, human factors can contribute to MEEs, or result in failure or degradation of the controls in place to protect against MEEs. The WMS includes a number of procedures designed to manage human factors related risks and prevent incident causation.

7.3 Change Management

Woodside's Change Management Procedure describes Woodside's requirements for change management at Woodside owned or controlled operations/sites.

Change management is used where there is no existing approved business baseline, such as a process, procedure or accepted practice, or where conformance with an approved baseline is not possible or intended; for example, due to equipment fault or failure or a recently discovered issue which will take time to rectify. Change management is also used when the baseline is changed (e.g., the process is modified). It applies to management of temporary, permanent, planned or unplanned change encompassing one or more of:

- plant (equipment, plant, technology, facilities, operations or materials)
- projects (budget, schedule)
- people (organisation structure, performance, roles)
- process (WMS content, processes, procedures, standards, legislation, information).

Woodside's change management process hierarchy is depicted in Figure 7-5. The hierarchy has been developed with sub-processes to address the different types of change performed at Woodside.

Figure 7-5: Change management hierarchy

To help manage the day-to-day operation of the facility, Woodside has developed a Golden Safety Rules Booklet, which provides a summary of mandatory requirements for safety in the workplace and includes guidance for managing changes that have a Health, Safety, Integrity and/or Environment impact.

7.3.1 Technical Change Management

Technical changes within the Operations Division are managed using the MoC – Assets Procedure. The objective of the procedure is to ensure HSE risks associated with both realised and potential changes, including any failure to meet the facility SCE Technical Performance Standards, are

identified, assessed and reduced to ALARP (Section 7.4 provides further information on management of SCE Technical Performance Standards).

Assessed changes must be recommended, agreed and decided upon based on the assessed current level of risk, as defined by Woodside's Technical Decision Authority matrices.

The MoC requirements contained in the PSM Procedure and Management System Performance Standard M05 MoC are considered when conducting any changes with the potential to impact process safety.

The Engineering Management Procedure specifies key requirements of engineering related changes, and requires that engineering Technical Decisions are agreed, recommended and decided at the appropriate engineering authority level according to the risk. Change management and risk assessment include consideration of applicable legislation/Regulation.

Change is also managed under management system requirements set out as part of major projects (brownfields), wells integrity, subsea and pipelines integrity management and marine management system. Change management includes consideration of regulatory requirements, managed in accordance with the Regulatory Compliance Management Procedure.

In addition, the MoC MSPS (M05) is in place to assure process safety risks arising from change (temporary and permanent) are systematically identified, assessed and managed.

7.3.2 Environment Plan Management of Change and Revision

Management of changes are managed in accordance with Woodside's Environmental Approval Requirements Australia Commonwealth Guideline. Management of changes relevant to this EP, concerning the scope of the activity description (Section 2.10), including: review of advances in technology at stages where new equipment may be selected such as vessel contracting; changes in understanding of the environment, DCCEEW EPBC Act listed threatened and migratory species status, Part 13 statutory instruments (recovery plans, threat abatement plans, conservation advice, wildlife conservation plans) and current requirements for AMPs (Section 4.8); and potential new advice from external stakeholders (Section 5), will be managed in accordance with Regulations 38 and 39 of the Environment Regulations.

Risk will be assessed in accordance with the environmental risk management methodology (Section 2.8) to determine the significance of any potential new environmental impacts or risks not provided for in this EP. Risk assessment outcomes are reviewed in compliance with Regulations 38 and 39 of the Environment Regulations.

Minor changes where a review of the activity and the environmental risks and impacts of the activity do not trigger a requirement for a formal revision under Regulations 38 or 39 of the Environment Regulations, will be considered a 'minor revision'. Minor administrative changes to this EP, where an assessment of the environmental risks and impacts is not required (e.g., document references, phone numbers), will also be considered a 'minor revision'. Minor revisions as defined above will be made to this EP using Woodside's document control process. Minor revisions will be tracked in an MOC Register to ensure visibility of cumulative risk changes, as well as enable internal EP updates/reissuing as required. This document will be made available to NOPSEMA during regulator environment inspections.

7.3.3 Oil Pollution Emergency Plan Management of Change

Relevant documents from the OPEP will be reviewed in the circumstances of:

- implementation of improved preparedness measures
- a change in the availability of equipment stockpiles
- a change in the availability of personnel that reduces or improves preparedness and the capacity to respond

- the introduction of a new or improved technology that may be considered in a response for this activity
- to incorporate, where relevant, lessons learned from exercises or events
- if national or state response frameworks and Woodside's integration with these frameworks changes.

Where changes are required to the OPEP, based on the outcomes of the reviews described above, they will be assessed against Regulations 38 and 39 to determine if EP, including OPEP, resubmission is required (see Section 7.3.2). Matters arising with potential to influence minor or technical changes to the OPEP are tracked in MoC records, project records and incorporated during internal updates of the OPEP or revisions to the EP.

7.4 Management of Safety and Critical Element Technical Performance Standards and Management System Performance Standards

7.4.1 Management System Performance Standards

Woodside ensures safety critical management processes function as required through the application of Management System Performance Standards (MSPS). These standards are developed and owned at non-facility-specific level (i.e., pan-Woodside) and include assurance checks for the key requirements of the applicable management system.

Individual facilities demonstrate conformance against the MSPS through the conduct of reviews. Non-conformances against an MSPS are internally managed in accordance with the WMS.

7.4.2 Safety and Environmental Critical Element Technical Performance Standards

An SCE is defined by Woodside as a hardware barrier, the failure of which could cause or contribute substantially to, and the purpose of which is to prevent or limit the effect of a MAE/MEE, or Process Safety Event.

Woodside identifies/develops, implements, monitors/assures, responds and verifies/optimises SCEs by applying SCE technical Performance Standards as described in the Safety and Environment Critical Element (SCE) Management Procedure and the Management of Hardware Controls in the Operate Phase Procedure. Response to an SCE failure is managed by the Control of Operational Risk Procedure. Key elements of the procedure are summarised in Table 7-3.

Table 7-3: Summary of Safety and Environment Critical Element Management Procedures

Identify/Develop	***Safety and Environment Critical Element Management Procedure*** **Identify SCE** – SCEs must be identified from the facilities PSRAs (e.g. Formal Safety Assessments) (**Section 2.2**). The identification of SCEs for which Performance Standards are required are part of the formal safety and environmental risk assessment processes. Woodside's Global Performance Standards (based on industry and Woodside Standards) should be used for preliminary selection of SCEs. **Complete Engineering Design Studies** – Engineering design studies must be completed to demonstrate that SCE Performance Criteria specified in the global Performance Standard and/or determined by PSRA will be met by the facility design, allowing for normal SCE degradation in operation. The studies must establish the testing and inspection tasks required to assess performance against the criteria. The scope and frequency of SCE Assurance Tasks are guided by the Global Performance Standard and may require designated Engineering Design Studies. Studies should include Reliability Centred Maintenance, Risk Based Inspection and Safety Instrumented Function studies to determine the Assurance Task scope and frequencies, RBI plans, and classification and implementation requirements for instrumented safeguarding. **Develop Performance Standards** – Facilities must develop Performance Standards for all SCEs by: • selecting the applicable Global Performance Standard (including Assurance Tasks) • considering facility specific requirements and applicable regulatory requirements • adding the specific data from the facility Engineering Design Studies and PSRA to compile scope and frequency of SCE assurance activities.

Implement	***Management of Hardware Controls in the Operate Phase Procedure*** **Identify SCE in Asset Register** – SCEs must be uniquely identified on the asset register and assigned Performance Standard flags. **Develop Testing, Inspection and Maintenance Programs** – SCE assurance tasks are developed into maintenance procedures. **Implement Testing, Inspection and Maintenance Programs** – SCE testing, inspection and maintenance requirements must be implemented in the CMMS (**Section 7.2.1.2**).
Maintain/Assure	***Management of Hardware Controls in the Operate Phase Procedure*** **Execute Testing, Inspection and Maintenance Programs** – On completion of SCE assurance tasks, results must be recorded with all relevant detail, assessed for conformance with the Performance Criteria and any follow-on correction work identified. **Conduct Fitness for Service (FFS) Assessment** – In some instances, an engineering FFS assessment may be required to determine whether equipment has failed its performance standard requirements; e.g., assessment of corrosion defects following inspection of piping. Detailed results of FFS assessment may be recorded out of CMMS. **Manage and Analyse Results** – The results from assurance tasks must be accurately recorded to support data analysis. Analysis will enable appropriate action to be taken to minimise future failure recurrences, and enable assessment of overall system performance and reliability to verify SCE effectiveness.
Respond	***Control of Operational Risk Procedure*** **Respond to SCE Failure** – SCE failure (technical Performance Standard non-conformance) is a failure to achieve the given Performance Criteria. SCE failures must be managed in accordance with a structured review process. This process may require the application of the facility MOPO which provides prescriptive guidelines to be followed in the event of a reduction in the performance of an SCE, or managed in accordance with the Management of Change – Assets Procedure (Section 7.3.1). **Management of Hardware Controls in the Operate Phase Procedure** **Report Internally** – SCE failure/damage and SCE demands must be reported in accordance with the Health Safety and Environment Event Reporting and Investigation Procedure (Section 7.13.4). **Report Externally** – External notification obligations for SCE failure/damage must be understood (i.e., based on local regulatory requirements). External communications must be in accordance with the health safety and environment event reporting and investigation procedure (Section 7.13.5).
Verify/Optimise	***Management of Hardware Controls in the Operate Phase Procedure*** **Review SCE Performance** – SCE performance reviews must be conducted to ensure requirements for maintaining SCE performance are being met. **Manage Change** – Any change to the Performance Standards must be conducted in accordance with the MoC Procedure (Section 7.3.1).

SCE Technical Performance Standards are a statement of the performance required of an SCE (e.g., functionality, availability, reliability, survivability), which is used as the basis for establishing agreed assurance tasks and managing the hazard. An assurance task is an activity to confirm that the SCE meets, or will meet, its SCE Performance Standard. Examples of assurance tasks include inspection routines, maintenance activities, test routines, instrumentation calibration and reliability monitoring.

These assurance tasks are identified in the CMMS, flagged against their associated technical Performance Standard, and given the appropriate priority. Management systems are in place to manage the completion of maintenance.

Events where the SCC/SCE have not met their specified performance criteria must be managed in accordance with a structured review process. This process may require the application of the facility Manual of Permitted Operation (MOPO) which provides prescriptive guidelines to be followed in the event of a reduction in the performance of an SCE in specific defined circumstances; or, if the MOPO does not cover the event, according to procedures for the assessment and management of operational risk.

Internal notification of SCC failures must be made in accordance with maintenance management workflows. Failures to meet a Facility Performance Standard occur where SCC events lead to the functional objectives (goal and/or key requirement statements) of the facility Performance Standard for the SCE not being met (i.e., lost or unavailable), taking into account any redundancy inherent

within the SCE. These ‘damage to SCE’ events are reported in the Event Reporting Database as potential SCE Failure to Meet Facility Performance Standard Events.

These are internally reported as Hazard Events. Where ‘Failure to meet a Facility Performance Standard’ leads to a loss of hydrocarbon containment, or a release of energy, it is internally reported (and externally where relevant) as a Loss of Primary Containment or Environmental Spill event, depending on the nature of the release.

Additionally, confirmed “Failure to meet a Facility Performance Standard’’ events for the SCEs identified in the MEE bowties may equate to a breach of EPOs and/or EPSs. The review to identify such events for external reporting considers whether the hazard event is relevant to environmental SCE functional objectives (goal and/or key requirements) of the SCE Facility Performance Standard and whether the event poses a risk to achieving EPOs and EPSs. The WMS Regulator Event Reporting Guideline provides additional information regarding external SCE related reporting obligations.

There may also be planned changes/deviations from SCE Technical Performance Standards, these are managed via procedures for the assessment and management of operational risk, and endorsed in accordance with the engineering management procedures (described further within Section 7.3. This management process ensures risks (including environment) are managed so that the planned change/deviation does not result in unacceptable impact or risk, remains ALARP and regulatory requirements are met.

An additional class of SCE exists to capture environment critical emissions monitoring and control equipment and is also managed under this process. The ‘P31 technical Performance Standard – Environmental Emissions Monitoring and Controls’ includes equipment required to comply with environmental legislation, Regulations, approval conditions or requirements which apply to the facility although not specifically required under the MEE bowtie analysis and SCE groupings.

The scope of P31 includes equipment such as that to maintain and monitor flare ignition, flow metering, and discharge quality of PW. P31 sets out key performance requirements for applicable equipment to meet regulatory requirements as appropriate to the reporting methods (e.g. NGERs Determination and NPI), and meet the functional intent of the system that the equipment supports (e.g. ensuring flare systems can be ignited, with monitoring in place to ensure the flare/pilots are lit). P31 also defines maintenance/assurance tasks for associated equipment (SCC), and is used to support change management, prioritisation and governance.

7.5 Woodside’s Decommissioning Framework

Decommissioning is a routine, planned activity for the offshore oil and gas industry. Current best practice for decommissioning includes:

- designing for decommissioning during the development phase of projects/facilities
- removing property, equipment and infrastructure, such as a facility or a pipeline, and plugging wells associated with a petroleum activities.
- assessing decommissioning options and opportunities during the operational life of the facility leading up to cessation of production
- selecting, developing and planning the selected decommissioning option
- executing decommissioning plans
- restoring the marine environment.

This assists with compliance with section 572 (3) of the OPGGS Act, which requires titleholders to remove property from the title area when it is neither used, nor to be used, in connection with the operations. Under section 572(7) of the OPGGS Act, the property removal requirements under section 572(3) of the OPGGS Act have effect subject to any other provision of the OPGGS Act, the

regulations, directions given by NOPSEMA or the responsible Commonwealth Minister under Chapter 3 or Chapter 6 of the OPGGS Act, and any other law. Under section 270(3) of the OPGGS Act, before title surrender, all property brought into the surrender area by any person engaged or concerned in the operations authorised by the permit, lease or licence must be removed or cause to be removed from the surrender area to the satisfaction of NOPSEMA, or arrangements that are satisfactory to NOPSEMA must be made in relation to the property. Sections 572(7) and 270(3) of the OPGGS Act provide scope for in-situ decommissioning and other arrangements to be made where it can be demonstrated that the risks and impacts are ALARP and acceptable as well as comply with all other Acts and legislation.

7.5.1 Decommissioning in Operations

Asset specific decommissioning plans are typically developed prior to cessation of production. Planning includes redundant infrastructure as well as structures coming to the end of production and decommissioning critical systems to enable removal. Appropriate maintenance plans are developed and implemented to ensure decommissioning critical systems meet the requirements to facilitate removal.

7.5.2 Facility Decommissioning Planning

Decommissioning planning generally commences two (2) to 10 years prior to Cessation of Production (CoP) (Figure 7-6). The timeframe selected for decommissioning planning depends on the complexity of the facility and infrastructure requiring decommissioning.

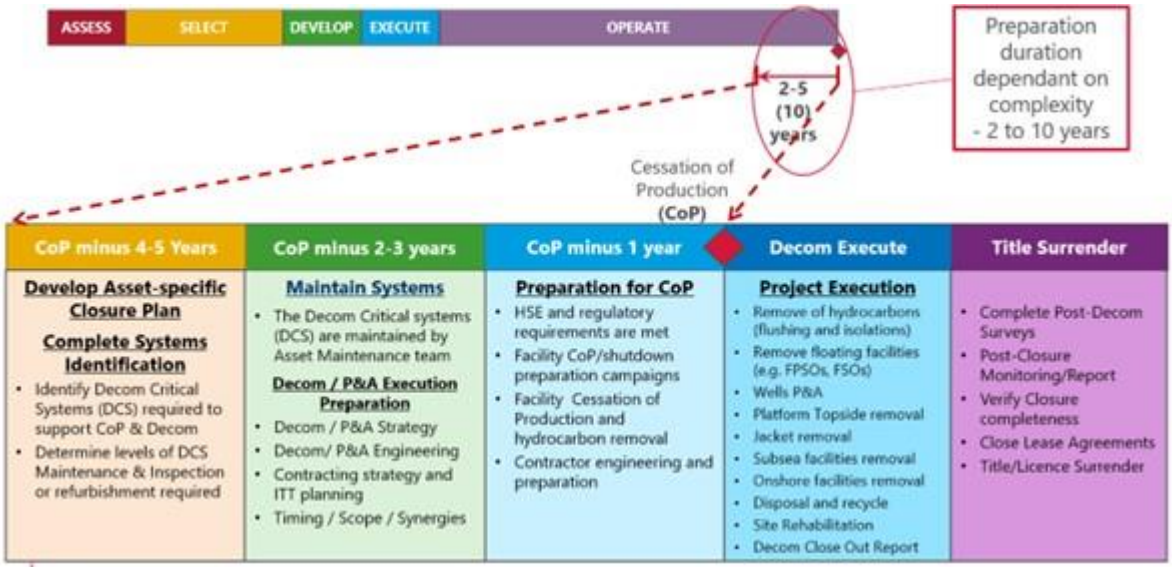

Figure 7-6: Woodside's process for decommissioning planning

7.5.3 Pluto Decommissioning Strategy

Decommissioning of Pluto offshore assets is being considered in a single stage, with all infrastructure anticipated to remain in service through to EoFL.

In line with Woodside's decommissioning planning process outlined above, an Asset Closure Management Plan has been prepared for the Pluto asset.

The plan for decommissioning consists of permanent plugging and abandonment (P&A) of wells, removal of trees, wellheads and other subsea equipment (e.g., xmas trees, manifolds, valve stations) by cleaning and flushing and removal from the title area. End state decisions and execution methodologies for other infrastructure including Pluto topsides, jackets and rigid pipelines will be finalised at EOFL.

The decommissioning strategy will be matured over the time through various studies and data gathering targeted to support that the final proposed Pluto decommissioning plan represents an ALARP position in respect of the environmental, safety and the socio-economic outcomes.

7.5.4 Pluto Decommissioning Phasing

Decommissioning of the Pluto facilities has been planned in two phases:

- Phase 1 – Plan for decommissioning/P&A of the Pluto offshore facilities
- Phase 2 – Execute decommissioning/P&A of the Pluto offshore facilities.

The expected CoP for the Pluto offshore facilities is around 2033.

Currently Woodside is commencing early studies at a portfolio level in support of the preparations for the future decommissioning activities to optimise the scope and strategy to deliver safe and effective decommissioning outcomes. These studies will assess removal options, timing of removal and synergies with other planned decommissioning activity. The decommissioning activities will be subject to separate EP(s).

The key envisaged activities related to the decommissioning are outlined in the indicative Pluto Decommissioning Planning Lifecycle Schedule shown in Figure 7-7. Timing is indicative, subject to reservoir performance outcomes through the remaining field life.

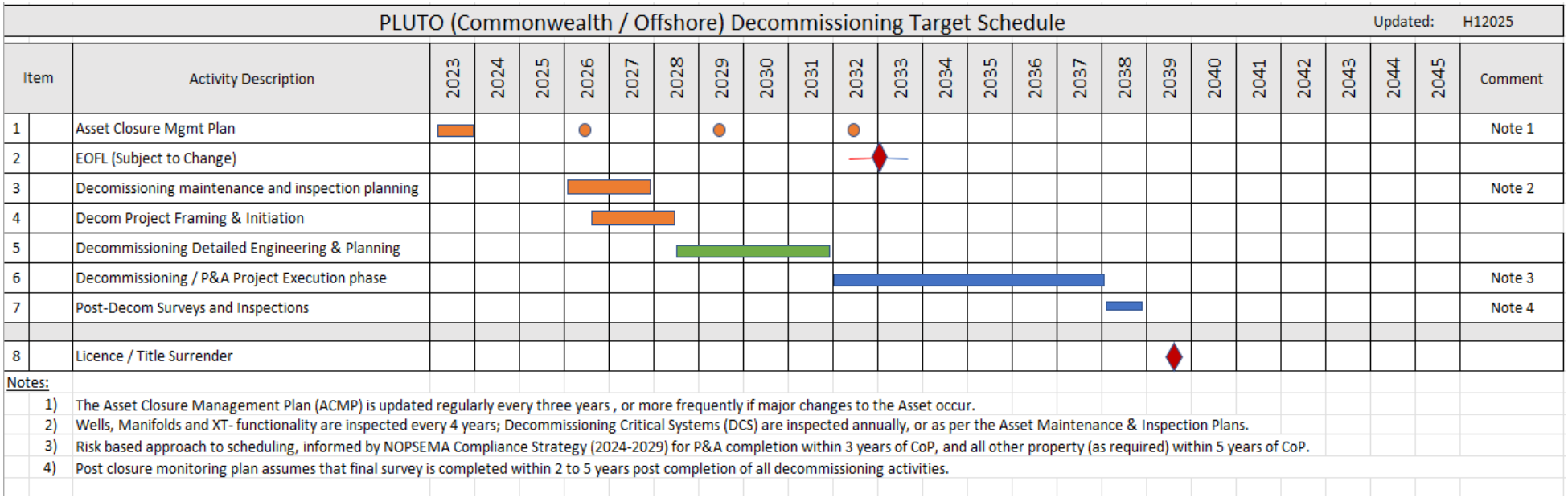

Figure 7-7: Indicative Pluto decommissioning planning lifecycle and schedule

7.5.4.1 Phase 1: Planning for Decommissioning – Key Activities

As outlined in Section 7.5.3, the asset has developed an asset-specific Closure Management Plan (CMP). The CMP is intended to be updated regularly to reflect changes to the asset infrastructure, or to address major changes in Regulator requirements.

As reflected in Figure 7-6, the following are planned to be completed during 2-10 years prior to CoP. Planning execution activities are expected to adopt a risk-based approach that is informed by NOPSEMA's Decommissioning Compliance Strategy 2024-2029 (NOPSEMA, 2023):

- Identify decommissioning critical systems (DCS), define DCS maintenance and inspection requirements and update the Asset Maintenance and Inspection Plans (if required).
- Progress Define/FEED Phase works for decommissioning/P&A of the Pluto offshore facilities.

Submit the EP(s) for the activities related to flushing of the subsea systems and for isolations/separation of the wells from the flushed subsea infrastructure.

Commence Pluto offshore asset CoP activities.

7.5.4.2 Phase 2: Execute Decommissioning and Plug and Abandonment – Key Activities

Post CoP: Decommissioning execution activities are intended to be executed in line with Phase 1 planning for decommissioning. This risk-based approach includes consideration of NOPSEMA's expectations to execute P&A of the wells targeting within three years from the CoP date, and decommissioning/removal of the PLA platform and the subsea equipment targeting within five years from the CoP date.

7.6 Organisation Structure

The following Woodside organisational structure provides leadership and direction for operation of the Pluto facility and environmental performance:

- The Executive Vice President (EVP) Australian Operations reports to the Chief Executive Officer.
- The Pluto and Scarborough Vice President (VP) reports to the EVP.
- The Asset Manager reports to the Pluto and Scarborough VP.
- The Reliability and Integrity Manager reports to the Pluto and Scarborough VP.
- The PLA Superintendent reports to the Asset Manager.
- The functional support teams report to the corresponding Functional VP.

Production facilities are supported by a team of environmental professionals who report to the Environment and Sustainability Manager – Australian Operations.

All facilities are supported by other Woodside functional teams, including:

- HSE – provides specific guidance and access to specialist HSE resources including assistance for governance and training, as well as guidance on Woodside HSE standards
- Subsea – responsible for the installation and IMMR activities on subsea infrastructure including facility structures, flowlines, manifolds and subsea isolation valves to ensure integrity
- Global Wells and Seismic – ensures the safe planning and execution of drilling, completion and work over operations

- Projects – responsible for the engineering, construction and execution of small projects on operational facilities to ensure ongoing integrity and safe operation
- Marine Group – responsible for chartering vessels to support Woodside's offshore production facilities including vessels to aid emergency response
- Aviation Group – provides personnel transport, material transport, emergency evacuation and search and rescue capabilities.

7.7 Roles and Responsibilities

Key roles and responsibilities for Woodside and contractor personnel in relation to implementing, managing and reviewing this EP are described in Table 7-4. Roles and responsibilities for hydrocarbon spill preparation and response are outlined in Table 7-4 and the Woodside Oil Pollution Emergency Arrangements (Australia).

It is the responsibility of all Woodside employees and contractors to apply the Woodside's Health and Safety Policy, and Environment and Biodiversity Policy in their areas of responsibility and that the personnel are suitably trained and competent in their respective roles.

Table 7-4: Roles and responsibilities

Title (Role)	Environmental Responsibilities
All Personnel	
All onshore and offshore personnel	Understand the Woodside standards and procedures that apply to their area of work. Understand the environmental risks and control measures that apply to their area of work. Carry out assigned activities in accordance with approved procedures and the EP. follow instructions from relevant supervisor with respect to environmental protection. Cease operations which are deemed to present an unacceptable risk to the environment. Participate in environmental assurance activities and inspections as required. Prompt reporting of environmental hazards/incidents to their supervisor and assist in event investigation. Attend HSE meetings, training and drills when required.
Office-based Personnel	
Woodside Project Manager	Monitor and manage the activity so it is undertaken as per the relevant standards and commitments in this EP. Notify the Woodside Environment Adviser of any scope changes in a timely manner. Liaise with regulatory authorities as required. Review this EP as necessary and manage change requests. Ensure all project and support vessel crew members complete an HSE induction. Verify that contractors meet environmental related contractual obligations. Confirm environmental incident reporting meets regulatory requirements (as outlined in this EP) and Woodside's Health, Safety and Environment Reporting and Investigation Procedure. Monitor and close out corrective actions identified during environmental monitoring or audits.
Woodside Head of Projects/Region (Global Wells and Seismic)	Ensure drilling operations are undertaken as per this EP and approval conditions. Provide sufficient resources to implement the drilling-related management measures (i.e. controls, EPOs, EPSs and MC) in this EP. Confirm controls and performance standards in this EP are actioned, as required, before drilling commences. Ensure the MODU start-up meets the requirements of the Drilling and Managing Rig Operations Process.

Title (Role)	Environmental Responsibilities
Subsea Delivery Lead	Ensure the subsea installation activities are undertaken as per this EP and approval conditions. Provide sufficient resources to implement the subsea installation-related management measures (i.e., controls, EPOs, PSs and MC) in this EP. Ensure installation vessel personnel are given an Environmental Induction as per Section 7.9.1 this EP at the start of the installation activities. Confirm controls and performance standards in this EP are actioned, as required, before installation activities commence. Ensure relevant vessels meet the requirements of Woodside's Marine Operations Operating Standard. Manage change requests for the activity and notify the Woodside Environment Adviser of any scope changes in a timely manner. Confirm that site-based personnel are given an Environmental Induction as per Section 7.9.1 of this EP at the start of the activity. Ensure all chemicals and drill fluids proposed to be discharged are assessed and approved as per the requirements of the EP.
Woodside Drilling Superintendent	Ensure the drilling program meets the requirements detailed in this EP. Ensure changes to the drilling program are communicated to the Woodside Environmental Adviser. Ensure the Woodside's Well Site Manager is provided with the resources required to ensure the management measures (i.e., controls, EPOs, EPs and MC) in this EP are undertaken. Confirm environmental incident reporting meets regulatory requirements (as outlined in this EP) and Woodside's Health, Safety and Environment Reporting and Investigation Procedure. Monitor and close out corrective actions identified during environmental monitoring or audits. Ensure MODU and project vessel personnel are given an Environmental Induction as per Section 7.9.1 of this EP at the start of the drilling programs.
Woodside Drilling Engineers	Ensure changes to the drilling program are communicated to the Woodside Environmental Adviser. Ensure all drill and completions fluid chemical components and other fluids that may be used downhole have been reviewed by the Drilling and Completions Environmental Adviser.
Woodside Projects/GWS Environmental Adviser	Verify relevant Environmental Approvals for the activities exist prior to commencing activity. Track compliance with performance outcomes and performance standards as per the requirements of this EP. Prepare environmental component of relevant Induction Package. Assist with the review, investigation and reporting of environmental incidents. Ensure environmental monitoring and inspections/audits are undertaken as per the requirements of this EP. Liaise with relevant regulatory authorities as required. Assist in preparing external regulatory reports required, in line with environmental approval requirements and Woodside incident reporting procedures. Monitor and close out corrective actions (Campaign Action Register (CAR)) identified during environmental monitoring or audits. Provide advice to relevant Woodside personnel and contractors to assist them to understand their environment responsibilities. Liaise with primary installation contractors to ensure communication and understanding of environment requirements as outlined in this EP and in line with Woodside's Compass values and management systems.

Title (Role)	Environmental Responsibilities
Asset Manager	Be accountable for ensuring all necessary regulatory approvals are in place to operate. Approve (decides on) the content to be contained in the Environment Plan. Be accountable for managing the asset throughout its operations in accordance with legislative/regulatory requirements (including this EP) and WMS requirements. Agree facility key performance indicators (KPIs), including environment KPIs, and be accountable for their achievement. Be responsible for continuous improvement of operations of the facility, including environmental performance. Decide on technical decisions where required based on assessed current level of risk. Be accountable for incident notification, reporting and investigation in line with regulatory requirements, the WMS and EP requirements
PLA Superintendent	Be responsible for the safe conduct of all activities within the facility 500 m PSZ and within the vicinity of the connected pipelines, through the facility team of coordinators, technicians and specialist resources. Be accountable for aspects of integrity management including the evaluation and reporting of conditions against performance standard, integrity envelope, reviewing post-incident/ legislative or joint venture requirements and planning and executing planned inspections. Be accountable for conformance to operations processes including ISSoW. Be accountable for compliance with all legislative and regulatory requirements including Safety Case and Environment Plan. Be accountable for ensuring all teams operate on the facility in a safe and reliable manner within the defined technical integrity envelope. Be responsible for making safe, repairing and raising technical deviations where necessary for abnormal situations. Be accountable and responsible for updating changes to production information in site-controlled documents. Be accountable for the performance and development of direct reports, ensuring operator and maintainer capability and competency across all shifts and ensuring the skill requirements are being met. Be accountable for effective handovers between shifts and swings. Be the decider for high risk MOC decisions associated with PLA and pipelines. Be custodian of and therefore responsible for ensuring the facility remains in compliance with PLA Safety Case and Environment Plan. Ensure offshore personnel comply with regulatory/legislative requirements (including the EP) and the WMS. Communicate changes relevant to the EP to the Production Environment team. Implement relevant offshore environment initiatives and review environmental performance to drive continuous improvement. Ensure effective communication with workforce on environmental performance. Ensure incidents are reported and investigated in line with WMS and EP requirements, with appropriate actions initiated and closed out.
Technical Support Lead	Champion technology and new ways of working to explore and implement new and efficient ways for managing performance and maintenance for equipment. Champion and embed risk thinking with Engineers and TICs so that effective and proportionate controls are implemented.

Title (Role)	Environmental Responsibilities
Reliability and Integrity Manager	Steward reliability and integrity for the business unit. Lead a team that expertly ensures strategies for equipment maintenance and operation are set to meet Reliability, Performance and Integrity goals. Ensure the Safety Case, Performance Standard, Regulatory and Reliability driven maintenance tasks for all equipment are known and implemented in the most efficient maintenance strategy possible. Ensure Very High and Severe risks are assessed and controlled when they appear, and that the right technical expertise, including technical authorities, is engaged to understand, communicate and manage the risk, as part of the 'Agree' role in the Engineering Management Procedure. Ensure refresh of facility baseline risk assessments is completed upon trigger of re-assessment. Assure that reliability and integrity delivery processes in the assets is being done to correct standard and engaging with relevant process owners.
Integrity Authorities (Technical Integrity Custodians, Technical Authorities and Engineering Authorities)	Manage technical integrity within their designated discipline by ensuring the safe and consistent application of integrity management processes and systems, discipline standards and good engineering practices. Agree technical integrity decisions based on assessed current level of risk. Agree to facility specific Performance Standards and confirm that Performance Standard requirements are met.
Subsea and Pipelines (IMMR) Activity Manager	Ensure IMMR activities undertaken in line with EP commitments. Manage IMMR change requests for the activity and notify the Subsea and Pipelines Environment Adviser of any scope changes in a timely manner. Be responsible for governance of IMMR related activities for subsea support vessels. Provide sufficient resources to implement the EP requirements. Monitor and close out corrective actions raised from IMMR environmental inspections/audits or incidents.
Environment Manager Australian Operations	Facilitate operations environmental approval documentation and timely submission in accordance with regulatory requirements. Ensure asset and supporting personnel understand and adhere to legislative and regulatory environment requirements, EP requirements and the environmental requirements of the WMS. Develop and maintain appropriate Production environmental processes and procedures. Monitor and communicate to internal stakeholders all relevant changes to legislation, policies, regulator organisation that may impact the EP or business. Facilitate review of the EP, including five-yearly revision and in relation to any technical decisions or proposed changes to operations.
Environment Adviser Australian Operations	Manage change relevant to the EP in accordance with the Regulations and the EP. Ensure environmental monitoring, offshore inspections, and reporting is undertaken as per the requirements of this EP. Coordinate and monitor closeout of corrective actions. Ensure environmental inspections/audits are undertaken as per the requirements of the EP. Ensure environmental incident reporting meets regulatory requirements (as described within the EP) and WMS.
Corporate Affairs Adviser	Prepare and implement the Consultation Plan for the Petroleum Activities Program. Report on consultation. Perform ongoing liaison and notification as required.
Woodside Marine Assurance Superintendent	Conduct relevant audit and inspection to confirm vessels comply with relevant Marine Orders and Woodside Marine Charters Instructions requirements to meet safety, navigation and emergency response requirements.

Title (Role)	Environmental Responsibilities
Woodside CIMT Deputy Incident Commander	On receiving notification of an incident: • establish and take control of the IMT and establish an appropriate command structure for the incident • assess situation, identify risks and actions to minimise the risk • communicate incident progress to relevant persons within the organisation • develop the incident action plan (IAP) including setting objectives for action • approve, implement and manage the IAP • communicate within and beyond the incident management structure • manage and review safety of responders • address the broader public safety considerations • conclude and review activities.
Contractor Sponsors	Ensure implementation of EP for the contractor's scope of work. Ensure contractors have adequate environmental capability in order to execute their respective scopes of work. Review contractor environmental performance as required.
PLP-based Personnel	
Frontline Superintendent	Onshore roles at Pluto LNG Park which are responsible for ensuring offshore work scopes are conducted in safe manner when platform is not crewed. Other responsibilities associated with onshore gas plant are described in the Pluto LNG Park Safety Case. Issuing Authority in ISSoW Permit to Work system when platform is uncrewed and/or subsea scope that does not involve work execution on PLA platform and is outside the facility 500m Safety Zone. Responsible for emergency response at or near PLA when platform is uncrewed.
Onshore Installation Manager (OIM)	Normally Site Controller in ISSoW process. Other responsibilities associated with onshore gas plant are described in the Pluto LNG Park Safety Case. Accountable for Permit to Work governance, processes and permit requirements. The OIM, supported by Frontline Superintendent, is the single point responsible person for the coordination of SIMOPS for activities that have ability to impact onshore or its operations.
Environment Advisor	Liaise with managers/supervisors on day-to-day management of environmental risks and issues. Assist in the ongoing promotion of environmental performance at the facilities and day-to-day management HSE risks and issues. Identify opportunities for continuous improvement and communicate these to the PLA Superintendent and Environment Team. Implement environmental improvement plans. Support operational personnel to understand the EP requirements applicable to their role. Communicate environmental performance information and training material to offshore personnel and maintain associated records.

Title (Role)	Environmental Responsibilities
PLA-based Personnel (in crewed mode)	
Person in Charge (PIC) (offshore crewed mode)	Offshore roles at PLA which are responsible for ensuring that offshore work scopes are conducted in a safe manner when platform is crewed. Be accountable for the day-to-day operations of the platform when crewed including, SIMOPS affecting PLA, effective shift handover; completion and logging of operator routine. Be responsible for operations shift compliance to all legislative and regulatory requirements as defined in the Safety Case and Environmental Plan. Be the Issuing Authority in ISSoW Permit to Work system when platform is crewed. Be responsible for auditing and maintaining maintenance procedures. Be responsible for leading and coordinating a multi-disciplined team that is responsible for the duties required to support the facility, including helicopter operations, vessel movements and consumable controls. Be responsible for emergency response at or near PLA when platform is crewed, including ensuring exercises and drills are carried out such that the facility's ability to respond effectively to an emergency is assured.
Production and Maintenance Technicians	Be responsible for daily operations on the facility within their operational control. Undertake daily operational and maintenance tasks in accordance with approved standards and procedures to ensure compliance with the EP. Manage day-to-day environmental risks through use of ISSoW and other risk management tools. Identify opportunities for continuous improvement and communicate these to their Supervisor. Complete training requirements to maintain competence and knowledge in operating and maintaining equipment and manage environmental risks and impacts. Participate in environmental assurance activities and inspections as required. Report all environmental hazards and incidents and assist in investigations.
MODU-based Personnel	
MODU Offshore Installation Manager (OIM)	Ensure the MODU's management system and procedures are implemented. Ensure personnel starting work on the MODU receive an environmental induction that meets the requirements specified in this EP. Ensure personnel are competent to undertake the work they have been assigned. Verify that emergency drills are conducted as per the MODU's schedule. Ensure the MODU's Emergency Response Team has been given sufficient training to implement the MODU's SOPEP. Ensure any environmental incidents or breaches of outcomes or standards are reported immediately to the Well Site Manager. Ensure corrective actions for incidents or breaches are developed, communicated to the Well Site Manager, and tracked to close out in a timely manner. Ensure close out of actions is communicated to the Well Site Manager.
Woodside Well Site Manager	Ensure the drilling program is undertaken as detailed in this EP. Ensure the management measures (i.e., controls, EPOs, PSs and MC) detailed in this EP (relevant to offshore activities) are implemented on the MODU (other controls will be implemented onshore). Ensure environmental incidents or breaches of outcomes or standards are reported as per the Woodside Corporate Event Notification Matrix. Corrective actions for incidents and breaches are developed, tracked and closed out in a timely manner. Ensure actions in the Drilling and Completions HSE Improvement Plan are undertaken. Ensure periodic environmental inspections/reviews are completed. Corrective actions from inspections are developed, tracked and closed out in a timely manner.

Title (Role)	Environmental Responsibilities
Woodside Offshore HSE Adviser	Support the Well Site Manager to ensure the controls detailed in this EP relevant to offshore activities are implemented on the MODU and help collect and record evidence of implementation (other controls are implemented, and evidence collected onshore). Support the Well Site Manager to ensure the Environmental Performance Outcomes are met and the performance standards detailed in this EP are implemented on the MODU. Confirm actions in the Drilling and Completions HSE Improvement Plan are undertaken. Support the Well Site Manager to ensure environmental incidents or breaches of outcomes or standards outlined in this EP, are reported, and corrective actions for incidents and breaches are developed, tracked and closed out in a timely manner. Ensure periodic environmental inspections/reviews are completed and corrective actions from inspections are developed, tracked and closed out in a timely manner. Review Contractors procedures, input into Toolbox talks and JSAs. Provide day to day environmental support for activities in consultation with the Woodside Environment Adviser.
Drilling Logistics Coordinator	Ensure waste is managed on the MODU and sent to shore as per the Drilling and Completions Waste Management Plan.
Vessel-based Personnel	
Vessel Master (Installation Vessel Master, Activity Support Vessel Master, Support Vessel (Platform and Subsea Support Vessels)	Ensure the vessel management system and procedures are implemented. Ensure personnel commencing work on the vessel receive an environmental induction that meets the relevant requirements specified in this EP. Ensure personnel are competent to undertake the work they have been assigned. Verify SOPEP drills are conducted as per the vessel's schedule. Ensure the vessel Emergency Response Team (ERT) has been given sufficient training to implement the SOPEP. Ensure any environmental incidents or breaches of relevant Environmental Performance Outcomes or performance standards detailed in this EP are reported immediately to the Woodside Representative. Ensure corrective actions for incidents or breaches are developed, communicated to the Woodside Representative, and tracked to close out in a timely manner. Close out of actions is communicated to the Woodside Representative.
Vessel Logistics Coordinators	Ensure waste is managed on the relevant support vessels or installation vessel and sent to shore as per the relevant Waste Management Plan.
Vessel HSE Advisers	Refer to Woodside HSE Offshore Adviser responsibilities detailed above under MODU-based personnel.
Contractor Project Manager	Confirm activities are undertaken in accordance with this EP, as detailed in the Woodside approved Contactor Environmental Management Plan Ensure personnel commencing work on the project receive a relevant environmental induction that meets the requirements specified in this EP. Ensure personnel are competent to undertake the work they have been assigned. Ensure any environmental incidents or breaches of objectives, standards or criteria outlined in this EP, are reported immediately to the Woodside Responsible Engineer or Vessel Master.
Woodside Site Representative/ Resident Engineer	Ensure activities are undertaken as detailed in this EP. Ensure the management measures made in this EP are implemented on the vessel. Ensure environmental incidents or breaches of objectives, standards or criteria outlined in this EP, are reported as per the Woodside Corporate Event Notification Matrix. Verify HSE improvement actions identified during the project are implemented where practicable. Ensure periodic environmental inspections are completed.

7.8 Unexpected Finds Procedure

In the event of the discovery of what appears to be Underwater Cultural Heritage (defined as 'any trace of human existence that has a cultural, historical or archaeological character and is located under water'); the following Unexpected Finds Procedure will apply:

- All activities with the potential to impact the suspected Underwater Cultural Heritage must cease immediately. Retain all records of the potential Underwater Cultural Heritage, including any imagery, description and location.
- Person who discovers the heritage object must inform the Activity Supervisor.
- Activity Supervisor must notify Woodside's Global Heritage Manager.

Woodside will specify an appropriate buffer around the potential Underwater Cultural Heritage, taking into consideration the nature and scale of the potential Underwater Cultural Heritage and the activities to be managed.

No seabed disturbance may occur within the buffer area around the potential Underwater Cultural Heritage until approved by Woodside's Global Heritage Manager. Woodside's Global Heritage Manager must notify a qualified underwater archaeologist and provide all available documentation of the potential Underwater Cultural Heritage. If the potential Underwater Cultural Heritage appears to be Aboriginal, Woodside's Global Heritage Manager must notify the appropriate Traditional Custodians to determine whether it is a heritage site and, if so, how the site should be managed.

If the potential Underwater Cultural Heritage appears to be a shipwreck or aircraft that has been wrecked for more than 75 years or is otherwise reportable under Section 40 of the UCH Act, Woodside's Global Heritage Manager must notify the Minister responsible for the UCH Act, the DCCEEW underwater archaeology section through the Australasian Underwater Cultural Heritage Database, and the Western Australian Museum.

If the suspected heritage object includes human remains, Woodside's Global Heritage Manager must also notify:

- the Australian Federal Police (phone: 131 444) of the location of the remains, that the remains are likely to be historic or Aboriginal in origin, and that it may be appropriate that Traditional Custodians and a maritime archaeologist are present during any handling of the remains
- the Office of the Federal Environment Minister in accordance with Section 20 of the ATSIHP Act.

Work must not recommence in the vicinity of the potential heritage object until Woodside's Principal Heritage Adviser provides written approval. Woodside's Global Heritage Manager must only provide written approval once agreed management measures are implemented consistent with approvals and legislation or where the potential Underwater Cultural Heritage is confirmed to not be Underwater Cultural Heritage.

7.9 Training and Competency

Woodside as part of its contracting process undertakes assessments of a proposed Contractor's environmental management system to determine the level of compliance with the standard AS/NZS ISO 14001. This assessment is undertaken for the PAP as part of the pre-mobilisation process. The assessment determines whether there is a clearly defined organisational structure that outlines the roles and responsibilities for key positions. The assessment also considers whether there is an up-to-date training matrix that defines any corporate and site/activity-specific environmental training and competency requirements.

As a minimum, environmental awareness during inductions is required for all Pluto facility and MODU personnel, detailing awareness and compliance with the Pluto facility, MODU and project vessel Contractor's environmental policy and environmental management system.

Impacts to training roll-out have arisen in the last five years due to major external disruptions beyond Woodside's control, namely associated with the COVID-19 pandemic. In the event of similar future disruptions, the adequacy of training and competency processes and procedures will be subject to Woodside's MoC process for ongoing safe operations of its facilities.

7.9.1 Inductions and Training

Inductions are provided to all relevant personnel (e.g., contractors and Company representatives) before mobilising to or on arrival at the activity location. The induction covers the HSE requirements and environmental information specific to the activity location. Attendance records will be maintained.

The PAP induction may cover information about:

- description of the activity
- ecological and socio-economic values of the activity location (including Underwater Cultural Heritage)
- Regulations relevant to the activity
- Woodside's Environmental Management System – Health and Safety, and Environment and Biodiversity Policies
- EP importance/structure/implementation/roles and responsibilities
- main environmental aspects/hazards and potential environmental impacts and related performance outcomes
- oil spill preparedness and response
- monitoring and reporting on performance outcomes and standards using MC
- incident reporting
- inductions for offshore facility workers and visitors
- operations competency framework training
- permit to work training (ISSoW)
- production environmental leadership training and environment awareness training
- emergency and hydrocarbon spill response training
- inductions for subsea IMMR (vessel based) personnel
- Unexpected Finds Procedure and reporting requirements (Section 7.8)
- records for Woodside operations personnel, in relation to the above listed training, are maintained in Woodside's learning management system. Contractor training records are also maintained
- competence of operations personnel can be reviewed via online dashboards.

7.9.2 Activities Program Specific Environmental Awareness

Before petroleum activities begin, a pre-activity meeting will be held on-board the MODU and project vessels with all relevant personnel. The pre-activity meeting provides an opportunity to reiterate specific environmental sensitivities or commitments associated with the activity. Relevant sections of the pre-activity meeting will also be communicated through to the support vessel personnel. Attendance lists are recorded and retained.

During operations, regular HSE meetings will be held on the Pluto facility, MODU and project vessels which cover all crew. During these meetings, recent environmental incidents are regularly reviewed, and awareness material presented.

7.9.3 Inductions for Offshore Facility Workers and Visitors

A comprehensive induction process is in place for personnel working on or visiting Woodside's offshore production facilities. The induction process is designed to equip personnel with the HSE awareness and skills necessary for them to manage their own safety and environmental performance and contribute to others working around them. The induction process includes:

- Common Production Induction – All employees and contractors who have not accessed a production facility within twelve months are required to undertake this induction prior to mobilisation. It includes Woodside's values, HSEQ and Process Safety, continuous improvement, risk management and ISSoW.
- Facility Specific Induction – All employees and contractors that have not accessed the production facility within twelve months are required to undertake this induction on arrival at the facility. This induction covers the HSE and emergency response issues specific to each facility. For environment, this induction covers the EP, prevention of spills, waste management, fauna interactions, hazard identification and risk assessment, and incident reporting.
- Production Offshore Environmental Leadership Training – Key operations leadership roles (as specified within the Operations Competency Framework) are required to complete this competency on commencement of the new role and three yearly thereafter. The training covers Woodside's policies and standards, environmental legislative requirements, the EP, key environmental risk and impacts, environmental reporting, environmental management tools (e.g., improvement planning, compliance reviews and audits), hydrocarbon spill response and environmental accountabilities.
- Production Offshore Environmental Awareness Training – All new offshore operational personnel are required to undertake this online training on commencement of the new role and two yearly thereafter. This training covers environmental legislative requirements, the facility EP, key environmental hazards and control measures (including waste management, spill prevention, chemical storage, wildlife interactions), environmental management tools, hazard and incident reporting, spill response, and environmental responsibilities.

7.9.4 Operations Competency Framework Training

The Operations Competency Guideline defines a framework to make sure all personnel on operating facilities are competent to perform their work and that competency is managed. By doing this, the potential for unplanned (accident/incident) type events that could result in environmental impact is minimised.

Operational Area Licence to Operate (LTO) roles are those roles related to oil and gas processing, equipment maintenance, marine Regulations, emergency response and any other roles involved with safeguarding the facility integrity, including all roles where high-risk work licenses are required. Additionally, roles mandated by Woodside such as HSEC and helicopter landing officer are included in the LTO roles process.

The requisite competency and training for each LTO role has been defined. Competencies for these LTO roles are stipulated by the governance group for each respective position and are based on the relevant Australian or International standards which apply. In cases where no Australian or International standards are available or applicable, training is based on the relevant Woodside Standard as determined by the respective governance group.

Contractors working on Woodside facilities are required to verify the competency of their personnel through the contractor's own verification systems. Additionally, contractor personnel working on Woodside facilities are required to be registered in Woodside's Contractor Verification Service (CVS) beforehand. Personnel registered in CVS have had their skills and qualifications independently verified on behalf of Woodside, thereby confirming that contractor personnel hold the required competencies before mobilisation to the facility.

The LTO Roles Report (available online on the Woodside Competency Reporting Dashboard on the Production Academy Intranet page) provides the conformance status of the facility against the LTO roles requirements.

7.9.5 Permit to Work System Training

The ISSoW permit to work (i.e., participation in crisis or emergency management exercises) roles-based training is further described in Section 7.14.

An overview of Woodside's hydrocarbon spill response training and competency requirements are provided in dashboards for key responder roles. The roles are consistent with Woodside's crisis and emergency management incident control structure. system (see Section 7.2.1) is a key element in ensuring that all necessary steps are taken for the safety of personnel, protection of the environment and technical integrity of the facility. The ISSoW system takes a risk-based approach to all activities, thus tasks with higher levels of risk are subjected to greater scrutiny and control.

All members of the workforce that are required to work with ISSoW (Section 7.2.1) receive training commensurate with the level of authority and responsibility they hold in ISSoW.

7.9.6 Emergency and Hydrocarbon Spill Response Training

All operations personnel involved in crisis and emergency management are required to commit to ongoing training, process improvement and participation in emergency and crisis response (both real and simulated), including emergency drills specific to potential incidents at the Pluto facility. Training includes task-specific training and role-based training and 'on the job' experience.

Woodside Hydrocarbon Spill Preparedness Advisor(s) are responsible for maintaining hydrocarbon spill preparedness competency. For more information see Section 7.14.

7.9.7 Subsea Inspection, Monitoring, Maintenance and Repair Activity Environmental Awareness

At the beginning of, and during a new Subsea IMMR activity, the Subsea Support Vessel crew including contractor crew, Woodside representatives and other relevant personnel are required to undertake a vessel induction before commencing work. This induction covers HSE requirements for the vessel and IMMR activities, and as required environmental information specific to the activity location. The induction may cover environmental information about:

- adherence to standards and procedures, and the use of Job Safety Analysis and permit to work hazard identification and management process
- spill management including prevention, response and clean-up, location of spill kits and reporting requirements
- waste management requirements and location of bins
- reporting of marine fauna, location of forms and charts
- chemical management requirements.

All personnel who undertake the project induction are required to sign an attendance sheet which is retained.

Regular HSE meetings are held on subsea support vessels with crew. During these meetings, any environmental incidents are reviewed and environmental awareness material is presented.

7.9.8 Management of Training Requirements

All personnel on the Pluto facility, MODU and project vessels are required to be competent to perform their assigned positions. This may be in the form of external or 'on the job' training. The vessel Safety Training Coordinator (or equivalent) is responsible for identifying training needs, keeping records of training performed and identifying minimum training requirements.

7.9.9 Cetacean and Whale Shark Sightings Reporting

All Project vessels and the MODU will be provided with sighting recording sheets which will be posted on notice boards for opportunistic reporting of cetacean and whale shark sightings. Awareness of sightings reporting will also be included in project inductions. When crewed sighting recording sheets will be posted on the noticeboards on the riser platform and awareness provided in the facility induction. These sightings reports will be collated and summarised on an annual basis during this activity (Regulation 29 notifications) and submitted to the Australian Antarctic Division of the DCCEEW to satisfy condition 1(c)(vi) of EPBC Approval Decision 2006/2968.

7.9.10 Marine Fauna Observation Training

The Marine Fauna Observer (MFO) role may be completed by Project vessel crew who are appropriately trained prior to the activity commencing. Vessel crew trained to undertake the MFO role will complete training that will include information specific to Pygmy Blue Whale (PBW) identification given migration/distribution BIAs overlap the Operational Areas. Woodside and Contractor personnel will be trained to deliver the MFO training ('train-the-trainer' model) by an external organisation specialising in marine environmental training, with expertise in marine fauna observations. The bespoke training package will cover:

- An overview of the Project
- An overview of the potential impacts and risks to marine megafauna, including PBWs
- An overview of marine megafauna that may be present during activities
- An overview of EP controls and management procedures relevant to marine megafauna (including PBW) presence
- Precautionary approach to identification i.e. assume PBW if positive ID of different species type not possible
- The role and responsibilities of MFOs
- The observation and reporting requirements
- When trained crew are undertaking observations, expectations are that:
  - Observation equipment / tools are used as required (i.e. range-finding binoculars, marine megafauna ID prompts etc.)
  - Escalation process carried out if cetaceans / PBWs are identified to allow for implementation of adaptive management as required by controls throughout EP
  - Make and maintain records including the date, time and approximate distance from the vessel, and the action taken to comply with relevant controls and management procedures
- Records will be maintained as evidence of the vessel crew who have completed the MFO training.

Completion of MFO Training (focusing on PBWs) is a minimum requirement for those performing observations relevant to PBW mitigation/adaptive management measures in this EP. For any trained crew who have not conducted MFO training for greater than 12 months, refresher training is required prior to undertaking the role.

7.10 Monitoring, Auditing, Management of Non-conformance and Review

Regulation 22(5) states that the implementation strategy is to provide for the monitoring, audit, management of non-conformance and review of operator's environmental performance and the implementation strategy itself.

Regulation 22(6) further states that the implementation strategy is to provide for sufficient monitoring of, and maintaining a quantitative record of, emissions and discharges (whether occurring during normal operations or otherwise).

This section of the EP outlines the measures undertaken by Woodside to regularly monitor the management of environmental risks and impacts of the Pluto facility against the EPOs, EPSs and MC, with a view to continuous improvement of environmental performance. The section also outlines records that are to be used to assess whether the EPOs and EPSs in the EP are being met.

The effectiveness of the implementation strategy is also reviewed periodically as part of the monitoring and assurance process.

7.10.1 Monitoring

Woodside and its contractors will perform a program of periodic monitoring during the PAP – starting at mobilisation of each activity and continuing through the duration of the Program. This information will be collected using the tools and systems outlined below, developed based on the EPOs, EPSs and MC in this EP. The tools and systems will collect, as a minimum, the data (evidence) referred to in the relevant measurement criteria in Section 6 and Appendix D.

The collection of this data will form part of the permanent record of compliance maintained by Woodside and will form the basis for demonstrating that the EPOs and EPSs are met, which will be summarised in a series of routine reporting documents.

7.10.1.1 Source-based Impacts and Risks

The tools and systems to monitor environmental performance, where relevant, will include:

- daily reports that include leading indicator compliance
- periodic review of waste management and recycling records
- use of contractor's risk identification program that requires recording and submitting safety and environment risk observation cards routinely (frequency varies with contractor)
- collection of evidence of compliance with the controls detailed in the EP relevant to offshore activities by the Woodside Offshore HSE Adviser (other compliance evidence is collected onshore)
- environmental discharge reports that record volumes of planned overboard discharges to the ocean

monitoring of progress against the Global Wells and Seismic and Operations Division scorecards for KPIs.

7.10.1.2 Internal Auditing and Assurance Program

A summary of ongoing monitoring and quantitative records of emissions and discharges that will be kept and used to assess environmental performance during operations are provided in Table 7-5.

Further details on assurance associated with the Xena 03 tieback activities is described in Sections 7.10.2.1 and 7.10.2.2

Table 7-5: Summary of operations emissions and discharges monitoring for the PAP

Category	Parameter to be Monitored/Reported	Monitoring Frequency	Monitoring Equipment/ Methodology	EP Reference
Planned Emissions				
Atmospheric emissions	Greenhouse, energy and criteria pollutants	Normally continuous process metering/annual reporting	NGERS and NPI reporting estimation methods (e.g., fuel/flare flow meters, throughput meters, process estimation)	Section 6.7.10
	Fuel gas and flare intensity	Normally continuous process metering/monthly reviews	Fuel and flare flowmeters inform intensity profiles – tracked against optimisation targets	Section 6.7.10
Planned Discharges				
Discharge of subsea control fluids during valve actuations	Subsea control fluid consumption	Normally continuous process indication/monthly review	Subsea control fluid consumption surveillance. Process indication for gross leaks/ruptures	Section 6.7.5
Discharge of hydrocarbons and chemicals during subsea IMMR activities	Volumes of hydrocarbons and chemicals released subsea	As required, during IMMR activities (activity specific)	Estimates based on known volumes pumped and ROV observation	Section 6.7.5
Discharge of produced water	Volume discharged overboard	Normally continuous process indication/monthly review	PW flow meter(s), process estimation	Section 6.7.7
	OIW concentration of discharged PW	Normally continuous process indication/monthly review	Online analyser(s) and/or manual sampling	
	Chemical characterisation	Annually	Characterisation of end of pipe sample	
	WET testing	Three yearly	PW ecotoxicity testing	
Waste recycling and disposal	Quantities of solid and liquid wastes disposed of onshore	Ongoing	Facility waste manifest	Section 6.7.6
Unplanned Emissions and Discharges				
Unplanned emissions and discharges	Nature of release	As required	HSEQ Event Reporting System (First Priority)	Sections 6.8 and 6.9

Throughout this activity, Woodside will continuously identify new source-based risks and impacts through the Monitoring and Auditing systems and tools described above.

Other examples of assurance tasks implemented through the EP include:

- start of shift operations meetings
- permit to work hazard, risk management check list, area sign-on, and permit audits (ISSoW – Section 7.2.1)
- technical integrity SCE performance reviews (daily, weekly, monthly) (Section 2.7.5)

- maintenance performance assurance (e.g., conformance dashboards)
- management system performance audits reviews (e.g., MSPSs)
- data gathering and governance dashboard presentations (e.g., Woodside Integrated Risk and Compliance System).

7.10.1.3 Management of Knowledge

Review of knowledge relevant to the existing environment is undertaken in order to identify changes relating to the understanding of the environment or legislation that supports the risk and impact assessments for EPs (in-force and in-preparation). New knowledge checks take place both routinely primarily via quarterly and annual knowledge reviews and ad hoc (as information is obtained), and encompasses the following topics:

- Environmental science – update checks conducted via desktop reviews: scientific literature, government publications and Woodside supported publications and studies relating to existing environment topics (including but not limited to species and habitats) as well as EPBC Act Matters of National Environmental Significance (Part 3) and Part 13 statutory instruments.
- Cultural features and heritage values science and information – update checks conducted via desktop reviews: scientific literature, government publications and Woodside consultation as well as reporting progress for the Murujuga Rock Art Monitoring Program.
- Socio-economic environment and stakeholder information – update checks conducted via desktop reviews: scientific literature, government publications and Woodside consultation.
- Environmental legislation – monitoring conducted of emerging regulatory changes and the subsequent management of regulatory change (as outlined in the WMS Regulatory Compliance Management Procedure).

A management of knowledge tracker is maintained to record reviews and updates. New knowledge identified will prompt a consideration of MoC, which is actioned and documented appropriately.

The frequency and documentation of reviews, communication of relevant new knowledge and consideration of management of change are documented in the WMS Environment Plan Guideline.

Any relevant new information on cultural values and heritage will be assessed using the EP MoC Process (refer to Section 7.3.2).

Under the Oil Spill Scientific Monitoring Program preparedness, an annual review and update to the environmental baseline studies database is completed and documented. Periodic location-focused environmental studies and baseline data gap analyses are completed and documented. Any subsequent studies scoped and executed as a result of such gap analysis are managed by the Environment Science Team and tracked via the Corporate Environment Baseline Database.

7.10.1.4 Management of Newly Identified Impacts and Risks

New sources of impacts and risks identified through monitoring and auditing systems and tools and the Woodside Environment Knowledge Management System are assessed using the MoC Process (Section 7.3).

7.10.2 Auditing

Environmental performance auditing will be performed to:

- identify potential new or changes to existing environmental impacts and risk, and methods for reducing those to ALARP

- confirm mitigation measures detailed in this EP are effectively reducing environmental impacts and risk, that mitigation measures proposed are practicable and provide appropriate information to verify compliance
- confirm compliance with the Performance Outcomes, Controls and Standards detailed in this EP.

Internal environmental auditing will be performed to cover each key project activity as summarised.

7.10.2.1 Mobile Offshore Drilling Unit Activities

Internal auditing is performed on a MODU-specific schedule, rather than a schedule to align with the well. This enables continuous review and improvement of environmental performance over the term of the MODU contract. The following internal audits, inspections and reviews will be performed to review the environmental performance of the activities:

- Survey environment rig equipment for a newly contracted MODU (if not previously contracted to Woodside within the last two years) against Woodside's Engineering Standard – Rig Equipment. This standard covers functional and technical requirements for Woodside contracted rigs and their associated equipment. An environment rig equipment survey scope typically includes mud and solids control systems, environmental discharge control (including drainage management), and loss of containment management.
- Complete a minimum of monthly environmental inspection (conducted by offshore Woodside personnel or a delegate) which may include verifying:
  - bunkering/transfers between support vessels and MODU/project vessels
  - environment containment including chemical storage, spill response equipment and housekeeping
  - general MODU environment risks including waste management, drilling fluids oil/water separation, and inspection of subsea and moonpool areas.
- Perform at least one environment audit during or within 6 months, while the MODU is on location (by a Woodside Environment Adviser or delegate), which may include:
  - operational compliance audits relevant to environmental risk of activities which may include compliance with training commitments, discharge requirements, bunkering activities, verification of use of approved chemicals, and satisfactory close out of items from previous audits
  - inspection of selected risk areas/activities (which may include shaker house, drill floor and mud management while commencing riser drilling or reservoir interception) during routine MODU visits throughout the MODU campaign, determined by risk, previous incidents or operation specification requirements.
  - audit findings relevant to continuous improvement of environmental performance will be tracked through the MODU or vessel compliance action register, a contractor register between the MODU operator or vessel contractor and Woodside.

7.10.2.2 Project Subsea Scope Activities

The following internal assurance will be performed for the subsea scope activities:

- Pre-mobilisation inspection/audit report will be conducted by a relevant person (before commencing). The scope of the audits are risk-based and specific to the relevant activity, but will generally focus on aspects relating to ensuring appropriate understanding of environmental commitments and the operational readiness of the activity scope, including appropriate environmental controls in place. All installation vessels associated with the above

scopes will be audited by Woodside. Support or transport vessels will be assessed on a risk-based approach, but will be audited via the primary subsea installation contractor's process.

- At least one compliance audit relevant to applicable EP commitments will be conducted by a Woodside Environment Adviser for the subsea campaign. The audit may be conducted offshore or office-based, subject to the duration of the activity and logistics of performing the audit offshore for short duration scopes (e.g., pipelay).
- Contractor-specific HSE audits will also be conducted of the associated support vessels. The audits will consider the implementation of HSE management, risk management, as well as pre-mobilisation and offshore readiness.
- Vessel based HSE inspections will be conducted fortnightly by vessel HSE personnel. Each inspection will focus on a specific risk area relevant to the project activity and a formal report will be issued (for example, bunkering controls, chemical and discharge management, cetacean reporting).
- Annual inspection of Woodside's long term hire subsea support vessels are undertaken for compliance with both the EP and the approved Contractor Management system.
- The internal audits and reviews, combined with the ongoing monitoring described in Section 7.10.1, and collection of evidence for MC are used to assess EPOs and standards.
- As part of Woodside's EMS and/or assurances processes, activities may also be periodically selected for environmental audits as per Woodside's internal auditing process. Audit, inspection and review findings relevant to continuous improvement of environmental performance are tracked through the Environmental Commitments and Actions Register.
- This Environmental Commitments and Actions Register is used to track subsea support vessel and subsea activity compliance with EP commitments, including any findings and corrective actions.

Non-conformances identified will be reported and/or tracked in accordance with Section 7.10.3.

7.10.2.3 Operations Assurance

To provide confidence, based on evidence commensurate with risk, that business objectives are met, business activities are performed and risks are managed, assurance is performed as described in the Provide Assurance Procedure and the Provide Assurance Guideline. The Guideline aims to explain how the Operations Division Assurance Team implement WMS Assurance requirements, while concurrently satisfying the Operations Division's specific objectives.

Operations Assurance Assignments are contained within the Operations Division Integrated Assurance Assignment Plan.

Environmental assurance activities are conducted on a regular basis to help:

- verify environmental risks and potential impacts are being managed in accordance with the EPOs and EPSs detailed in this EP
- monitor, review and evaluate the effectiveness of the performance outcomes and standards detailed in this EP
- verify effectiveness of the EP implementation strategy
- identify potential non-conformances.

The outputs of the assurance process are corrective actions that feed the improvement process. Therefore, assurance is a key driver of continuous improvement.

7.10.2.4 Annual Offshore Inspection/Desktop Review

An inspection/review of the Pluto offshore facility is undertaken every calendar year by the Australian Operations Environment Team, via either an offshore inspection or desktop review. Selected risk areas/activities are inspected to review environmental performance against the EPOs and EPSs and verify that control measures are effective in reducing the environmental risks and impacts of the activity to an ALARP and acceptable level.

The inspection/review also includes review of conformance with selected aspects of the EP implementation strategy. All risk sources/activities applicable to the offshore facility will be reviewed over a three-year rolling period. Records of findings and records of close-out of any corrective or improvement actions are maintained (close-out is tracked in Woodside's action tracking system).

7.10.2.5 Marine Assurance

Woodside's marine assurance is managed by the Marine Assurance Team of the Logistics Function in accordance with Woodside's Marine Offshore Vessel Assurance Procedure. The Woodside process is based on industry standards and consideration of guidelines and recommendations from recognised industry organisations such as Oil Companies International Marine Forum and International Maritime Contractors Association.

Woodside's Marine Offshore Assurance process is mandatory for all vessels (other than Tankers and Floating Production Storage and Offloading vessels) that are chartered directly by or on behalf of Woodside, including for short term hires (i.e., more than three months in duration). It defines applicable marine offshore assurance activities, ensuring all vessel operators operate seaworthy vessels that meet the requirements for a defined scope of work and are managed with a robust Safety Management System.

The process is multi-faceted and encompasses the marine assurance activities of:

- safety management system assessment
- dynamic positioning (DP) system verification
- vessel inspections
- project support for tender review, evaluation and pre/post contract award.

Vessel inspections are used to verify actual levels of compliance with the company's Safety Management System, the overall condition of the vessel and the status of the planned maintenance system onboard. Woodside Marine Assurance Specialist will conduct a risk assessment on the vessel to determine the level of assurance applied and the type of vessel inspection required.

Methods of vessel inspection may include:

- Woodside Marine Vessel Inspection
- Oil Companies International Marine Forum (OCIMF) Offshore Vessel Inspection Database (OVID) Inspection
- IMCA CMID Inspection
- Marine Warranty Survey.

Upon completion of the marine assurance process, to confirm that identified concerns are addressed appropriately and conditions imposed are managed, the Woodside Marine Assurance Team will issue the vessel a statement of approval. Should a vessel not meet the requirements of the Woodside Marine Offshore Vessel Assurance Process and be rejected, there does exist an opportunity to further scrutinise the proposed vessel.

Where a vessel inspection and/or OVMSA Verification Review is not available and all reasonable efforts based on time and resource availability to complete an vessel inspection and/or OVMSA

Verification Review are performed (i.e. short term vessel hire), the Marine Assurance Specialist Offshore may approve the use of an alternate means of inspection, known as a risk assessment (Section 7.10.2.6).

Environmental requirements specific to offshore facility support vessel contractors are communicated via Woodside marine charterers instructions. This document provides the Master of a vessel on hire to Woodside, with a clearly defined set of requirements and procedures for operating the vessel in the vicinity of the Woodside's operating facilities. This includes the management of environmental risks and impacts from the Pluto facility. The document includes information on:

- applicable legislation and guidelines
- roles and responsibilities
- marine fauna interaction guidance
- incident reporting requirements.

Environmental requirements specific to Subsea Support Vessels are communicated via the Subsea Environmental Compliance Package. This document outlines mandatory environmental management requirements for Subsea Support Vessels and associated contractors.

7.10.2.6 Vessel Risk Assessment

Woodside conducts a risk assessment of vessels where either an OVMSA Verification Review and/or vessel inspection cannot be completed. This is not a regular occurrence and is typically used when the requirements of the assurance process are unable to be met or the processes detailed are not applicable to a proposed vessel(s). The Marine Vessel Risk Assessment will be conducted by the Marine Assurance Specialist, where the vessel meets the short-term hire prerequisites.

The risk assessment is a semi-quantitative method of determining what further assurance process activity, if any, is required to assure a vessel for a particular task or role. The process compares the level of management control a vessel is subject to against the risk factors associated with the activity or role.

Several factors are assessed as part of a vessel risk assessment, including:

- management control factors:
  - company audit score (i.e., management system)
  - vessel HSE incidents
  - vessel Port State Control deficiencies
  - instances of Port State Control vessel detainment
  - years since previous satisfactory vessel inspection
  - age of vessel
  - contractors' prior experience operating for Woodside.
- activity risk factors:
  - people health and safety risks (a function of the nature of the work and the area of operation)
  - environmental risks (a function of environmental sensitivity, activity type and magnitude of potential environment damage (e.g., largest credible oil spill scenario))
  - value risk (likely time and cost consequence to Woodside if the vessel becomes unusable)
  - reputation risk

- exposure (i.e., exposure to risk based on duration of project)
- industrial relations risk.

The acceptability of the vessel or requirement for further vessel inspections or audits is based on the ratio of vessel score to activity risk. If the vessel management control is not deemed to appropriately manage activity risk, a satisfactory company audit and/or vessel inspection may be required before awarding work.

The risk assessment is valid for the period a vessel is on hire and for the defined scope of work.

7.10.3 Management of Non-conformance

Woodside classifies non-conformances with EPOs and standards in this EP as environmental incidents. Woodside employees and contractors are required to report all environmental incidents, and these are managed as per Woodside's internal event recording, investigation and learning requirements.

An internal computerised database called First Priority is used to record and report these incidents. Details of the event, immediate action taken to control the situation, investigation outcomes and corrective actions to prevent reoccurrence are all recorded. Corrective actions are monitored using First Priority and closed out in a timely manner.

Woodside uses a consequence matrix for classification of environmental incidents, with the significant categories being A, B and C (as detailed in Section 2.3). Detailed investigations are completed for all categories A, B, C and high potential environmental incidents.

7.10.4 Review

7.10.4.1 Management Review

Within the Australian Operations Environment Team, senior management regularly monitor and review environmental performance and the effectiveness of managing environmental risks and performance. Within each Function and Business Unit Leadership Team (e.g., Drilling and Completions, Subsea and Developments/Projects), managers review environmental performance regularly, including through quarterly HSE review meetings.

Woodside's Global, Wells and Seismic Environment Team will perform six-monthly reviews of the effectiveness of the implementation strategy and associated tools. This will involve reviewing the:

- Drilling and Completions environment KPIs (leading and lagging).
- tools and systems to monitor environmental performance
- lessons learned about implementation tools and throughout each campaign.

Reviews of oil spill arrangements and testing are performed in accordance with Section 7.14.10.

Woodside's Operations Division Environment Team will perform routine reviews of the effectiveness of the implementation strategy and associated tools. This will involve reviewing the:

- Operations Division environment KPIs (leading and lagging)
- tools and systems to monitor environmental performance.

Reviews of oil spill arrangements and testing are performed in accordance with Section 7.14.10.

7.10.4.2 Program of Ongoing Engagement with Traditional Custodians

Woodside will undertake an annual review of the Program of Ongoing Engagement with Traditional Custodians to determine its effectiveness and adapt the program accordingly. The annual review will

also include an assessment of appropriateness of the methods used to undertake ongoing consultation with Traditional Custodians (Appendix G).

7.10.4.3 Learning and Knowledge Sharing

Learning and knowledge sharing occurs via different methods, including:

- event investigations
- event bulletins
- after-action review conducted at the end of each well, including review of environmental incidents as relevant
- ongoing communication with MODU and facility operators
- formal and informal industry benchmarking
- cross asset learnings
- engineering and technical authorities discipline communications and sharing
- review of impacts, risks and controls across the life of the EP.

7.10.4.4 Continuous Improvement

Continuous Improvement Projects to improve production or environmental performance that involve refurbishment, modification or major maintenance on the facility are typically managed by Brownfields engineering, and required to follow appraise and develop management procedures. Currently, the Procedure requires that all projects be managed in accordance with the Opportunity Management Framework which supports the progressive maturation of an opportunity through value creation in the Assess and Select Phases and the maintenance of value in the Develop and Execute phases.

To support the accountable executive to make a decision on whether a project should proceed to the next phase in the Opportunity Management Framework, it is sometimes necessary to conduct a trial of the modification to determine the outcomes that can be expected if the modification is implemented. Due to prioritisation of resources, the phased progress of opportunities, competition between different solutions and long-term strategic and financial considerations, it is not possible to set quantitative success criteria to determine whether a modification will be implemented based on the results of trials. Instead, the results of a trial are used to inform a decision on whether to progress the project to the next phase in the Opportunity Management Framework. Decisions are typically made with two key considerations; whether the business is ready to proceed which has a technical/functional focus and whether there is a business case for progressing to the next phase. The business case may consider the ALARP position for the project, if relevant.

7.11 Record Keeping

Compliance records (outlined in MCs in Section 6) are maintained.

Record keeping is in accordance with Regulation 22(6) that addresses maintaining records of emissions and discharges. See also Table 7-5.

7.12 Ongoing Consultation

Although consultation for the purpose of Regulation 25 is complete, in accordance with Regulation 22(15) of the Environment Regulations, the implementation strategy must provide for appropriate consultation with relevant authorities of the Commonwealth, a State or Territory and other relevant interested persons or organisations.

Woodside proposes to undertake the engagements with directly impacted relevant persons and additional persons listed in Table 7-6. Relevant new information identified during ongoing consultation will be assessed using the EP Management of Knowledge (refer to Section 7.10 and Management of Change Process (refer to Section 7.3).

Woodside hosts community forums at which members are provided updates on Woodside activities on a regular basis (for example community reference group meetings). Representatives who present at those meetings are from community and industry and include Woodside, State Government (for instance relevant Regional Development Commissions), Local Government, Indigenous Groups, industry representative bodies, Community and industry organisations.

Relevant persons and those who are simply interested in the activities, can otherwise remain up to date on this activity through subscribing to our website the Woodside website, or by reading the publicly available version of the EP on NOPSEMA's website, where available.

Should consultation feedback be received following EP acceptance that identifies relevant new information or a measure or control that requires implementation or update to meet the intended outcome of consultation (see Section 5.2), Woodside will apply its EP Management of Knowledge process (refer to Section 7.10) and MoC process (refer to Section 7.3), as appropriate.

Woodside has developed a Program of Ongoing Engagement with Traditional Custodians (Appendix G), which is compliant with Corporate Woodside Policies Strategies and procedures and directly informed by feedback from Traditional Custodians. It provides a mechanism for ongoing dialogue so that Traditional Custodians can, on an ongoing basis, provide Woodside with feedback relating to the activity and in relation to caring for and managing country, including Sea Country. The Program will be tailored to each Traditional Custodian group and may include, as agreed with relevant Traditional Custodians:

- social investment to support Indigenous ranger programs
- support for Indigenous oil spill response capabilities
- support for recording Sea Country values
- support to Traditional Custodian groups to build capabilities and capacity with respect to ability to engage with Woodside and the broader oil and gas industry on activities
- development of ongoing relationships with Traditional Custodian groups
- any other initiatives proposed for the purpose of protecting Country including cultural values.

At the time of EP submission, a number of activities related to ongoing consultation regarding the activity are planned with Traditional Custodian Relevant Persons. These are described in Appendix G. Where Traditional Custodian relevant persons have requested information or further engagement considered as ongoing consultation, but have not requested a consultation agreement, these requests have been captured in Table 7-6. However, a consultation agreement may still be initiated by these groups at any time.

Table 7-6: Ongoing consultation engagements

Report/ Information	Recipient	Purpose	Frequency	Content
Program of Ongoing Engagement with Traditional Custodians	Relevant cultural authorities	Identification, assessment and consideration of cultural values relevant to the PAA and EMBA	Ongoing	Assessment of cultural values Any relevant new information on cultural values will be assessed using the EP Management of Knowledge and Management of Change Process (refer to Section 7.3.2)
Notification (email)	AHO	As requested by AMSA during consultation	No less than 4 weeks prior to commencement	PS 1.9 Date of activity start
Updates (email)			As required.	Changes to planned activities
Notification (email)	AMSA	As requested by AMSA during consultation	At least 24–48 hours before operations commence	PS 1.10 Date of activity start
Update (email)			As required	Changes to planned activities
Notification (email)	Other relevant persons	Notification of significant change	As required	Notification of significant change
Notification (email)	AFMA WAFIC CFA DAFF – Fisheries KUFPEC		No less than 10 days prior to commencement and following completion of activities	PS 1.13 Date of activity start and end
Emails/ Meetings	Persons or organisations who provide feedback to Woodside post EP submission	Identification, assessment and consideration of feedback, claims and/or objections	As appropriate	Assessment of claims and/ or objections Relevant new information will be assessed using the EP Management of Knowledge and MoC Process (refer to Section 7.3.2)
Notification (email)	Australasian Underwater Cultural Heritage Database Any other stakeholders as required in the Unexpected Finds Procedure	Report any unexpected finds of potential Underwater Cultural Heritage	If triggered by Unexpected Finds Procedure	Refer to Unexpected Finds Procedure

7.13 Reporting

7.13.1 Overview

To meet the EPOs and EPSs outlined in this EP, Woodside reports at a number of levels, as outlined in the next sections.

7.13.2 Routine Reporting (Internal)

7.13.2.1 Daily Progress Reports and Meetings

The following daily reports, containing environmental performance information, are issued:

- Daily reports for drilling activities provide performance information about drilling activities, heath, safety and environment, and current and planned work activities.
- Pan-Woodside Daily Production Report – The report includes facility performance information on production and a log of any HSE events.
- Subsea support vessel Daily Progress Report(s) – During subsea IMMR activities, daily reports are issued by the Woodside Site Representative. The reports provide performance information on HSE events, diesel use, together with equipment information, current and planned work activities.

Meetings between key personnel are used to transfer information, discuss incidents, agree plans for future activities and develop plans and accountabilities for resolving issues.

7.13.2.2 Regular Health, Safety and Environment Meetings

Regular dedicated HSE meetings are held with the offshore and Perth-based management and advisers to address targeted HSE incidents and initiatives. Minutes of these meetings are produced and distributed as appropriate.

7.13.2.3 Performance Reporting

Monthly and quarterly performance reports are developed and reviewed by the Function and Business Unit Leadership Teams (e.g., Drilling and Completions, Operations). These reports cover a number of subject matters, including:

- HSE incidents (including high potential incidents and those related to this EP) and recent activities
- corporate KPI targets, which include environmental metrics
- outstanding actions as a result of audits or incident investigations
- technical high and low lights
- status of subsea IMMR activities.

7.13.3 Routine Reporting (External)

7.13.3.1 Start and End Notifications of the Petroleum Activities Program

7.13.3.1.1 Pluto Operations

In accordance with Regulation 54, Woodside will notify NOPSEMA within 10 days of the completion of the Petroleum Activities Program.

The EP will end when Woodside notifies NOPSEMA that the PAP has ended, all the obligations identified in this EP have been completed, and NOPSEMA has accepted the notification, in accordance with Regulation 46 of the Environment Regulations.

The PAP is not expected to end within the five-year life of this EP.

7.13.3.1.2 Xena-03 Drilling and Tie-back

In accordance with Regulation 54, Woodside will notify NOPSEMA of the commencement of the PAP at least ten days before the activity commences, and will notify NOPSEMA within 10 days of completing the activity.

7.13.3.2 Cetacean and Whale Shark Sightings Reporting

In accordance with EPBC Act approval conditions for the activity (refer Table 1-4), Woodside will keep a record of any cetacean and whale shark sightings for the life of this EP. A sightings report will be submitted to the Australian Antarctic Division annually with the reporting period being by calendar year (see also Table 7-7).

7.13.3.3 Environmental Performance Review and Reporting

In accordance with applicable environmental legislation for the activity, Woodside is required to report information on environmental performance to the appropriate regulator. Regulatory reporting requirements are summarised in Table 7-7.

Table 7-7: Routine external reporting requirements

Report	Recipient	Frequency	Content
Monthly Recordable Incident Reports	NOPSEMA	Monthly, by 15th of each month	Details of recordable incidents that have occurred during the PAP for previous month (if applicable).
Annual EP Performance Report	NOPSEMA	Annual, by 30 April of the year following reporting period	Compliance with EPOs, controls and standards outlined in this EP, in accordance with the Environment Regulations (Regulation 22(7)).
NPI Report	DCCEEW	Annual, by 30 September each year	Summary of the emissions to land, air and water including those from the facility. Reporting period 1 July to 30 June each year.
National Greenhouse and Energy Reporting (NGERS)	Clean Energy Regulator	Annual, by 31 October each year	Summary of energy use and greenhouse gas emissions including those from the facility. Reporting period is 1 July to 30 June each year.
Cetacean and Whale Shark Sightings Report	Australian Antarctic Division	Annually, by 31 January each year	Summary of any sightings of cetaceans or whale sharks. Reporting period is 1 January to 31 December.

7.13.3.4 End of the PAP Notification

In accordance with Regulation 54, Woodside will notify NOPSEMA within ten days of the completion of the Petroleum Activities Program.

7.13.3.5 End of the Environment Plan

The EP will end when Woodside notifies NOPSEMA that the PAP has ended, all of the obligations identified in this EP have been completed, and NOPSEMA has accepted the notification, in accordance with Regulation 46 of the Environment Regulations. As noted above, the PAP is not expected to end within the five-year life of this EP.

7.13.4 Incident Reporting (Internal)

All Woodside employees and contractors are required to report environmental incidents and non-conformances with this EP. Incidents are reported using an Event Report Form which includes details of the event, immediate action taken to control the situation, and corrective actions to prevent reoccurrence.

7.13.5 Incident Reporting (External) – Reportable and Recordable

7.13.5.1 Reportable Incidents

A reportable incident is defined under Regulation 5 of the Environment Regulations as:

- 'an incident relating to the activity that has caused, or has the potential to cause, moderate to significant environmental damage'.

A reportable incident for the PAP is:

- an incident that has caused environmental damage with a Consequence Level of Moderate C+ or above (as defined under Woodside's Risk Table; refer to Section 2.2)
- an incident that has the potential to cause environmental damage with a Consequence Level of Moderate C+ or above (as defined under Woodside's Risk Table – refer to Section 2.6).

The environmental risk assessment (Section 6) for the PAP identifies those risks with a potential consequence level of C+ for environment. The incidents that have the potential to cause this level of impact include hydrocarbon loss of containment events to ocean resulting from either:

- well loss of containment (MEE-01)
- subsea equipment loss of containment (MEE-02)
- loss of structural integrity (MEE-03)
- loss of marine vessel separation with platform (MEE-04)
- loss of control of suspended load from platform (MEE-05)
- unplanned hydrocarbon release: loss of well integrity during drilling operations.

Any such incidents represent potential events which would be reportable incidents. Reporting of incidents is undertaken with consideration of NOPSEMA (2014) guidance, stating 'if in doubt, notify NOPSEMA', and assessed on a case-by-case basis to determine if they trigger a Reportable incident as defined in this EP and by the Regulations.

7.13.5.1.1 Notification

NOPSEMA will be notified of all reportable incidents, according to the requirements of Regulations 47, 48 and 49 of the Environment Regulations. Woodside will:

- report all reportable incidents to the regulator (orally) as soon as practicable (ASAP), but within two hours of the incident or of its detection by Woodside
- provide a written record of the reported incident to NOPSEMA, the National Offshore Petroleum Titles Administrator (NOPTA) and the Department of the responsible State Minister (DMIRS) ASAP after orally reporting the incident
- complete a written report for all reportable incidents using a format consistent with the NOPSEMA Form FM0831 – Reportable Environmental Incident which must be submitted to NOPSEMA ASAP, but within three days of the incident or of its detection by Woodside
- provide a copy of the written report to the NOPTA and DMIRS, within seven days of the written report being provided to NOPSEMA.

AMSA will be notified of oil spill incidents ASAP after their occurrence, and DCCEEW notified if MNES are to be affected by the oil spill incident.

7.13.5.2 Recordable Incidents

A recordable incident is defined under Regulation 5 of the Environment Regulations as a 'breach of an EPO or EPS, in the EP that applies to the activity, that is not a reportable incident'.

Any breach of the EPOs or EPSs (as presented within Section 6) will be raised as a recordable incident and managed as per the notification and reporting requirements outlined below and internal requirements outlined in Section 7.13.4.

7.13.5.2.1 Notification

NOPSEMA will be notified of all recordable incidents, according to the requirements of Regulation 50(2), no later than 15 days after the end of the calendar month using the NOPSEMA Form – Recordable Environmental Incident Monthly Summary Report detailing:

- all recordable incidents that occurred during the calendar month
- all material facts and circumstances concerning the recordable incidents that the operator knows or is able, by reasonable search or enquiry, to find out
- any action taken to avoid or mitigate any adverse environment impacts of the recordable incidents
- the corrective action that has been taken, or is proposed to be taken, to prevent similar recordable incidents
- the action that has been taken, or is proposed to be taken, to prevent a similar incident occurring in the future.

7.13.5.3 Other External Reporting Requirements and Notifications

In addition to the notification and reporting of environmental incidents defined under the Environment Regulations and Woodside requirements, Table 7-8 describes the incident reporting requirements that also apply in the PAA if a spill originates from a vessel.

Table 7-8: External incident reporting requirements

Event	Responsibility	Notifiable party	Notification requirements	Contact	Contact detail
Any marine incidents during Petroleum Activities Program	Vessel Master	AMSA	Incident Alert Form 18 as soon as reasonably practicable* Within 72 hours after becoming aware of the incident, submit Incident Report Form 19	AMSA	reports@amsa.gov.au
Oil pollution incidents in Commonwealth waters	Vessel Master	AMSA Rescue Coordination Centre (RCC)	As per Article 8 and Protocol I of MARPOL within two hours via the national emergency 24-hour notification contacts and a written report within 24 hours of the request by AMSA	AMSA RCC Australia	If the ship is at sea, reports are to be made to: Free call: 1800 641 792 Phone: 08 9430 2100 (Fremantle)
Oil pollution incidents in Commonwealth waters	Vessel Master	AMSA	Without delay as per Protection of the Sea Act, part II, section 11(1), AMSA RCC notified verbally via the national emergency 24-hour notification contact of the hydrocarbon spill; follow up with a written Pollution Report ASAP after verbal notification	RCC Australia	Phone: 1800 641 792 or +61 2 6230 6811 AFTN: YSARYCYX
Any oil pollution incident which has the potential to enter a National Park or requires oil spill response activities to be conducted within a National Park	Vessel Master	DCCEEW	Reported verbally, ASAP	Director of National Parks	Phone: 02 6274 2220
Activity causes unintentional death of or injury to fauna species listed as Threatened or Migratory under the EPBC Act	Vessel Master	DCCEEW	Within seven days of becoming aware	Secretary of the DCCEEW	Phone: 1800 803 772 Email: protected.species@environment.gov.au

7.14 Emergency Preparedness and Response

7.14.1 Overview

Under Regulation 22(8), the implementation strategy must contain an oil pollution emergency plan (OPEP) and provide for the updating of the OPEP. Regulation 22(9) outlines the requirements for the OPEP which must include adequate arrangements for responding to and monitoring of oil pollution.

A summary of how this EP and supporting documents address the various requirements of Environment Regulations relating to oil pollution response arrangements is shown in Table 7-9.

Table 7-9: Oil pollution preparedness and response overview

Content	Environment Regulations Reference	Document/Section Reference
Details (oil pollution response) control measures that will be used to reduce the impacts and risks of the activity to ALARP and an acceptable level	Regulation 21 (5), (6), 22 (2)	Oil Spill Preparedness and Response Mitigation Assessment
Describes the OPEP	Regulation 22 (8)	EP: Section 7.9. Woodside's oil pollution emergency plan has the following components: • Woodside Oil Pollution Emergency Arrangements (Australia) • Pluto Operations Oil Pollution First Strike Plan • Xena-03 Tie-Back Oil Pollution First Strike Plan • Oil Spill Preparedness and Response Mitigation Assessment
Details the arrangements for responding to and monitoring oil pollution (to inform response activities), including control measures	Regulation 22 (9)	Oil Spill Preparedness and Response Mitigation Assessment Pluto Operations Oil Pollution First Strike Plan Xena-03 Tie-back Oil Pollution First Strike Plan
Details the arrangements for updating and testing the oil pollution response arrangements	Regulation 22 (8)(12)(13)(14)	EP: Section 7.3.3 Oil Spill Preparedness and Response Mitigation Assessment
Details provisions for monitoring impacts to the environment from oil pollution and response activities	Regulation 22(10)	Oil Spill Preparedness and Response Mitigation Assessment
Demonstrates that the oil pollution response arrangements are consistent with the national system for oil pollution preparedness and control	Regulation 22(11)	Oil Pollution Emergency Arrangements (Australia).

7.14.2 Emergency Response Training

Regulation 22(4) requires that the implementation strategy includes measures to ensure that employees and contractors have the appropriate competencies and training. Woodside has conducted a risk-based training needs analysis on positions required for effective emergency response (Table 7-10).

Table 7-10: Emergency response training requirements

IMT Position	Minimum Competency
Corporate Incident Management Team (CIMT) Incident Commander and Deputy Incident Commander	• IMT Fundamentals Course (internal course) or equivalent • ICS 100/200 • IMO3 or equivalent spill response specialist level with an oil spill response organisation (OSRO) • Participation in L2 activation, exercise or skills maintenance
Operations, Planning, Logistics and Finance Sections, and other rostered members of the CIMT	• IMT Fundamentals Course or equivalent • ICS 100/200 • Oil spill theory • Participation in L2 activation, exercise or skills maintenance
Environment Unit Leader	• IMT Fundamentals Course • ICS 100/200 • IMO2 or equivalent spill response specialist level with an OSRO • Participation in L2 activation, exercise or skills maintenance
Note on Competency/Equivalency	
In 2023, Woodside undertook a review of incident and crisis systems, processes and tools to assess whether these were fit-for purpose and has rolled out a change to the Crisis and Emergency Management training and the oil spill response training requirements for IMT roles. The revised IMT Fundamentals training Program aligns with the performance requirements of the PMAOMIR320 – Manage Incident Response Information and PMAOM0R418 - Coordinate Incident Response. In 2023, Woodside took the decision to align its global incident command arrangements to the Incident Command System (ICS). As such, all rostered members of the Incident Management Team are trained up to ICS 200. In addition to baseline incident management training, all rostered members of the CIMT undertake a level of hydrocarbon spill response training. Depending upon the role, this may take the form of IMO training or completion of Woodside's internal oil spill training course (OSREC) which involves the completion of two online AMSA Modules (Introduction to National Plan and Incident Management; and Introduction to Oil Spills) and face-to-face training. Woodside Learning Services (WLS) are responsible for collating and maintaining personnel training records. The HSP Dashboard reflects the competencies required for each oil spill role (IMT/operational).	

7.14.3 Emergency Response Preparation

The Corporate Incident Management Team, based in Woodside's head office in Perth, is the onshore coordination point for an offshore emergency. The CIMT is staffed by a roster of appropriately skilled personnel available on call 24 hours a day. The CIMT, under the leadership of the CIMT Leader, supports the site-based Incident Management Team by providing additional support in areas such as operations, logistics, planning, people management and public information (corporate affairs). A description of Woodside's Incident Command Structure and arrangements is further detailed in the Woodside Oil Pollution Emergency Arrangements (Australia).

Woodside will have a number of Emergency Response Plans (ERP) in place relevant to the PAP. The ERP provides procedural guidance specific to the asset and location of operations to control, coordinate and respond to an emergency or incident.

For the tie-back activity, the ERP will be a bridging document to the contracted rig's emergency documentation. This document summarises the emergency command, control and communications processes for the integrated operation and management of an emergency. It is developed in collaboration with the contracted rig so that roles and responsibilities between the contracted rig and Woodside personnel are identified and understood. The ERPs will contain instructions for vessel emergency, medical emergency, search and rescue, reportable incidents, incident notification, contact information and activation of the contractor's emergency centre and Woodside Communication Centre (WCC). Electronic copies of the ERPs are available on the facility Virtual

Bookshelves and the Security and Emergency Management intranet page. Hard controlled copies are available on the facilities.

In addition, the Emergency Preparedness MSPS (M06) is in place to assure that in the event of an incident, the organisation is appropriately prepared for all necessary actions which may be required for the protection of People, Environment, Asset, Reputation and Livelihood.

7.14.4 Emergency Event During Tie-back Activity

In the event of an emergency of any type:

- On the MODU, the OIM will assume overall onsite command and act as the Incident Controller (IC). All persons aboard the MODU will be required to act under the IC's directions. The MODU/vessels will maintain communications with the onshore Drilling Superintendent and/or other emergency services in the event of an emergency. Emergency response support can be provided by the contractor's emergency centre or WCC if requested by the IC.
- Vessel Master (depending on the location of the emergency) will assume overall onsite command and act as the IC. All persons will be required to act under the IC's directions. The vessels will maintain communications with the onshore project manager and/or other emergency services in the event of an emergency. Emergency response support can be provided by the contractor's emergency centre or WCC if requested by the IC.
- The MODU and project vessels will have on-board equipment for responding to emergencies including medical equipment, fire-fighting equipment and oil spill response equipment.

7.14.5 Initial Response to Facility Incident

The facility is equipped with emergency shutdown systems designed to protect personnel, the facility and the environment from unsafe operating conditions and catastrophic situations.

Emergency shutdown systems are provided as a means of isolation in response to process upsets and facility conditions (including associated flowlines and risers) that could result in loss of hydrocarbon inventories, or to reduce the potential impact from a hydrocarbon loss of containment event on the facility. Provision has been made for process and facility alarm systems to provide early indication of any process upset conditions and potential hazardous events, including fire and gas alarms.

The key ERP relevant to the facility and subsea infrastructure (excluding the export pipeline) is the Pluto Emergency Response Plan. This plan covers health, safety, asset and environmental risks (including fire, structural integrity, sabotage) so that the range of occupational, asset and environmental risk exposures from incidents have been considered and plans are in place for their management. The plan provides specific details on the initial response required during events with potential significant environmental consequences such as a hydrocarbon spill, subsea hydrocarbon leak or potential collision.

The Pipelines Emergency Response Plan covers key ERP relevant to the export pipeline, as well as other major pipelines on Woodside's NWS facilities. The Pluto. Vessels will have SOPEPs in accordance with the requirements of MARPOL 73/78 Annex I. These plans outline responsibilities, specify procedures and identify resources available in the event of a hydrocarbon or chemical spill from vessel activities. The Pluto Operations Oil Pollution First Strike Plan is intended to work in conjunction with the SOPEPs, if hydrocarbons are released to the marine environment from a vessel.

Woodside has established EPOs, EPSs and MC to be used for hydrocarbon spill response during the Petroleum Activities Program.

7.14.6 Oil and Other Hazardous Materials Spill

A significant hydrocarbon spill during the PAP is unlikely, but should such an event occur, it has the potential to cause serious environmental and reputational damage if not managed properly. The Woodside Oil Pollution Emergency Arrangements (Australia) document, supported by the Oil Pollution First Strike Plan which provides tactical response guidance to the activity/area and Oil Spill Preparedness and Response Strategy Selection and Evaluation of this EP, cover spill response for this Petroleum Activities Program.

The Crisis and Emergency Management Team manages Woodside's hydrocarbon spill response equipment stockpile. Woodside also maintains a suite of contracts for access to additional specialist response equipment and trained personnel as required via Australian and international spill response organisations and labour supply companies. In the event of a major spill, Woodside will enact first strike response actions, in liaison with the relevant Control Agency, as detailed in the activity-specific Oil Pollution First Strike Plan.

The MODU and project vessels will have SOPEPs in accordance with the requirements of MARPOL 73/78 Annex I. These plans outline responsibilities, specify procedures and identify resources available in the event of a hydrocarbon or chemical spill from vessel activities. The Oil Pollution First Strike Plan is intended to work in conjunction with the SOPEPs, if hydrocarbons are released to the marine environment from a vessel.

Woodside has established EPOs, performance standards and MC to be used for oil spill response during the Petroleum Activities Program.

7.14.7 Emergency and Spill Response

Woodside categorises incidents in relation to response requirements as follows:

7.14.7.1 Level 1 Incident

A Level 1 incident can be resolved through the use of existing resources, equipment and personnel. A Level 1 incident is contained, controlled and resolved by site/regionally based teams using existing resources and functional support services.

7.14.7.2 Level 2 Incident

A Level 2 incident is characterised by a response that requires external operational support to manage the incident. It is triggered in the event the capabilities of the tactical level response are exceeded. This support is provided to the activity via the activation of all, or part of, the responsible CIMT.

7.14.7.3 Level 3 Incident

A Level 3 incident or crisis is identified as a critical event that seriously threatens the organisation's People, the Environment, company Assets, Reputation, or Livelihood. At Woodside, the Crisis Management Team (CMT) manages the strategic impacts in order to respond to and recover from the threat to the company (material impacts, litigation, legal and commercial, reputation etc.). The CIMT may also be activated as required to manage the operational incident response.

7.14.8 Source Control Response Capability

Source Control IMT Structure

Woodside source control incident classification levels are defined in the Woodside *Well Control Procedure*. Level 1 and Level 2 Source Control events will be managed by Global Wells and Seismic (GWS) without activation of the Corporate Incident Management Team (CIMT).

A Level 3 Source Control incident requires the activation of the CIMT and Crisis Management Team (CMT). The CIMT organisation includes a Source Control Section Chief position on the core roster reporting to the CIMT Incident Commander (IC). Following activation, the Source Control Section Chief will assemble a Source Control Section comprising multiple Functional Support Teams (FST) appropriate to the magnitude and complexity of the situation. The make-up of the Source Control Section may change as the well control incident progresses. An example Source Control Section showing FST structures is shown in Figure 7-8. For clarity the Source Control Section can be considered a like for like replacement for the "Well Control Incident Team" which is referred to in some legacy documentation.

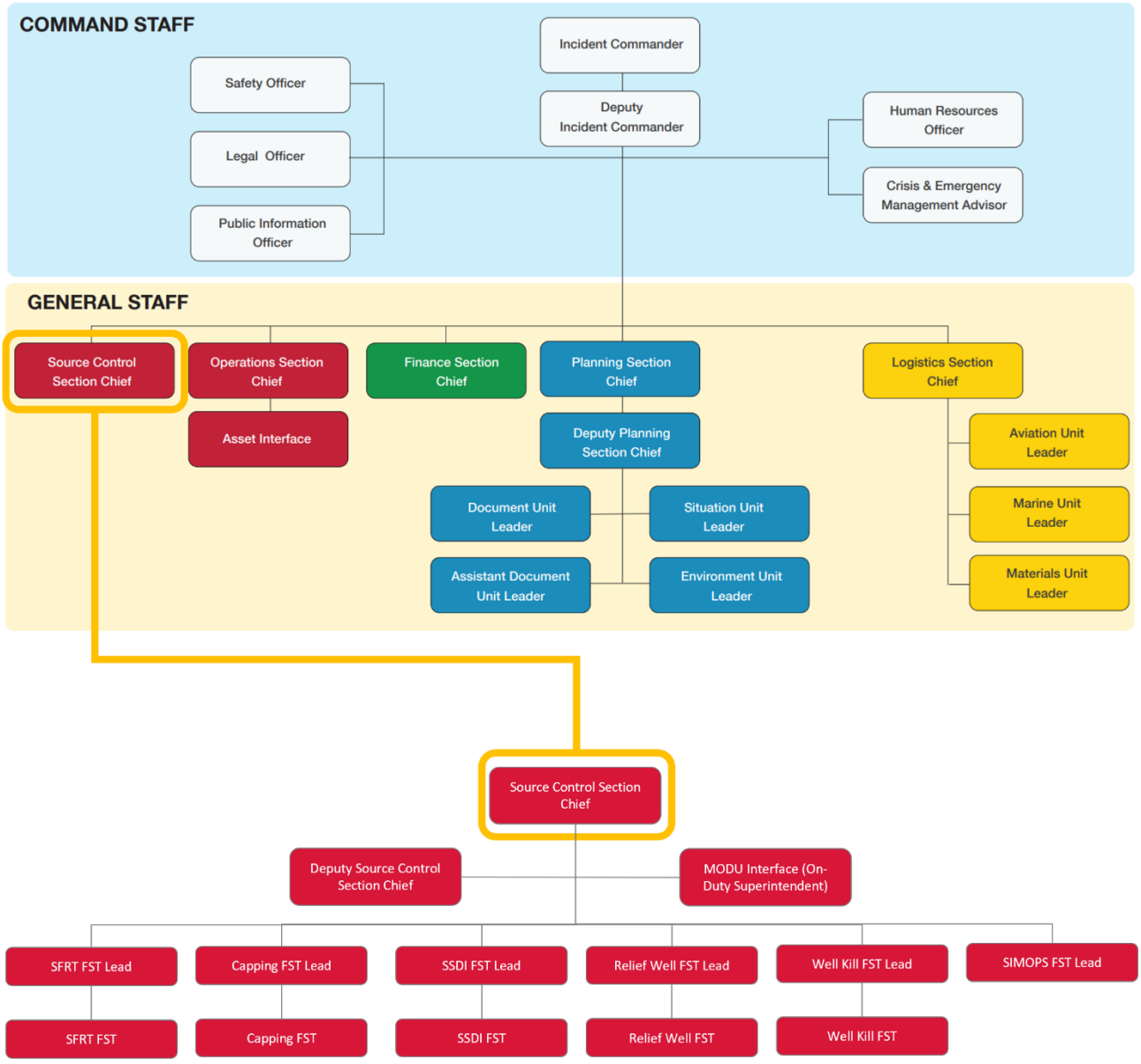

Figure 7-8: Source Control Section organisation structure

For complex source control events, the Source Control Section may be required to be in existence for an extended period. Suitable arrangements must be made to establish shifts and duty roster cycles for Source Control Section members.

Table 7-11: Source Control Section roles and responsibilities

Role	Key Responsibilities
Source Control Section Chief (SCSC)	The SCSC, a member of the CIMT, is responsible for managing, implementing, and coordinating operations and plans directly related to source control. The SCSC activates and supervises organizational elements per the Incident Action Plan (IAP) and directs its execution. The SCSC directs dedicated source control equipment, requests or releases resources, approves group operational plans, approves source control changes to the IAP, as necessary, and is aligned with the CIMT Operations Section Chief. The SCSC might have one or more Deputy SCSCs to coordinate SC Branch activities.
Deputy Source Control Section Chief	The Deputy Source Control Section Chief (Deputy SCSC) provides support and relief to the SCSC. The Deputy has the same training and expertise as the Section Chief. The Deputy-SCSC serves as the delegate of authority for the SCSC when the SCSC is unavailable. The number of Deputy-SCSCs varies as a function of proficiency and the support level required.
MODU Interface	The active Woodside Superintendent or delegate fulfills the role of MODU interface. The MODU interface assists the SCSC and Operations Section Chief in communications with the MODU and Associated Drilling Contractor. The MODU interface provides specialist knowledge of operations leading up to the event to the wider WICT.
Subsea First Response Toolkit (SFRT) FST Lead	The SFRT FST Lead is responsible for planning, organizing, and conducting operations that utilize the Subsea First Response kit. This includes site survey and assessment, debris removal and BOP intervention. The SFRT FST Lead reports directly to the SCSC and coordinates with the Capping, SSDI and SIMOPS FST Leads.
Capping FST Lead	The Capping FST Lead is responsible for planning, organizing, mobilising and conducting Capping Stack Installation and operations to shut-in the well. The Capping Stack FST Lead reports to the SCSC and coordinates its operations with the SFRT and Relief Well FST Leads. After the well is capped, the Capping Stack FST Lead's team monitors the well and cap integrity.
Subsea Dispersant Injection (SSDI) FST Lead	The Subsea Dispersant FST Lead coordinates the use of subsea dispersant equipment at or near the incident source. The Subsea Dispersant FST Lead manages subsea dispersant operations, encompassing subsea dispersant equipment operations, including setup, determination of flow rates and application techniques. The Subsea Dispersant FST Lead also coordinates the procurement and transportation of dispersant materials and works with the surface spill team to ensure the proper dispersant resource allocation. The Subsea Dispersant FST Lead also coordinates with the SIMOPS FST Lead.
Relief Well FST Lead	The Relief Well FST Lead is responsible for managing and coordinating the relief well design, relief well operation, coordinating the development of the drilling plan and drilling procedures, securing resources, and managing relief well operations. The Relief Well FST Lead coordinates their operations with the SIMOPS FST Lead. The Relief Well FST Lead reports to the SCSC for source control matters and the GWS Drilling Engineering Manager for drilling matters.
Well Kill FST Lead	The Well Kill FST Lead is responsible for planning and coordinating the Well Kill operation. This includes providing the best estimate of well-discharge rates and evaluation of well integrity to support capping and relief well operations. The Well Kill FST Lead coordinates gathering current reservoir and geologic models, wellbore diagram and directional surveys, well fluid surveys, performance predictions, wellbore stability, and mechanical condition of the well. The well kill FST provides recommendations on chemical injection programs (hydrate inhibitors) and proposed subsea flow equipment. The Well Kill FST Lead reports directly to the SCSC and coordinates with the Relief Well, Capping, SSDI and SIMOPS FST Leads.
SIMOPS FST Lead	The Simultaneous Operations (SIMOPS) Function Support Team Lead plans, organizes, and monitors subsea and surface operations within the designated SIMOPS area. The Supervisor manages the access to the subsea areas for all simultaneous activities, including remotely operated vehicle (ROV) operations, relief well operations, debris removal operations, capping operations, subsea dispersant operations, and containment operations, including frequency management. The SIMOPS FST Lead ensures coordination of all Source Control operations with other associated Response Operations. The Lead also works with the SCSC to develop operational plans for the IAP. The SIMOPS FST Lead reports directly to the SCSC.

The Source Control Section may include:

- GWS Head of Region
- GWS Engineering Manager/s
- GWS Superintendent/s
- Subsea Vessel Superintendent/s
- GWS Engineering support, as required
- Subsea Engineering support, as required
- Rig Contractor Representatives
- Service Company and Vendor Representatives
- Source Control Contractors
- HSE Adviser/s
- Logistics Coordinator/s
- Fluids Coordinator
- Sub-surface Pore Pressure Prediction Focal Point
- Operations Geologists
- Geomatics Representative

Woodside has a contract with Integrity Management and Response LLC, based in Houston, for the provision of source control emergency response services and personnel. This service can be called off on an "as-required" basis to supplement the Perth-based Source Control Response team.

7.14.8.1 Source Control IMT personnel and resourcing

A source control response is managed by the Source Control Section Chief (SCSC). This is a rostered position with role specific training requirements. The SCSC will initially draw upon personnel within the GWS Australia organisation for form the necessary Functional Support Teams (FSTs). To ensure the FSTs are staffed by the appropriate personnel, a map of FST positions against current role descriptions has been developed and can be found below in Table 7-12. For example the "Senior Drilling Engineer" role is mapped as being a primary candidate to fill the "Relief Well Unit Lead" FST position. In this example the competencies required to drill a relief well are deemed to be analogous to the competences required to drill a development or exploration well. As such, any individual currently performing in the Senior Drilling Engineer role, and subject to the existing Woodside performance management process including the completion of annual performance reviews, is deemed to be competent to perform the mapped FST role.

Table 7-12: Role Descriptions Mapped to Source Control Team Roles

	Functional Support Team							
Role Description	***Deputy SCSC***	***SFRT Unit***	***Capping Unit***	***SSDI Unit***	***Relief Well Unit***	***Well Kill Unit***	***SIMOPs Unit***	***RWIS Unit (SCA)***
Eng Manager / SME	Primary	Backup	Backup	Backup	Backup	Backup	Backup	Backup
Superintendent	Primary	Backup	Primary	Backup	Primary	Primary	Primary	Primary
Sen Drilling Engineer	Primary	Backup	Backup	Backup	Primary	Primary	Primary	Backup
Drilling Engineer	Backup		Backup	Backup	Backup	Backup	Backup	Backup

Sen Completions Engr	Primary	Backup	Backup	Backup		Primary	Primary	Backup
Completions Engr	Backup		Backup	Backup		Backup	Backup	Backup
Sen Subsea Engineer	Primary	Primary	Primary	Primary			Primary	Primary
Subsea Engineer	Backup	Backup	Backup	Backup			Backup	Backup

The Source Control IMT response structure indicated in Figure 7-8 is estimated to require from four to 14 personnel per shift, varying with the scale of response (eight to 28 personnel for 24-hour coverage). For a prolonged response, including resources to provide on/off weekly cycles, an additional 28 personnel may be required. These numbers are indicative and will vary, depending on scale and complexity of operations.

The current organisational review indicates Woodside has more than 80 internal staff members to support the Source Control IMT positions. In the event of a Level 3 incident, response activities will be given priority and other projects may be reduced or suspended, allowing reallocation of significant additional resources. Woodside would require access to external resources primarily for Specialist Services and Expertise in Source Control and Well Control operations.

Additional personnel to support the Source Control FST will be filled through the following avenues:

- Source Control Specialists through existing contracts, for example Wild Well Control, AGR.
- Secondment of personnel from other Titleholders through AEP Industry Memorandum of Understanding (2021).
- Engineering support through call-off frame agreements.

7.14.9 Emergency and Spill Response Drills and Exercises

Woodside's capability to respond to incidents will be tested periodically, in accordance with the Emergency and Crisis Management Procedure. The scope, frequency and objective of these tests is described in Table 7-13. Emergency response testing is aligned to existing or developing risks associated with Woodside's operations and activities. Corporate hazards/risks outlined in the corporate risk register, respective Safety Cases or project Risk Registers, are reference points developing and scheduling emergency and crisis management exercises. External participants may be invited to attend exercises (e.g., government agencies, specialist service providers, oil spill response organisations, or industry members with which Woodside has mutual aid arrangements).

The overall objective of exercises is to test procedures, skills and the teamwork of the Emergency Response and Command Teams in their ability to respond to major accident / major environment events. After each exercise, the team holds a debriefing session, during which the exercise is reviewed. Any lessons learned or areas for improvement are identified and incorporated into revised procedures, where appropriate.

Table 7-13: Testing of response capability

Response Category	Scope	Response Testing Frequency – tie-back activities	Response Testing Frequency – Operations	Response Testing Objective
Level 1 Response	Exercises are project-/ activity-specific	One Level 1 'First Strike' drill conducted within two weeks of commencing activity*. For campaigns with an operational duration of greater than one month this will occur within the first two weeks of commencing the	Two Level 1 'First Strike' drills conducted per year, per asset. Additional Level 1 emergency drills routinely conducted (approximately one per fortnight).	Operations: Drills test elements of the Pluto Facility Operations Oil Pollution First Strike Plan. Tie-back activities: Drills test elements of the Xena-03 Drilling and

Response Category	Scope	Response Testing Frequency – tie-back activities	Response Testing Frequency – Operations	Response Testing Objective
		activity and then at least every 6-month hire period thereafter.		Tie-back Oil Pollution First Strike Plan. Emergency drills are scheduled to test other aspects of the Emergency Response Plan.
Level 2 Response	Exercises are facility-specific	Level 2 Emergency Management exercises are relevant to activities with an operational duration of one month or greater. At least one Emergency Management exercise per MODU per campaign must be conducted within the first month of commencing the activity and then at every 6-month hire period thereafter, where applicable based on duration.	A minimum of one Emergency Management exercise is conducted biennially.	Testing both the facility IMT response and/or that of the CIMT following handover of incident control.
Level 3 Response	Exercises are relevant to all Woodside assets	The number of CMT exercises conducted each year is determined by the Chief Executive Officer, in consultation with the Vice President of Security and Emergency Management.		Test Woodside's ability to respond to and manage a crisis level incident.

** For drilling and tie-back activities, this applies to the project installation vessel (PIV) and MODU only.*

7.14.10 Hydrocarbon Spill Response Testing of Arrangements

There are a number of arrangements which, in the event of a spill, will underpin Woodside's ability to implement a response across its petroleum activities. So that these arrangements are adequately tested, the Capability Development Team within Security and Emergency Management ensures tests are conducted in alignment with the Hydrocarbon Spill Testing of Arrangements Schedule.

Woodside's arrangements for spill response are common across its Australian operating assets and activities so that the controls are consistent. The overall objective of testing these arrangements is so that Woodside maintains an ability to respond to a hydrocarbon spill, specifically so:

- relevant responders, contractors and key personnel understand and practise their assigned roles and responsibilities
- response arrangements and actions to validate response plans are tested
- lessons learned are incorporated into Woodside's processes and procedures and improvements are made where required.

If new response arrangements are introduced, or existing arrangements significantly amended, additional testing is undertaken accordingly. Additional activities or activity locations are not anticipated to occur; however, if they do, testing of relevant response arrangements will be undertaken as soon as practicable.

In addition to the testing of response capability described in Table 7-13, up to eight formal exercises are planned annually, across Woodside, to specifically test arrangements for responding to a hydrocarbon spill to the marine environment.

7.14.10.1 Testing of Arrangements Schedule

Woodside's Testing of Arrangements Schedule (Figure 7-9) aligns with international good practice for spill preparedness and response management; the testing is compatible with the IPIECA Good Practice Guide and the Australian Institute for Disaster Resilience's Australian Emergency Management Arrangements Handbook. If a spill occurs, enacting these arrangements will underpin Woodside's ability to implement a response across its petroleum activities.

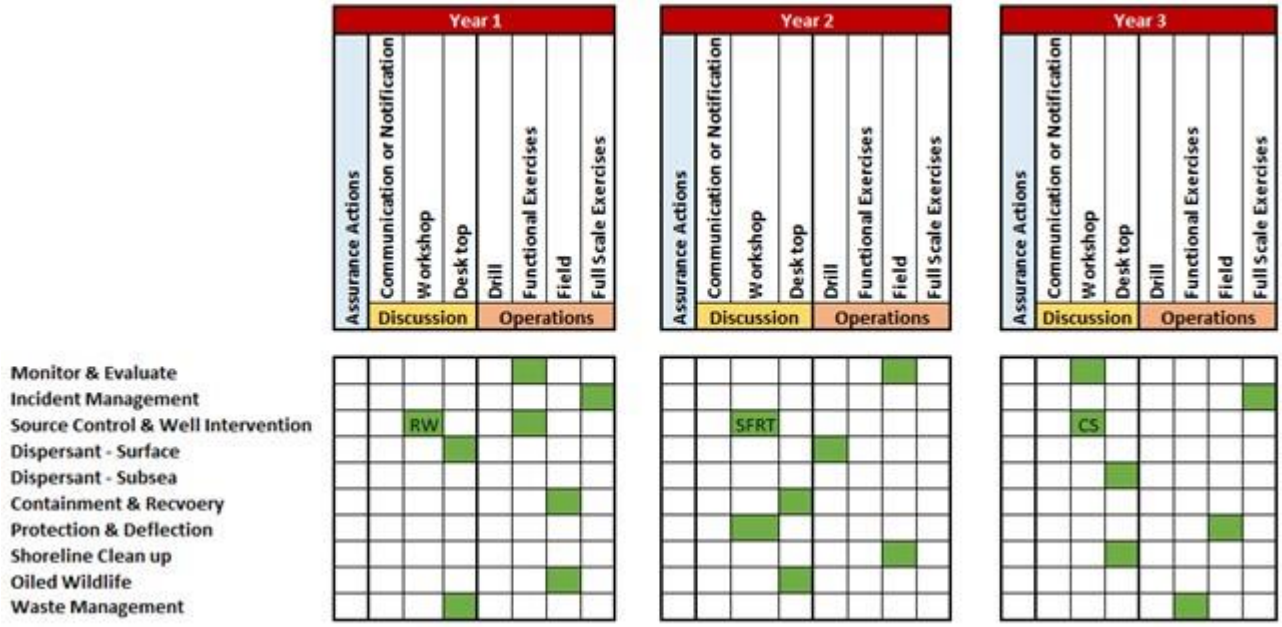

Figure 7-9: Indicative three-yearly testing of arrangements schedule

The hydrocarbon spill arrangements shown in the rows of the schedule are tested against Woodside's regulatory commitments. Each arrangement has a support agency/company and an area to be tested (e.g., capability, equipment and personnel). For example, an arrangement could be to test Woodside's personnel capability for conducting scientific monitoring, or the ability of the Australian Marine Oil Spill Centre to provide response personnel and equipment.

The vertical columns relate to how hydrocarbon spill arrangements will be tested over the three-year rolling schedule. The sub-heading for the column describes the standard method of testing likely to be undertaken (e.g., discussion exercise, desktop exercise), and the green cells indicate the arrangements that could be tested for each method.

Some arrangements may be tested across multiple exercises (e.g., critical arrangements) or via other 'additional assurance' methods outside the formal Testing of Arrangements Schedule that also constitute sufficient evidence of testing of arrangements (e.g., audits, no-notice drills, internal exercises, assurance drills).

7.14.10.2 Source Control testing and exercise arrangements

This section aims to present the testing and exercise arrangements for Source Control techniques as recommended in the recent industry guidelines such as the AEP Australian Offshore Titleholders Source Control Guideline (issued June 2021) and the NOPSEMA Information Paper: Source Control Planning and Procedures (issued June 2021)

The paragraphs below elaborate on the scope, testing frequency, objectives and close-out processes applicable to testing/ exercises for Source Control techniques.

*7.14.10.2.1 **Scope, objectives and KPIs***

- The objective of tests/exercises is to verify the capability of Woodside and/or contractors to manage and deliver elements of the Source Control Plans presented in OPEP.
- Tests may include specific elements of the response cycle for source control strategy, e.g. activation of arrangements, mobilisation of equipment and personnel and if relevant, testing of specific operational plans (e.g. SFRT, capping and relief well).
- Objectives typically include; testing of IMT capabilities, communications requirements, testing of source control response plans and evaluating specific aspects of source control arrangements, e.g. number of personnel, equipment, mobilisation plans and timeframes for response.
- An example of test objectives from recent exercise are presented below for reference –
  - Objective 1 – Exercising Source Control IMT against worst case credible loss of containment scenario
  - Objective 2 – Sourcing of relief well MODU
  - Objective 3 – Verify key equipment and services availability to support relief well operations.
  - Objective 4 – Delivery of ‘xx day’ relief well specific to activity.
- KPIs are taken from the ALARP commitments as stated in the OSPRMA (Appendix H: Oil Spill Preparedness and Response Mitigation Assessment).
- The exercises are planned utilising SMEs from the function with independent observers/ agencies as available (e.g. AMOSC, OSRL) along with Industry collaboration as available/ permitted.
- Formal exercise plans are produced prior to tests and exercises to document the scope, objectives, allocate resources and select relevant plans and previous lessons learnt for the test or exercise.
- Table 7-13 provides indicative scope, testing frequency and objectives of the emergency and spill response drills and exercises which includes Source Control response techniques.

*7.14.10.2.2 **Frequency of tests***

In addition to Testing of Arrangements for all responses listed in the schedule, source control techniques are tested on an annual basis; at least one technique per year. The schedule for testing of Source Control techniques is described in Section 7.14.10.1.

Woodside has tested the below response techniques in last three years:

- Capping stack deployment in 2021
- Subsea well kill spool in 2022 (discussion exercise)
- Subsea first response toolkit (SFRT), capping stack, relief well and well kill, and well intervention in 2023
- SFRT, relief well, capping stack, and well kill in 2024 during the Level 3 Crisis Management Exercise.

In addition, Woodside Source Control team members participate in joint industry exercises on source control as available for continuous improvements to response plans.

*7.14.10.2.3 **Close out Processes***

Post-exercise debriefs are held with the exercise team to identify gaps and capture learnings. The recommendations and actions are documented and assigned to the relevant function within the organisation and tracked until close-out. Close-out reports are distributed to relevant function leads and captured under Woodside's document management systems and relevant processes. Lessons learned are incorporated into Woodside's processes and procedures and improvements are made where required.

7.14.11 Cyclone and Dangerous Weather Preparation

Tropical cyclones and other severe weather events are a potential risk to the safety and health of personnel and can potentially cause spills of hazardous materials into the environment from infrastructure and/or damaged vessels.

Facilities and relevant support vessels on hire to Woodside receive regular forecasts from Woodside Meteorologists, who liaise closely with the Bureau of Meteorology (BoM). If a cyclone (or severe weather event) is forecast, the path and its development is plotted and monitored using the BoM data. If there is the potential for the cyclone (severe weather event) to affect the Petroleum Activities Program, the asset Cyclone Contingency Plan and the vessel's Cyclone Contingency Plan will be actioned. If required, vessels can transit from the proposed track of the cyclone (severe weather event).

8. REFERENCES

Aichinger Dias, L., Litz, J., Garrison, L., Martinez, A., Barry, K., Speakman, T., 2017. Exposure of cetaceans to petroleum products following the Deepwater Horizon oil spill in the Gulf of Mexico. Endangered Species Research 33: 119–125. doi:10.3354/esr00770.

Andrews, T.D. and Buggey, S., 2008. Authenticity in Aboriginal cultural landscapes. APT bulletin, 39(2/3), pp.63-71.

ANZG, 2018. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia.

Australian Institute of Marine Science, 2014. AIMS 2013 biodiversity survey of Glomar Shoal and Rankin Bank (Report prepared by the Australian Institute of Marine Science for Woodside Energy Ltd.). Australian Institute of Marine Science, Townsville.

Baker, C., Potter, A., Tran, M., Heap, A.D., 2008. Sedimentology and geomorphology of the northwest marine region: a spatial analysis (Geoscience Australia Record No. 2008/07). Geoscience Australia, Canberra.

Balcom, B.J., Graham, B.D., Hart, A.D., Bestall, G.P., 2012. Benthic Impacts Resulting from the Discharge of Drill Cuttings and Adhering Synthetic Based Drilling Fluid in Deepwater. In International Conference on Health, Safety and Environment in Oil and Gas Exploration and Production. OnePetro.

Barber, M., Jackson, S., 2011. Water and Indigenous People in the Pilbara, Western Australia: A Preliminary Study. CSIRO: Water for a Healthy Country Flagship.

Bartol, S.M., Musick, J.A., 2003. Sensory biology of sea turtles. In: Biology of Sea Turtles, Vol. 2. Lutz, P.L., Musick, J.A., Wyneken, J. (Eds.), pp. 79–102. Boca Raton, FL: CRC Press.

Batley, GE, van Dam, RA, Warne, MStJ, Chapman, JC, Fox, DR, Hickey, CW and Stauber, JL 2018. Technical rationale for changes to the Method for Deriving Australian and New Zealand Water Quality Guideline Values for Toxicants. Prepared for the revision of the Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra, ACT, 49 pp.

Batten, S., Allen, R., Wotton, C., 1998. The effects of the Sea Empress oil spill on the plankton of the southern Irish Sea. Marine Pollution Bulletin 36: 764–774.

Bednarik, R., 2002. The survival of the Murujuga (Burrup) petroglyphs. Rock Art Research 19(1): 29–40.

Benjamin, J., O'Leary, M., McDonald, J., Wisemen, C., McCarthy, J., Beckett, E., Morrison, P., Stankiewicz, F., Leach, J., Hacker, J., Baggaley, P., Jerbic, K., Fowler, M., Fairweather, J., Jefferies, P., Ulm, S., Bailey, G., 2020. Aboriginal artefacts on the continental shelf reveal ancient drowned cultural landscapes in northwest Australia. PLoS ONE 15(7): e0233912. https://doi.org/10.1371/journal.pone.0233912.

Berry WO, 1980, A comparative study of the uptake of toluene by bluegill sunfish *Lepomis macrochirus* and crayfish *Orconectes rusticus*. Environmental Pollution 21:109–119.

Black, K., Brand, G., Gwyther, D., Hammond, L., Mourtikas, S., Noyes-Fitzsimmons, R., Smith, J., Richardson, B., 1994. Environmental implications of offshore oil and gas development in Australia Coastal Facilities (pp. 460–492). Australian Petroleum Exploration Association (APEA).

BMT Asia Pacific, 2005. Environmental Impact Assessment Study for construction of helipads at Peng Chau and Yung Shue Wan, Lamma Island (Reference No. R/8109/10). BMT Asia Pacific, Hong Kong.

BMT, 2021. Goodwyn Alpha Produced Water Ecotoxicity and Chemical Characterisation Assessment 2020. BMT Commercial Australia Pty Ltd, Perth.

BMT, 2022. Offshore Water and Sediment Sampling Program Pluto. BMT Commercial Australia Pty Ltd, Perth.

BMT Oceanica, 2015. Offshore water quality monitoring verification and sediment quality study – Goodwyn A survey report (No. 1178_003/1 Rev 0). BMT Oceanica Pty Ltd, Perth.

BP Azerbaijan, 2013. Drilling and Completion Environmental Impact Assessment, Mitigation and Monitoring. BP Development Pty Ltd. https://www.bp.com/content/dam/bp/country-sites/en_az/azerbaijan/home/pdfs/esias/sd/sd2/9_drilling_eia.pdf.

Brewer, D.T., Lyne, V., Skewes, T.D., Rothlisberg, P., 2007. Trophic Systems of the North West Marine Region. A Report to The Department of the Environment, Water, Heritage and the Arts, by CSIRO Marine and Atmospheric Research: 156 pp.

Brown, S. 2018. Tales of a fat-tailed macropod. In: Archaeology of Portable Art: Southeast Asian, Pacific, and Australian Perspectives. Langley, M., Litster, M., Wright, D. and May, S. (eds), pp. 241-257. Routledge Publications, United Kingdom.

Cai, W., Cowan, T., 2006. SAM and regional rainfall in IPCC AR4 models: Can anthropogenic forcing account for southwest Western Australia winter rainfall reduction? Geophysical Research Letters 33. https://doi.org/10.1029/2006GL028037.

Catry, T., Ramos, J., Le Corre, M., Phillips, R., 2009. Movements, at-sea distribution and behaviour of a tropical pelagic seabird: the wedge-tailed shearwater in the western Indian Ocean. Marine Ecology Progress Series 391: 231–242. doi:10.3354/meps07717.

Chapman, C.C., Lea, M.A., Meyer, A., Sallée, J.B., Hindell, M., 2020. Defining Southern Ocean fronts and their influence on biological and physical processes in a changing climate. Nature Climate Change, 10(3), pp.209–219.

Chevron Australia Pty Ltd, 2015. Gorgon gas development and Jansz feed gas pipeline: Long-term marine turtle management plan (No. G1-NT-PLNX0000296). Chevron Australia Pty Ltd, Perth.

Church, J.A., Hunter, J.R., McInnes, K., White, N.J., 2006. Sea-level rise around the Australian coastline and the changing frequency of extreme events Australian Meteorological Magazine 55, 253–260. https://doi.org/10.1016/j.gloplachs.2006.04.001.

Cianchetti-Benedetti M., Becciu, P., Massa, B., Dell'Omo, G., 2018. Conflicts between tourist recreational activities and breeding shearwaters: short-term effect of artificial light and sound on chick weight. European Journal of Wildlife Research, 64, doi:10.1007/s10344-018-1178-x.

Clarkson, C., Jacobs, Z., Marwick, B., Fullagar, R., Wallis, L., Smith, M., Roberts, R.G., Hayes, E., Lowe, K., Carah, X., 2017. Human occupation of northern Australia by 65,000 years ago. Nature 547, 306–325.

Cohen, A., Gagnon, M.M., Nugegoda, D., 2005. Alterations of metabolic enzymes in Australian bass, *Macquaria novemaculeata*, after exposure to petroleum Hydrocarbons. Archives of Environmental Contamination and Toxicology 49: 200–205. doi:10.1007/s00244-004-0174-1.

Commonwealth of Australia, 2006. A guide to the integrated marine and coastal regionalisation of Australia Version 4.0. Department of the Environment and Heritage, Canberra, Australia.

Commonwealth of Australia, 2013. Recovery Plan for the White Shark (*Carcharodon carcharias*). Department of Sustainability, Environment, Water, Population and Communities.

Commonwealth of Australia, 2014. Recovery Plan for the Grey Nurse Shark (*Carcharias taurus*). Department of the Environment, Canberra.

Commonwealth of Australia, 2015. Wildlife conservation plan for migratory shorebirds. Department of the Environment, Canberra.

Commonwealth of Australia, 2015a. Conservation management plan for the blue whale: A recovery plan under the *Environment Protection and Biodiversity Conservation Act 1999* 2015–2025. Department of the Environment, Canberra.

Commonwealth of Australia, 2015b. Sawfish and river shark multispecies recovery plan (Recovery Plan). Department of the Environment, Canberra.

Commonwealth of Australia, 2017. Recovery plan for marine turtles in Australia 2017–2027. Department of the Environment and Energy, Canberra.

Commonwealth of Australia, 2018. Threat abatement plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans (2018). Department of the Environment and Energy.

Commonwealth of Australia, 2020. National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds. Department of the Environment and Energy, Canberra.

Commonwealth of Australia, 2022. Wildlife Conservation Plan for Seabirds. Canberra, Australian Capital Territory: Department of Agriculture, Water and the Environment (Australian Government). https://www.dcceew.gov.au/sites/default/files/documents/wildlife-conservation-plan-for-seabirds.pdf.

Crecelius, E., Trefry, J., McKinley, J., Lasorsa, B., Trocine, R., 2007. Study of barite solubility and the release of trace components to the marine environment (OCS Study No. MMS 2007-061). United States Department of the Interior, New Orleans.

CSIRO, 2017. Climate Change in Australia [WWW Document]. URL https://www.climatechangeinaustralia.gov.au/en/.

Dai, A., 2013. Increasing drought under global warming in observations and models. Nature climate change 3, 52.

Data Analysis Australia, 2016. Review of Statistical Aspects of Burrup Peninsula Rock Art Monitoring. Project DER/1.

de Lestand, S., Walsh, A. 2023. West Coast Rock Lobster Resource Status Report 2023. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2021/22: The State of the Fisheries eds. Newman, S.J., Santoro, K.G., Gaughan, D.J., Department of Primary Industries and Regional Development, Western Australia. pp. 41–47.

Dean, T.A., Stekoll, M.S., Jewett, S.C., Smith, R.O., Hose, J.E., 1998. Eelgrass (Zostera marina L.) in Prince William Sound, Alaska: Effects of the Exxon Valdez oil spill. Marine Pollution Bulletin 36: 201–210.

Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016. Deepwater Horizon oil spill: final programmatic damage assessment and restoration plan and final programmatic environmental impact statement. National Oceanic and Atmospheric Administration, Silver Spring.

[DAWE] Department of Agriculture, Water and the Environment, 2021. Species Profile and Threats Database – Key Ecological Features. Commonwealth of Australia, Canberra.

[DBCA] Department of Biodiversity Conservation and Attractions (DBCA) 2013. Murujuga National Park management plan 78. Available at https://library.dbca.wa.gov.au/static/FullTextFiles/924013.pdf

[DBCA & MAC] Department of Biodiversity Conservation and Attractions (DBCA) & Murujuga Aboriginal Corporation (MAC), 2023. Murujuga National Park management plan - Amendment 2023. Available at https://www.dbca.wa.gov.au/media/1306/download

[DBCA] Department of Biodiversity Conservation and Attractions (DBCA) 2024. 'Murujuga National Park' Available at https://www.dbca.wa.gov.au/management/plans/murujuga-national-park

[DBCA] Department of Biodiversity Conservation and Attractions (DBCA) 2013. Murujuga National Park management plan 78. Available at https://library.dbca.wa.gov.au/static/FullTextFiles/924013.pdf

[DBCA] Department of Biodiversity Conservation and Attractions (DBCA) & Murujuga Aboriginal Corporation (MAC), 2023. Murujuga National Park management plan - Amendment 2023. Available at https://www.dbca.wa.gov.au/media/1306/download

[DBCA] Department of Biodiversity Conservation and Attractions (DBCA) 2024. 'Murujuga National Park' Available at https://www.dbca.wa.gov.au/management/plans/murujuga-national-park

[DBCA] Department of Biodiversity, Conservation and Attractions 2020. Pilbara Inshore Islands Nature Reserves and Proposed Additions Draft Management Plan 2020. Department of Biodiversity, Conservation and Attractions, Perth

[DCCEEW] Department of Climate Change, Energy, the Environment and Water, 2021. Loss of Terrestrial Climatic Habitat Caused by Anthropogenic Emissions of Greenhouse Gases. Department of Climate Change, Energy, the Environment and Water. 2021. https://www.dcceew.gov.au/environment/biodiversity/threatened/key-threatening-processes/loss-ofhabitat-caused-by-greenhousegases#:~:text=The%20'Loss%20of%20climatic%20habitat,human%20activities%20of%20greenhouse%20gases.

[DCCEEW] Department of Climate Change, Energy, the Environment and Water, 2022. Australia's emissions projections 2022. www.dcceew.gov.au/climate-change/publications/australias-emissions-projections-2022.

[DCCEEW] Department of Climate Change, the Environment, Energy and Water, 2023a. Indigenous Protected Areas. Accessed at https://www.dcceew.gov.au/environment/land/indigenous-protected-areas.

[DCCEEW] Department of Climate Change, Energy, the Environment and Water, 2023b. Continental slope demersal fish communities. Australian Government. URL: https://www.environment.gov.au/sprat-public/action/kef/view/79;jsessionid=01AD87551D0DE1B0248C8722BE137004.

[DCCEEW] Department of Climate Change, Energy, the Environment and Water, 2023c. Conservation Advice for *Calidris ferruginea* (curlew sandpiper). Canberra: Department of Climate Change, Energy, the Environment and Water. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/856-conservation-advice-18122023.pdf.

[DCCEEW] Department of Climate Change, Energy, the Environment and Water (DEECCW), 2023d. Australia's emissions projections 2022. https://www.dcceew.gov.au/climate-change/publications/australias-emissions-projections-2022.

[DCCEEW] Department of Climate Change, Energy, the Environment and Water, 2024a. National Recovery Plan for the Southern Right Whale, Department of Climate Change, Energy, the Environment and Water, Canberra. Accessed at dcceew.gov.au/publications.

[DCCEEW] Department of Climate Change, Energy, the Environment and Water (DCCEEW) 2024b. Australia's emissions projections 2024, Department of Climate Change, Energy, the Environment and Water, Canberra, November. CC BY 4.0.

[DCCEEW] Department of Climate Change, Energy, the Environment and Water (DCCEEW) 2024c. Guidelines to assessing and managing impacts to Underwater Cultural Heritage in Australian waters. 2024, Department of Climate Change, Energy, the Environment and Water, Canberra, July. CC BY 4.0.

[DCCEEW] Department of Climate Change, Energy, the Environment and Water 2007. "Conservation Agreement between the Minister for the Environment and Water Resources on behalf of the Commonwealth of Australia and Woodside Energy Ltd in relation to the National Heritage Values of the National Heritage Place Dampier Archipelago (including Burrup Peninsula) https://www.dcceew.gov.au/sites/default/files/env/pages/4b63db66-1d8e-4427-91d1-951aff442414/files/ca-woodside.pdf[CALM] Department of Conservation and Land Management, 2005. Management Plan for the Ningaloo Marine Park and Muiron Islands Marine Management Area 2005–2015 (Management Plan No. 52). Department of Conservation and Land Management, Perth.

[DEC] Department of Environment and Conservation, 2007. Management plan for the Montebello/Barrow Islands Marine Conservation Reserves. Marine Parks and Reserves Authority, Perth.

[DoE] Department of Environment, 2015. Wildlife Conservation Plan for Migratory Shorebirds. Commonwealth of Australia, 2015.

[DOE] Department of the Environment, 2015b. Conservation Advice *Calidris ferruginea* curlew sandpiper. Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/856-conservation-advice.pdf.

[DISER] Department of Industry, Science and Resources, 2021. Australia's Long-Term Emissions Reduction Plan – A Whole-of-Economy Plan to Achieve Net Zero Emissions by 2050. Canberra, Australian Capital Territory: Department of Industry, Science, Energy and Resources (Australian Government).

[DISER] Department of Industry, Science and Resources, 2022. Australia's Nationally Determined Contribution Communication 2022. Canberra, Australian Capital Territory: Department of Industry, Science, Energy and Resources (Australian Government). https://unfccc.int/sites/default/files/NDC/2022-06/Australias%20NDC%20June%202022%20Update%20%283%29.pdf.

[DPAW] Department of Parks and Wildlife (2013) Whale shark management with particular reference to Ningaloo Marine Park, Wildlife management program no. 57, Department of Parks and Wildlife, Perth, Western Australia.

[DPIRD] Department of Primary Industries and Regional Development, 2022. Fish Cube WA – Commercial Collector Component Public Cube. Department of Primary Industries and Regional Development, Western Australia, Perth.

[DPIRD] Department of Primary Industries and Regional Development, 2023. Fish Cube WA – Commercial Collector Component Public Cube. Department of Primary Industries and Regional Development, Western Australia, Perth.

[DSEWPaC] Department of Sustainability, Environment, Water, Population and Communities, 2012. Marine bioregional plan for the North-west Marine Region. Prepared under the *Environment Protection and Biodiversity Conservation Act 1999*.

[DSEWPaC] Department of Sustainability, Environment, Water, Population and Communities, 2012a. Conservation Management Plan for the Southern Right Whale. A Recovery Plan under the *Environment Protection and Biodiversity Conservation Act 1999* 2011–2021. Canberra, Australian Capital Territory: Department of Sustainability, Environment, Water, Population and Communities. http://www.environment.gov.au/resource/conservation-management-plan-southern-right-whalerecovery-plan-under-environment.

[DSEWPaC] Department of Sustainability, Environment, Water, Population and Communities, 2013a. Recovery Plan for the Australian Sea Lion (*Neophoca cinerea*) 2013. Department of Sustainability, Environment, Water, Population and Communities. Available from: http://www.environment.gov.au/system/files/resources/1eb9233c-8474-40bb-8566-0ea02bbaa5b3/files/neophoca-cinerea-recovery-plan.pdf.

[DoEE] Department of the Environment and Energy, 2018. Injury and fatality to vertebrate marine life caused by ingestion of, or entanglement in, harmful marine debris. Accessed at http://www.environment.gov.au/biodiversity/threatened/key-threatening-processes/harmful-marine-debris.

[DoEE] Department of the Environment and Energy, 2019. Loss of terrestrial climatic habitat caused by anthropogenic emissions of greenhouse gases [WWW Document]. URL https://www.environment.gov.au/climate-change/climate-solutions-package (accessed 6.4.19).

[DEWHA] Department of the Environment, Water, Heritage and the Arts, 2008. The North-west Marine Bioregional Plan: Bioregional Profile. Department of the Environment, Water, Heritage and the Arts, Canberra.

[DNP] Director of National Parks, 2018. Australian Marine Parks: North-West Marine Parks Network Management Plan 2018. Canberra, Australian Capital Territory: Director of National Parks, Australian Government. https://parksaustralia.gov.au/marine/pub/plans/north-west-managementplan-2018.pdf.

Dix, G.R., James, N.P., Kyser, T.K., Bone, Y., Collins, L.B., 2005. Genesis and dispersal of carbonate mud relative to late quaternary sea-level change along a distally-steepened carbonate ramp (Northwestern Shelf, Western Australia). Journal of Sedimentary Research 75: 665–678.

Ditchfield, K., Manne, T., Hook, F., Ward, I. 2018. Coastal occupation before the “Big Swamp”: Results from excavations at John Wayne Country Rockshelter on Barrow Island [Papers in North-west Australian Archaeology]. Archaeology in Oceania 53 (3): 163-178

Dokulil, M. T., 1994. Environmental control of phytoplankton productivity in turbulent turbid systems. In Phytoplankton in Turbid Environments: Rivers and Shallow Lakes (pp. 65-72). Springer, Dordrecht.

Dorn, R. I. 2020. “Anthropogenic Interactions with Rock Varnish.” In Biogeochemical Cycles: Ecological Drivers and Environmental Impact, edited by K. Dontsova, Z. Balogh-Brunstad, and G. L. Roux, 267–283. Hoboken: American Geophysical Union and Wiley.

Dortch et al., 2019. Stone artifacts in the intertidal zone, Dampier Archipelago: Evidence for a submerged coastal site in Northwest Australia. The Journal of Island and Coastal Archaeology 16(1):1-15

Double, M., Gales, N., Jenner, K., Jenner, M., 2010. Satellite tracking of south-bound female humpback whales in the Kimberley region of Western Australia. Australian Marine Mammal Centre, Hobart.

Double, M., Jenner, K., Jenner, M., Ball, I., Childerhouse, S., Loverick, S., Gales, N., 2012. Satellite tracking of northbound humpback whales (*Megaptera novaeangliae*) off Western Australia. Australian Marine Mammals Centre, Hobart.

Double, M.C., Andrews-Goff, V., Jenner, K.C.S., Jenner, M.-N., Laverick, S.M., Branch, T.A., Gales, N.J., 2014. Migratory movements of pygmy blue whales (*Balaenoptera musculus brevicauda*) between Australia and Indonesia as revealed by satellite telemetry. PloS one 9: e93578.

Duffy, N., Ramanaidou, E., Alexander, D., Lau, D., 2017. Burrup Peninsula Aboriginal petroglyphs: colour change and spectral mineralogy 2004-2016. CSIRO, Australia. Confidential Report EP161761.

Dunlop, M., Hilbert, D., Ferrier, S., House, A., Liedloff, A., Prober, S., Smyth, A., Martin, T., Harwood, T., Williams, K., Fletcher, C., Murphy, H., 2012. The Implications of Climate Change for Biodiversity, Conservation and the National Reserve System: Final Synthesis. CSIRO Climate Adaptation Flagship. https://doi.org/10.4225/08/5850384d796c6.

Environment Australia, 2002. Ningaloo Marine Park (Commonwealth Waters) Management Plan. Federal Register of Legislative Instruments F2007B00971. Commonwealth of Australia, Canberra.

Environmental Protection Agency, 2016. State Waters Technical Guidance: Protecting the quality of Western Australia's marine environment.

Erbe, C., 2012. Effects of underwater noise on marine mammals. Advances in Experimental Medicine and Biology. 730:pp. 17–23.

Erbe, C., Dunlop, R., Dolman, S., 2018. Effects of Noise on Marine Mammals. Effects of Anthropogenic Noise on Animals pp 277–309.

Erbe, C., Reichmuth, C., Cunningham, K., Lucke, K., Dooling, R., 2015. Communication masking in marine mammals: A review and research strategy. Marine Pollution Bulletin. 103 1–2: pp. 15–38.

Falkner, I., Whiteway, T., Przeslawski, R., Heap, A.D., 2009. Review of Ten Key Ecological Features in the Northwest Marine Region: a report to the Department of the Environment, Water, Heritage and the Arts by Geoscience Australia, Geoscience Australia Record. Geoscience Australia, Canberra.

Field, C.D., 1995. Impact of expected climate change on mangroves. Hydrobiologia 295, 75–81.

Finneran, J., Henderson, E., Houser, D., Jenkins, K., Kotecki, S., Mulsow, J., 2017. Criteria and thresholds for U.S. navy acoustic and explosive effects analysis (phase III). Department of Navy, San Diego, California, USA. 183 pp.

Fletcher, W., Mumme, M., Webster, F., 2017. Status reports of the fisheries and aquatic resources of Western Australia 2015/2016: State of the fisheries. Department of Fisheries, Perth.

Fodrie, F.J., Heck, K.L., 2011. Response of coastal fishes to the Gulf of Mexico oil disaster. PLoS ONE 6: e21609. doi:10.1371/journal.pone.0021609.

Frick W.E., Roberts, P.J.W., Davis, L.R., Keyes, J., Baumgartner, D.J., George, K.P., 2001. Dilution Models for Effluent Discharges, 4th Edition (Visual Plumes) Draft. US Environmental Protection Agency, Georgia. July 2001.

Furnas, M., Mitchell, A., 1999. Wintertime carbon and nitrogen fluxes on Australia's Northwest Shelf. Estuarine, Coastal and Shelf Science 49: 165–175.

Gagan, M.K., Halide, H., Permana, R.C.E., Lebe, R., Dunbar, G., Kimbrough, A.K., Scott-Gagan, H., Zwartz, D., Hantoro, W.S., 2022. The historical impact of anthropogenic air-borne sulphur on the Pleistocene rock art of Sulawesi. Scientific Reports 12.

Gagnon, M.M., Rawson, C., 2010. Montara well release: Report on necropsies from a Timor Sea green turtle. Curtin University, Perth.

Gaston, K.J., Duffy, J.P., Gaston S., Bennie J., Davies, T.W., 2014. Human alteration of natural light cycles: causes and ecological consequences. Oecologia 176: 917–931.

Geraci, J., 1988. Physiologic and toxicologic effects of cetaceans, in: Geraci, J., St Aubin, D. (Eds.), Synthesis of Effects of Oil on Marine Mammals, OCS Study. Department of Interior, Ventura, pp. 168–202.

Gilmour, J., Smith, L., Pincock, S., Cook, K., 2013. Discovering Scott Reef: 20 years of exploration and research. Australian Institute of Marine Science, Townsville.

Gilmour, J., Speed, C.W., Babcock, R., 2016. Coral reproduction in Western Australia. PeerJ 4, e2010. https://doi.org/10.7717/peerj.2010.

Gleeson et al 2018, Rock-art microbiome: influences on long term reservation of historic and culturally important engravings.

Gophen, M., 2015. Ecological devastation in Lake Victoria: Part B: Plankton and fish communities. Open Journal of Ecology, 5(07), 315.

Greene, Jr., C. R., 1987. Characteristics of oil industry dredge and drilling sounds in the Beaufort Sea. Journal of the Acoustical Society of America 82: 1315–1324.

Hanson, C.E., Waite, A.M., Thompson, P.A., Pattiaratchi, C.B., 2007. Phytoplankton community structure and nitrogen nutrition in Leeuwin Current and coastal waters off the Gascoyne region of Western Australia. Deep Sea Research Part II: Topical Studies in Oceanography 54, 902–924.

Hassan, A., Javed, H., 2011. Effects of Tasman Spirit oil spill on coastal birds at Clifton, Karachi coast, Pakistan. Journal of Animal and Plant Sciences 21: 333–339.

Hazel, J., Lawler, I.R., Marsh, H., Robson, S., 2007. Vessel speed increases collision risk for the green turtle Chelonia mydas. Endangered Species Research 3: 105–113.

Heatwole, H., Cogger, H.G., 1993. Chapter 36: Family Hydrophiidae, in: Fauna of Australia. Australian Government Publishing Service, Canberra.

Helm, R.C., Costa, D.P., DeBruyn, T.D., O'Shea, T.J., Wells, R.S., Williams, T.M., 2015. Overview of effects of oil spills on marine mammals, in: Fingas, M. (Ed.), Handbook of Oil Spill Science and Technology. Wiley, pp. 455–475.

Henkel, J.R., Sigel, B.J., Taylor, C.M., 2012. Large-scale impacts of the Deepwater Horizon oil spill: Can local disturbance affect distant ecosystems through migratory shorebirds? BioScience 62: 676–685. doi:10.1525/bio.2012.62.7.10.

Hinwood, J.B., Potts, A.E., Dennis, L.R., Carey, J.M., Houridis, H., Bell, R.J., Thomson, J.R., Boudreau, P., Ayling, A.M., 1994. "Environmental Implications of Offshore Oil and Gas Development in Australia - Drilling Activities" in Environmental Implications of Offshore Oil and Gas Development in Australia - the Findings of an Independent Scientific Review , Swan, J.M., Neff, J.M., Young, P.C. eds, Australian Petroleum Exploration Association, pp 124–207.

Hjermann, D.Ø., Melsom, A., Dingsør, G.E., Durant, J.M., Eikeset, A.M., Røed, L.P., Ottersen, G., Storvik, G., Stenseth, N.C., 2007. Fish and oil in the Lofoten–Barents Sea system: synoptic review of the effect of oil spills on fish populations. Marine Ecology Progress Series 339: 283–299.

Hoegh-Guldberg, O., 1999. Climate change, coral bleaching and the future of the world's coral reefs. Marine and freshwater research 50, 839–866.

Hoegh-Guldberg, O., Jacob, D., Taylor, M., Bindi, M., Brown, S., Camilloni, I., Diedhiou, A., Djalante, R., Ebi, K.L., Engelbrecht, F., Guiot, J., Hijioka, Y., Mehrotra, S., Payne, A., Seneviratne, S.I., Thomas, A., Warren, R., Zhou, G., 2018. Impacts of 1.5oC Global Warming on Natural and Human Systems, in: Global Warming of 1.5°C. An IPCC Special Report on the Impacts of Global Warming of 1.5°C above Pre-Industrial Levels and Related Global Greenhouse Gas Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty.Hughes, L., 2003. Climate change and Australia: Trends, projections and impacts. Austral Ecology 28, 423–443. https://doi.org/10.1111/j.1442-9993.2003.tb00266.x

Hook, F., McDonald, E., Paterson, A., Souter, C. and Veitch B., 2004. Cultural Heritage Assessment & Management Plan - Proposed Gorgon Development, Pilbara, North Western Australia

IEA International Energy Agency, 2021. Net Zero by 2050, IEA, Paris https://www.iea.org/reports/net-zero-by-2050, License: CC BY 4.0.

Ingole, B. S. Goltekar, R., Gonsalves, S., Ansari, Z. A., 2005. Recovery of Deep-sea Meiofauna after Artificial Disturbance in the Central Indian Basin. Marine Georesources and Geotechnology Vol. 23(4).

[IPPC] International Panel on Climate Change, 2021. Climate Change 2021: The Physical Science Basis. Working Group 1 Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. [Masson-Delmotte, V., Zhai, P., Pirani, A., Connors, S.L., Péan, C., Berger, S., Caud, N., Chen, Y., Goldfarb, L., Gomis, M.I., Huang, M., Leitzell, K., Lonnoy, E., Matthews, J.B.R., Maycock, T.K., Waterfield, T., Yelekçi, O., Yu, R., Zhou, B. (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 2391 pp. doi:10.1017/9781009157896.

[IPCC] International Panel on Climate Change, 2021b. 'Technical Summary' In Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge, United Kingdom and New York: Cambridge University Press. Doi:10.1017/9781009157896.002.

IPCC 2023. "Climate Change 2023: Synthesis Report. Contributions of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change".

[IPIECA] International Petroleum Industry Environmental Conservation Association, 2004. A guide to oiled wildlife response planning (IPIECA Report Series No. 13). International Petroleum Industry Environmental Conservation Association, London.

International Tanker Owners Pollution Federation, 2011a. Effects of oil pollution on the marine environment (Technical Information Paper No. 13). International Tanker Owners Pollution Federation Limited, London.

International Tanker Owners Pollution Federation, 2011b. Effects of oil pollution on fisheries and mariculture (Technical Information Paper No. 11). International Tanker Owners Pollution Federation Limited, London.

IUCN, 2020a. "Great Barrier Reef". IUCN World Heritage Outlook. 2020. https://worldheritageoutlook.iucn.org/explore-sites/wdpaid/2571.

IUCN, 2020b. "Ningaloo Coast". IUCN World Heritage Outlook. 2020. https://worldheritageoutlook.iucn.org/explore-sites/wdpaid/555542338.

IUCN, 2020c. "Shark Bay, Western Australia". IUCN World Heritage Outlook. 2020. https://worldheritageoutlook.iucn.org/explore-sites/wdpaid/67724.

Jacobs, 2014. Lambert Deep Development: Environmental Baseline Report. Report prepared for Woodside Energy Ltd. Jacobs Group (Australia) Pty Ltd, Perth.

Jacobs, 2016. Offshore Facilities Produced Water: Chemical Characterisation and Sedimentation Assessment 2016, Document number: IW118700-0000-NM-RPT-0004.

Jacobs, 2018. Offshore Production Facilities Marine Discharges Modelling Study – Angel. Report prepared for Jacobs by Rob Phillips Consulting Pty Ltd.

James, N.P., Bone, Y., Kyser, T.K., Dix, G.R., Collins, L.B., 2004. The importance of changing oceanography in controlling late Quaternary carbonate sedimentation on a high-energy, tropical, oceanic ramp: north-western Australia. Sedimentology 51: 1179–1205. doi:10.1111/j.1365-3091.2004.00666.x.

Jarman, S., Wilson, S., 2004. DNA-based species identification of krill consumed by whale sharks. Journal of Fish Biology 65: 586–591.

Jenkins, G., and McKinnon, L., 2006, Port Phillip Bay Channel Deepening Project: supplemental environmental effects statement – aquaculture and fisheries.

Jensen, A., Silber, G., 2004. Large whale ship strike database (NOAA Technical Memorandum No. NMFS-OPR). National Marine Fisheries Service, Silver Spring.

Jiménez-Arranz, G., Glanfield, R., Banda, N., Wyatt, R. 2017. Review of Existing Data on Underwater Sounds Produced by the Oil and Gas Industry. Prepared by Seiche Ltd. E&P Sound and Marine Life (JIP). August 2017.

Johansen, J.L., Allan, B.J., Rummer, J.L., Esbaugh, A.J., 2017. Oil exposure disrupts early life-history stages of coral Reef fishes via behavioural impairments. Nature Ecology and Evolution 1: 1146–1152. doi:10.1038/s41559-017-0232-5.

Johnston, D., Harris, D., Mckinley, S., Blay, N., 2023. North Coast Crab Resource Status Report 2023. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2021/22: The State of the Fisheries eds. Newman, S.J., Santoro, K.G., Gaughan, D.J., Department of Primary Industries and Regional Development, Western Australia. pp. 191–200.

Jones, R., Wakeford, M., Currey-Randall, L., Miller, K., Tonin, H., 2021. Drill cuttings and drilling fluids (muds) transport, fate and effects near a coral reef mesophotic zone. Marine Pollution Bulletin 172, 35 pp.

Juluwarlu Aboriginal Corporation. 2004. Know the song know the country: the Ngaardangarli story of culture and history in Ngarluma & Yindjibarndi country. Roebourne, W. A : Juluwarlu Aboriginal Corporation

Kearney, A., O'Leary, M. & Platten, S. 2023. Sea Country: Plurality and knowledge of saltwater territories in Indigenous Australian contexts. The Geographical Journal, 189, 104–116. Available from: https://doi.org/10.1111/geoj.12466.

Keller, K., Blake, S., Cao, A., 2023. Western Deepwater Trawl Fishery. In: Butler, I., Patterson, H., Bromhead, D., Galeano, D., Timmiss, T., Woodhams, J., Curtotti, R., 2023. Fishery status reports 2023. Australian Bureau of Agriculture and Resources Economics and Sciences, Canberra.249-256. URL: https://doi.org/10.25814/vgp4-xr81.

Keller, K., Curtotti, R., 2023. North-West Slope Trawl Fishery. In: Butler, I., Patterson, H., Bromhead, D., Galeano, D., Timmiss, T., Woodhams, J., Curtotti, R., 2023. Fishery status reports 2023. Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra. 70-77. URL: https://doi.org/10.25814/vgp4-xr81.

King, D., Lyne, R., Girling, A., Peterson, D., Stephenson, R., Short, D., 1996. Environmental risk assessment of petroleum substances: The hydrocarbon block method (CONCAWE No. 96/52). CONCAWE, Brussels.

Laist, D.W., Knowlton, A.R., Mead, J.G., Collet, A.S., Podesta, M., 2001. Collisions between ships and whales. Marine Mammal Science 17: 35–75.

Lawrence, J., Mackey, B., Chiew, F., Costello, M., Hennessy, K., Lansbury, N., Nidumolu, U., et al., 2022. 'Australia'. In Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge. United Kingdom and New York: Cambridge University Press.

Lewis, P and Watt, M. 2023. Statewide Large Pelagic Finfish Resource Status Report 2022. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2021/2022: The State of the Fisheries eds. Newman, S.J., Wise, B.S., Santoro, K.G., Gaughan, D.J. Department of Primary Industries and Regional Development, Western Australia. Pp 255–261.

Li, S, Koessler, M.W., Stephen, T.J. (2024) Woodside NSW FPSO Operations Modelling. JASCO Applied Sciences (Australia) Pty Ltd.

Longcore, T., Rich, C., 2004. Ecological light pollution. Frontiers in Ecology and the Environment 2: 191–198.

Lutcavage, M., Lutz, P., Bossart, G., Hudson, D., 1995. Physiologic and clinicopathologic effects of crude oil on loggerhead sea turtles. Archives of Environmental Contamination and Toxicology 28: 417–422.

Mackie, M., Nardi, A., Lewis, P., Newman, S., 2007. Small pelagic fishes of the north-west marine region. Department of Fisheries, Perth.

MacLeod, I. 2005 'Effects of moisture, micronutrient supplies and microbiological activity on the surface pH of rocks in the Burrup Peninsula' in ICOM Committee for Conservation, 14th Triennial Meeting Preprints.

MacLeod, I. and W. Fish, 2021. 'Determining decay mechanisms on engraved rock art sites using pH, chloride ion and redox measurements with an assessment of the impact of cyclones, sea salt and nitrate ions on acidity' in ICOM Committee for Conservation, 19th Triennial Meeting Preprints.

MacLeod, I. 2020. "Surface chemistry of Burrup Rock art at the Yara monitoring sites October 2020" Report for Yara Pilbara Nitrates by CBG Solutions

MacLeod, I. 2021. "Surface chemistry of Burrup Rock art at the Yara monitoring sites September 2021" Report for Yara Pilbara Nitrates by CBG Solutions

Mason, R.P., Choi, A.L., Fitzgerald, W.F., Hammerschmidt, C.R., Lamborg, C.H., Soerensen, A.L. Sunderland, E.M. Mercury biogeochemical cycling in the ocean and policy implications. Environmental Research Volume 119, 2012, Pages 101-117, ISSN 0013-9351, https://doi.org/10.1016/j.envres.2012.03.013.

Martin, S.B., Kowarski, K.A., Maxner, E.E., Wilson, C.C., 2019. Acoustic Monitoring During Scotian Basin Exploration Project: Summer 2018. Document 01687, Version 2.0. Technical report by JASCO Applied Sciences for BP Canada Energy Group ULC.

Matkin, C.O., Saulitis, E.L., Ellis, G.M., Olesiuk, P., Rice, S.D., 2008. Ongoing population-level impacts on killer whales *Orcinus orca* following the 'Exxon Valdez' oil spill in Prince William Sound, Alaska. Marine Ecology Progress Series 356: 269–281.

McCauley, R., 1998. Radiated underwater noise measured from the drilling rig Ocean General, rig tenders Pacific Ariki and Pacific Frontier, fishing vessel Reef Venture and natural sources in the Timor Sea, Northern Australia. (Report No. C98–20). Centre for Marine Science and Technology, Curtin University of Technology, Perth.

McCauley, R.D., 2002. Underwater noise generated by the Cossack Pioneer FPSO and its translation to the proposed Vincent petroleum field. Centre for Marine Science and Technology, Curtin University of Technology, Perth.

McCauley, R., 2005. Underwater sea noise in the Otway Basin – drilling, seismic and blue whales, Oct–Dec 2003, in: Howell, E. (Ed.), A Compilation of Recent Research into the Marine Environment. Australian Petroleum Exploration Association, Canberra, pp. 18–19.

McCauley, R., Jenner, C., Bannister, J., Cato, D., Duncan, A., 2000. Blue whale calling in the Rottnest trench, Western Australia, and low frequency sea noise. Acoustics Australia / Australian Acoustical Society: 245–250.

McCauley, R., Jenner, C., 2010. Migratory patterns and estimated population size of pygmy blue whales (*Balaenoptera musculus brevicauda*) traversing the Western Australian coast based on passive acoustics (International Whaling Commission Report No. SC/62/SH26). International Whaling Commission.

McDonald, E.M., Phillips, T., 2021. Report of an Ethnographic Consultation Regarding Woodside's Scarborough Gas Project and Submerged Landscape, Pilbara, Western Australia – Phase I. Report by Ethnosciences to Murujuga Aboriginal Corporation.

McDonald, J.J. and P. Veth 2006. Distribution of rock art on the Dampier Archipelago and Associated Islands including Peninsula, Western Australia. Gap Analysis and Predictive Model. Report to the Department of Environment and Heritage, Canberra

McDonald, J. 2015. I must go down to the sea again: Or, what happens when the sea comes to you? Murujuga rock art as an environmental indicator for Australia's north-west. Quaternary International, 395:124-135.

McDonald, J. and Berry, M. 2016. Murujuga, Northwestern Australia: When arid hunter-gatherers became coastal foragers. Journal of Island and Coastal Archaeology, 12: 24-43

McDonald, J., Reynen, W., Ditchfield, K., Dortch, J., Leopold, M., Stephenson, B., Whitley, T., Ward, I. and Veth, P. 2018. Murujuga Rockshelter: First evidence for Pleistocene occupation on the Burrup Peninsula. Quaternary Science Reviews, 193:266-287.

McInnes, K., 2015. Wet Tropics Cluster Report, in: Ekström, M., Whetton, P., Gerbing, C., Grose, M., Webb, L., Risbey, J. (Eds.), Climate Change in Australia Projections for Australia's Natural Resource Management Regions: Cluster Reports. CSIRO and Bureau of Meteorology, Australia.

McLean, D.L., Partridge, J.C., Bond, T., Birt, M.J., Bornt, K.R., Langlois, T.J., 2017. Using industry ROV videos to assess fish associations with subsea pipelines. Continental Shelf Research 141: 76–97. doi:10.1016/j.csr.2017.05.006.

McNiven, I., 2004. Saltwater People: spiritscapes, maritime rituals and the archaeology of Australian indigenous seascapes. World Archaeology, 35(3): 329-349.

McPherson, C., Wlech, S., Zykov, M., Wood, M., Koessler, M., 2019. Scarborough US4AB Noise Modelling Study. Acoustic modelling for assessing marine fauna sound exposures. JASCO Applied Sciences (Australia) Pty Ltd.

Milroy, J., & Revell, G. 2013. Aboriginal story systems: remapping the west, knowing country, sharing space. Occasion: Interdisciplinary Studies in the Humanities

Milton, S.L., Lutz, P.L., 2003. Physiological and genetic responses to environmental stress, in: Lutz, P.L., Musick, J.A., Wyneken, J. (Eds.), The Biology of Sea Turtles. CRC Press, Boca Raton, pp. 164–198.

Mitkus, M., Nevitt, G.A., Kelber, A., 2018. Development of the Visual System in a Burrow-Nesting Seabird: Leach's Storm Petrel. Brain Behaviour Evolution 91: 4–16.

MGP, 2022. 'Methane Guiding Principles – Enabling Action to Reduce Global Methane Emissions'. Methane Guiding Principles. 2022.

Morse, K., 1993. Who can see the sea? Prehistoric Aboriginal occupation of the Cape Range peninsula. Records of the Western Australian Museum, Supplement 45: 227-248.

Muller, S., 2008. Community-based management of saltwater country, Northern Australia. Development 51(1): 139-143

Mulvaney, K. 2010. Murujuga Marni – Dampier Petroglyphs: shadows in the landscape echoes across time. Unpublished PhD Thesis, University of New England, Armidale.Murujuga Aboriginal Corporation 2016. Murujuga Cultural Heritage Management Plan. Pindan Printing Pty Ltd, Broome.

National Energy Resources Australia, 2018. Environment Plan Reference Case – Consequence analysis of an accidental release of diesel. Available at: https://referencecases.nera.org.au/.

National Indigenous Australians Agency (NIAA) 2024. Indigenous Protected Areas Program Evaluation Community Report

National Marine Fisheries Services (NMFS), 2005. Habitat Conservation and Restoration Anadromous Fish Policy (National Marine Fisheries Service Instruction No. 03-401-11). National Marine Fisheries Service, USA.

National Marine Fisheries Service (US), 2014. Marine mammals acoustic thresholds guidance. National Marine Fisheries Service, National Oceanic and Atmospheric Administration, US Department of Commerce. Viewed online on 24 February 2019 at http://www.westcoast.fisheries.noaa.gov/protected_species/marine_mammals/threshold_guidance.html.

National Marine Fisheries Service (US), 2018. 2018 Revision to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0): Underwater Thresholds for Onset of Permanent and Temporary Threshold Shifts. US Department of Commerce, NOAA. NOAA Technical Memorandum NMFS-OPR-59. 167 p.

National Oceanic and Atmospheric Administration, 2006. Fact Sheet: Small Diesel Spills (500–5000 gallons).

National Oceanic and Atmospheric Administration, 2010. Oil and sea turtles: Biology, planning and response. National Oceanic and Atmospheric Administration, Washington.

National Oceanic and Atmospheric Administration, 2014. Oil spills in mangroves: Planning and response considerations. National Oceanic and Atmospheric Administration, Washington.

National Oceanic and Atmospheric Administration (US), 2019. ESA Section 7 Consultation tools for marine mammals on the west coast, www.fisheries.noaa.gov/westcoast/endangered-species-conservation/esa-section-7-consultation-tools-marine-mammals-west.

National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), 2019. Oil spill modelling bulletin.

Nedwed, T., Smith, J.P., Melton, R., 2006. Fate of nonaqueous drilling fluid cuttings discharged from a deepwater exploration well. Presented at the SPE International Health, Safety and Environment Conference, Society of Petroleum Engineers, Abu Dhabi.

Neff, J.M., 2010. Fate and effects of water based drilling muds and cuttings in cold water environments. Houston (TX): Report to Shell Exploration and Production Company.

Neff, J., 2002. Bioaccumulation in Marine Organisms - Effect of Contaminants from Oil Well Produced Water. Elsevier, Amsterdam.

Neff, J., Lee, K., DeBlois, E.M., 2011. Produced water: Overview of composition, fate and effects. In: Produced Water, Environmental Risks and Advances in Mitigation Technologies (Eds. Lee, K. and Neff, J.) pp 608. Springer New York.

Neff, J., McKelvie, S., Ayers Jr., R., 2000. Environmental impacts of synthetic based drilling fluids (OCS Study No. MMS 2000-064). United States Department of the Interior, New Orleans.

Neff, J.M., 2005. Composition, environmental fates, and biological effects of water based drilling muds and cuttings discharged to the marine environment: a synthesis and annotated biography. Prepared for the Petroleum Environment Research Forum (PERF) and the American Petroleum Institute. American Petroleum Institute, Washington, DC, 73 pp.

Neff and Sauer, 1996. Aromatic Hydrocarbons in Produced Water, in: Reed, M., Johnsen, S. (Eds.), Produced Water 2: Environmental Issues and Mitigation Technologies. Springer US, Boston, MA, pp. 163–175. https://doi.org/10.1007/978-1-4613-0379-4_16.

Neff, J.M., 2008. Estimation of bioavailability of metals from drilling mud barite. Integrated Environmental Assessment and Management 4, 184–193.

Negri, A.P., Heyward, A.J., 2000. Inhibition of fertilization and larval metamorphosis of the coral Acropora millepora (Ehrenberg, 1834) by petroleum products. Marine Pollution Bulletin 41: 420–427.

Neumann, J., J. Black, S. Hoerlé, B. Smith, R. Watkins, M. Lagos, A. Ziegler and T. Geisler. 'Artificial weathering of rock types bearing petroglyphs from Murujuga, Western Australia' in Heritage Science (2002).

Newman, S., Bruce, C., Steele, A., 2023. Statewide Marine Aquarium Fish and Hermit Crab Resources Status Report 2023. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2021/22: The State of the Fisheries eds. Newman, S.J., Santoro, K.G., Gaughan, D.J., Department of Primary Industries and Regional Development, Western Australia. pp. 279-285.

Newell, R.C., Seiderer, L.J., Hitchcock, D.R., 1998. The impact of dredging works in coastal waters: a review of the sensitivity to disturbance and subsequent recovery of biological resources on the sea bed. Oceanography and Marine Biology: an annual review, 36(1), 127–178.

O'Leary, M.J., Paumard, V., Ward, I., 2020. Exploring Sea Country through High-Resolution 3D Seismic Imaging of Australia's NW Shelf: Resolving Early Coastal Landscapes and Preservation of Underwater Cultural Heritage. Quaternary Science Reviews 239, 106353.

Offshore: Risk and Technology Consulting Inc., 2002. Post mortem failure assessment on MODUs during Hurricane Lili (MMS Order No. 0103PO72450). Minerals Management Service, Houston.

Oil and Gas UK, 2014. Guidance on risk related decision making (Issue No. 2). United Kingdom Offshore Operators Association, London.

OSPAR Commission, 2021. OSPAR List of Substances Used and Discharged Offshore which Are Considered to Pose Little or No Risk to the Environment (PLONOR) – Update 2021. Agreement 2013-06. 9pp.

Oxford Economics, 2010. Potential impact of the Gulf oil spill on tourism. Oxford Economics, Oxford.

Pangerc, T., Robinson, S., Theobald, P., 2016. Underwater sound measurement data during diamond wire cutting: First description of radiated noise. Proc. Mtgs. Acoust. 27, 040012 (2017). Acoustical Society of America.

Patterson, H., Bromhead, D., Dylewski, M., 2023. Western Tuna and Billfish Fishery. In: Butler, I., Patterson, H., Bromhead, D., Galeano, D., Timmiss, T., Woodhams, J., Curtotti, R., 2023. Fishery status reports 2023. Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra. 352-365. URL: https://doi.org/10.25814/vgp4-xr81.

Patterson, H., Dylewski, M., 2023a. Southern Bluefin Tuna Fishery. In: Butler, I., Patterson, H., Bromhead, D., Galeano, D., Timmiss, T., Woodhams, J., Curtotti, R., 2023. Fishery status reports 2023. Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra. 344-351. URL: https://doi.org/10.25814/vgp4-xr81Patterson, H., Dylewski, M., 2023b. Western skipjack tuna fishery. In: Butler, I., Patterson, H., Bromhead, D., Galeano, D., Timmiss, T., Woodhams, J., Curtotti, R., 2023. Fishery status reports 2023. Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra. 336-343. URL: https://doi.org/10.25814/vgp4-xr81.

Paterson, A., Anderson, R., Mulvaney, K., de Koning, S., Dortch, J., McDonald, J., 2019. So ends this day: American whalers in Yaburara country, Dampier Archipelago. Antiquity, 93(367), 218–236.

Patterson, H, Bromhead, D, Galeano, D, Larcombe, J, Timmiss, T, Woodhams, J., Curtotti, R., 2022. Fishery status reports 2022, Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra. CC BY 4.0. https://doi.org/10.25814/gx9r-3n90.

Pendoley Environmental, 2020. Scarborough Desktop Lighting Impact Assessment. Unpublished report prepared by Pendoley Environmental Pty for Advisian, February 2020.

Popper, A.N., Hawkins, A.D., Fay, R., Mann, D., Bartol, S., Carlson, T., Coombs, S., Ellison, W., Gentry, R., Halvorsen, M., Løkkeborg, S., Rogers, P., Southall, B., Zeddies, D., Tavolga, W., 2014. Sound exposure guidelines for fishes and sea turtles: a technical report. Prepared by ANSI-Accredited Standards Committee S3/SC1 and Registered with ANSI. 978-3-319-06658-5. Springer International Publishing, New York, USA.

Quijano, J.E., McPherson, C.R., 2018. Acoustic Characterisation of the Technip Deep Orient: Measuring and Modelling Operational Sound Levels (Document Number 01647, Version 1.0). Technical report by JASCo Applied Sciences for Woodside Energy Limited.

Quijano, J., McPherson, C., 2021. Subsea cutting of the Nganhurra Riser Turret Mooring: Acoustic Modelling for Assessing Marine Fauna Sound Exposures. Document 02511, Version 1.0. Technical Report by JASCO Applied Sciences for Woodside Energy Limited.

Ramboll, 2022. Study of the cumulative impacts of air emissions in the Murujuga Airshed. Department of Water and Regulation.

Richardson, W.J., Greene Jr, C.R., Malme, C.I., Thomson, D.H., 1995. Marine Mammals and Noise. Academic Press, San Diego.

Rodríguez, A., Holmes, N.D., Ryan, P.G., Wilson, K-J., Faulquier, L., Murillo, Y., Raine, A.F., Penniman, J.F., Neves, V., Rodríguez, B., Negro, J.J., Chiaradia, A., Dann, P., Anderson, T., Metzger, B., Shirai, M., Deppe, L., Wheeler, J., Hodum, P., Gouveia, C., Carmo, V., Carreira, G.P., Delgado-Alburqueque, L., Guerra-Correa, C., Couzi, F-X., Travers, M., Corre, M.L., 2017. Seabird mortality induced by land-based artificial lights. Conservation Biology 31: 986–1001.

Rolland, R.M., Parks, S.E., Hunt, K.E., Castellote, M., Corkeron, P.J., Nowacek, D.P., Wasser, S.K., Kraus, S.D., 2012. Evidence that ship noise increases stress in right whales. Proc.R.Soc.B Biol.Sci., 27 (2012), pp. 2363–2368.

Romero, I.C., Schwing, P.T., Brooks, G.R., Larson, R.A., Hastings, D.W., Ellis, G., Goddard, E.A., Hollander, D.J., 2015. Hydrocarbons in deep-sea sediments following the 2010 Deepwater Horizon blowout in the northeast Gulf of Mexico. PLOS ONE 10: e0128371. doi:10.1371/journal.pone.0128371.

RPS Environment and Planning, 2011. Field report July 2011: Apache Julimar Development Pipeline Corridor Biological Seabed Survey. RPS Environment and Planning Pty Ltd, Subiaco.

RPS Group (RPS), 2010. Apache Julimar Development Project Pipeline and Umbilical Route Seabed Survey. Field Report April–May 2010, Rev 0. Prepared for Apache Energy Limited Ltd by RPS Bowman Bishaw Gorham, Perth, Western Australia.

RPS Group (RPS), 2019. Woodside GWF-3/Lambert Deep Quantitative Spill Risk Assessment - Preliminary Results. Report prepared for Woodside Energy Ltd.

RPS Group, 2021. Woodside Goodwyn Alpha Operations – Quantitative Spill Risk Assessment Report. April 2021. RPS Group, Perth.

RPS Group, 2023. Woodside Pluto-A Riser Platform Marine Dispersion Modelling of (non-routine) Produced Water Discharges. Revision 4, December 2023.

RPS Group, 2024a. Woodside Pluto Offshore Facility Operations: Scenario 1. Preliminary results. 604-MSOSCPER-338568. Rev 0. January 2024.

RPS Group, 2024b. Woodside Pluto Offshore Facility Operations: Scenario 2. Preliminary results - 604-MSOSCPER-338568. Rev 0. January 2024.

RPS Group 2024c. Woodside Pluto Offshore Facility Operations: Scenario 3 – Preliminary results. 604-MSOSCPER-338568. Rev 0. January 2024.

RPS Group, 2024d. Woodside Pluto Offshore Facility Operations: Scenario 4. Preliminary results - 604-MSOSCPER-338568. Rev 0. January 2024.

RPS Group, 2024e. Woodside Pluto Offshore Facility Operations: Scenario 5 - Preliminary results. 604-MSOSCPER-338568. Rev 0. February 2024.

Ruffolo, S.A., La Russa, M.F., Rovella, N., Ricca, M., 2023. The Impact of Air Pollution on Stone Materials. Environments 10(7): 119.

Runcie, J., Macinnis-Ng, C., Ralph, P., 2010. The toxic effects of petrochemicals on seagrassess - literature review. Institute for Water and Environmental Resource Management, University of Technology Sydney, Sydney.

Salgado-Kent, C., McCauley, R.D., Duncan, A., Erbe, C., Gavrilov, A., Lucke, K., Parnum, I., 2016. Underwater sound and vibration from offshore petroleum activities and their potential effects on marine fauna: An Australian Perspective. Centre for Marine Science and Technology (CMST), Curtin University.

Salmon, M., Reiners, R., Lavin, C., Wyneken, J., 1995a. Behavior of loggerhead sea turtles on an urban beach. I. Correlates of nest placement. Journal of Herpetology 560–567.

Salmon, M., Tolbert, M.G., Painter, D.P., Goff, M., Reiners, R., 1995b. Behavior of loggerhead sea turtles on an urban beach. II. Hatchling orientation. Journal of Herpetology 568–576.

Salmon, M., Witherington, B.E., 1995. Artificial lighting and seafinding by loggerhead hatchlings: evidence for lunar modulation. Copeia 931–938.

Salmon, M., Wyneken, J., Fritz, E., Lucas, M., 1992. Seafinding by hatchling sea turtles: role of brightness, silhouette and beach slope as orientation cues. Behaviour 122:56–77.

SGS Economics and Planning, 2012. Economic development opportunities for the Gascoyne region associated with resource sector investment and expansion. Gascoyne Development Commission, Fortitude Valley.

Shigenaka, G., 2001. Toxicity of oil to reef building corals: a spill response perspective (NOAA Technical Memorandum No. NOS OR&R 8). National Oceanic and Atmospheric Administration, Seattle.

Simmonds, M., Dolman, S., Weilgart, L., 2004. Oceans of noise, WDCS Science Report. Whale and Dolphin Conservation Society, Chippenham.

SINTEF, 2017. SINTEF Offshore Blowout Database - SINTEF [WWW Document]. SINTEF Offshore Blowout Database. URL https://www.sintef.no/en/projects/sintef-offshore-blowout-database/ (accessed 8.17.17).

Sinclair Knight Merz (SKM), 2006. Pluto LNG Development Offshore Marine Environmental Survey.

SKM, 2013. Offshore Marine Discharges Study – Modelling and Sedimentation Analysis. Report prepared for Woodside Energy Ltd.

Smallwood, C.B., Beckley, L.E., Moore, S.A., Kobryn, H.T., 2011. Assessing patterns of recreational use in large marine parks: A case study from Ningaloo Marine Park, Australia. Ocean and Coastal Management 54: 330–340. doi:10.1016/j.ocecoaman.2010.11.007.

Smith, B., J. Black, S. Hoerlé, M. Ferland, S. Diffey, J. Neumann and T. Geisler, 2022a. 'The Impact of Industrial Pollution on the Rock Art of Murujuga, Western Australia' in Rock Art Research (39).

Smith, B., J. Black, K. Mulvaney and S. Hoerlé, 2022b. 'Monitoring Rock Art Decay: Archival Image Analysis of petroglyphs on Murujuga, Western Australia' in Conservation and management of Archaeological Sites.

Smith, B., 2024. 'The Effects of Acidic Pollution on the Rock Art of Murujuga'. School of Social Sciences, University of Western Australia

Smyth, D., 2007. Sea Countries of the North-west: Literature review on Indigenous connection to and uses of the North West Marine Region. Department of the Environment and Water Resources, Canberra.

Southall, B.L., Bowles, A.E., Ellison, W.T., Finneran, J.J., Gentry, R.L., Greene, C.R., Kastak, D., Ketten, D.R., Miller, J.H., Nachtigall, P.E., Richardson, W.J., Thomas, J.A., Tyack, P.L., 2007. Marine mammal noise exposure criteria: Initial scientific recommendations. Aquatic mammals, 33, 511–414.

Southall, B.L., Finneran, J.J., Reichmuth, C., Nachtgall, P.E., Ketten, D.R., Bowles, A.E., Ellison, W.T., Nowacek, D.P., Tyack, P.L., 2019. Marine mammal noise exposure criteria: updated scientific recommendations for residual hearing effects.

Spalding, M.D., Brown, B.E., 2015. Warm-water coral reefs and climate change. Science 350, 769–771.

Steffen, W., Burbidge, A.A., Hughes, L., Kitching, R., Lindenmayer, D., Musgrave, W., Staford Smith, M., Werner, P., 2009. Australia's biodiversity and climate change: A strategic assessment of vulnerability of Australia's biodiversity to climate change. A report to the Natural resource Management Ministerial Council commissioned by Australian Government. CSIRO Publishing.

Strain, L., Fabris, F., Blay, N., 2023. South Coast Greenlip/Brownlip Abalone Resource Status Report 2023. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2021/22: The State of the Fisheries eds. Newman, S.J., Santoro, K.G., Gaughan, D.J., Department of Primary Industries and Regional Development, Western Australia. pp. 218–224.

Stroot, D.H., Koessler, M.W., McPherson, C.R., 2022. Acoustic Modelling for Assessing Marine Fauna Sound Exposures. Woodside NWS MODU Drilling Operations. JASCO Applied Sciences (Australia) Pty Ltd. 4 November 2022.

Taylor, J.G., 2007. Ram filter-feeding and nocturnal feeding of whale sharks (*Rhincodon typus*) at Ningaloo Reef, Western Australia. Fisheries Research 84: 65–70.

Telfer, T.C., Sincock, J.L., Byrd, G.V., Reed, J.R., 1987. Attraction of Hawaiian seabirds to lights: conservation efforts and effects of moon phase. Wildlife Society Bulletin 15: 406–413.

Terrens, G.W., Gwyther, D., Keough, M.J., Tait, R.D., 1998. Environmental Assessment of Synthetic-Based Drilling-Mud Discharges to Bass Strait, Australia. Presented at the International Conference on Health, Safety, and Environment in Oil and Gas Exploration and Production, Society of Petroleum Engineers, Caracas, p. SPE-46622-MS. Doi:10.2118/46622-MS.

Thomson, P.G., Pillan, R., Jaine, F.R.A., Harcourt, R.G., Taylor, M.D., Pattiaratchi, C.B., McLean, D.L., 2021. Acoustic Telemetry Around Western Australia's Oil and Gas Infrastructure Helps Detect the Presence of an Elusive and Endangered Migratory Giant. Frontiers in Marine Science, 8: https://www.frontiersin.org/articles/10.3389/fmars.2021.631449.

[TSSC] Threatened Species Scientific Committee, 2015a. Conservation Advice *Balaenoptera borealis* sei whale. Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/34-conservation-advice-01102015.pdf.

[TSSC] Threatened Species Scientific Committee, 2015b. Conservation Advice *Balaenoptera Physalus* (Fin Whale). Canberra, Australian Capital Territory: Threatened Species Scientific Committee. Department of the Environment. http://www.environment.gov.au/biodiversity/threatened/species/pubs/37-conservation-advice-01102015.pdf.

[TSSC] Threatened Species Scientific Committee, 2015d.M Conservation Advice *Rhincodon typus* whale shark. Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/66680-conservation-advice-01102015.pdf.

[TSSC] Threatened Species Scientific Committee, 2016a. Conservation Advice *Calidris tenuirostriss* Great knot. Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/862-conservation-advice-05052016.pdf.

Thums, M., Ferreira, L.C., Jenner, C., Jenner, M., Harris, D., Davenport, A., ... McCauley, R., 2022. Pygmy blue whale movement, distribution and important areas in the Eastern Indian Ocean. Global Ecology and Conservation, 35, e02054.

Tomajka, J., 1985. The influence of petroleum hydrocarbons on the primary production of the Danube River plankton. Acta Hydrochimica et Hydrobiologica 13: 615–618.

Tourism Western Australia, 2023. The Pilbara Region, Overnight Visitor Factsheet 2022. Prepared by Tourism WA Insights and Planning, April 2023.

Tuffley, E., How, J., Wiberg, L., 2023. West Coast Deep Sea Crustacean Resource Status Report 2023. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2021/22: The State of the Fisheries eds. Newman, S.J., Santoro, K.G., Gaughan, D.J., Department of Primary Industries and Regional Development, Western Australia. pp. 127–133.

Twachtman Snyder and Byrd, Inc. and Center for Energy Studies, Louisiana State University, 2004. Operational and Socioeconomic Impact of Nonexplosive Removal of Offshore Structures. US

Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 2004-074. 50 pp.

Underwood, J.N., 2009. Genetic diversity and divergence among coastal and offshore reefs in a hard coral depend on geographic discontinuity and oceanic currents. Evolutionary Applications 2: 222–233. doi:10.1111/j.1752-4571.2008.00065.x.

UWA, 2021. Scarborough Pipeline Cultural Heritage Assessment: Establishing Archaeological Potential and Significance. Technical report by UWA for Woodside Energy Limited.

Vanderlaan, A.S.M., Taggart, C.T., 2007. Vessel collisions with whales: the probability of lethal injury based on vessel speed. Marine Mammal Science 23: 144–156. doi:10.1111/j.1748-7692.2006.00098.x.

Veth, P., Ward, I., Manne, T., Ulm, S., Ditchfield, K., Dortch, J., Hook, F., Petchey, D., Hogg, A., Questiaux, D., Demuro, M., Arnold, L., Spooner, N., Levchenko, V., Skippington, J., Byrne, C., Basgall, M., Zeanah, D., Belton, D., Helmholz, P., Bajkan, S., Bailey, R., Placzek, C., Kendrick, P., 2017. Early human occupation of a maritime desert, Barrow Island, North-West Australia. Quaternary Science Reviews Volume, 168, 19–29.

Veth, P., McDonald, J., Ward, I., O'Leary, M., Beckett, E., Benjamin, J., Ulm, S., Hacker, J., Ross, P., Bailey, G., 2019. A Strategy for Assessing Continuity in Terrestrial and Maritime Landscapes from Murujuga (Dampier Archipelago), North West Shelf, Australia. The Journal of Island and Coastal Archaeology 15(4): 477-503. Doi: 10.1080/15564894.2019.1572677.

Vik, E.A., Bakke, D.R., Verburgh, J., 1996. The N-octanol/water partition coefficient: a critical parameter in environmental risk assessment of offshore EandP chemicals, in Ray, J.P. and Engelhardt, F.R., (eds), Produced Water: Technological/Environmental Issues and Solutions, Plenum Press, New York.

Vinnicombe, P. 2002. Petroglyphs of the Dampier Archipelago: Background to Development and Descriptive Analysis. Rock Art Research, 19:3-27.

[WAFIC] Western Australian Fishing Industry Council, 2024. West Coast Deep Sea Crustacean Fishery. https://www.wafic.org.au/fishery/west-coast-deep-sea-crustacean-fishery/.

Wakefield, C., Trinnie, F., Skepper, C., Boddington, D., Newman, S., Steele, A., 2023. North Coast Demersal Resource Status Report 2022. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2021/2022: The State of the Fisheries eds. Newman, S.J., Wise, B.S., Santoro, K.G., Gaughan, D.J. Department of Primary Industries and Regional Development, Western Australia. Pp 172–181.

Water Corporation 2019. Pilbara dreamtime story comes to life: Media Release. Available at: https://www.watercorporation.com.au/About-us/Media-releases/2019/October-2019/Pilbara-dreamtime-story-comes-to-life

Warne, M.S.T.J., Batley, G.E., van Dam, R.A., Chapman, J.C., Fox, D.R., Hickey, C.W., Stauber, J.L., 2015. Revised Method for Deriving Australian and New Zealand Water Quality Guideline Value for Toxicants. Updated January 2017. Prepared for the Council of Australian Government's Standing Council on Environment and Water (SCEW). Department of Science, Information Technology and Innovation, Brisbane, Queensland. 48 pp.

Wecker, H., Koessler, M.W., Connel, S.J., McPherson, C.R., 2022. Acoustic Modelling for Assessing Marine Fauna Sound Exposures. Woodside Pluto Drilling Campaign. JASCO Applied Sciences (Australia) Pty Ltd 27 September 2022.

Weilgart, L.S., 2007. A brief review of known effect of noise on marine mammals. International Journal of Comparative Psychology, 20 (2-3), 159–168.

Whittock, P.A., Pendoley, K.L., Hamann, M., 2014. Inter-nesting distribution of flatback turtles.

Whittock, P.A., Pendoley, K.L., Hamann, M., 2016. Using habitat suitability models in an industrial setting: the case for internesting flatback turtles. Ecosphere, 7(11): e01551. 10.1002/ecs2.1551.

Wilkin, S., Koefoed, I., Brown, S., How, J., 2023a. Exmouth Gulf Prawn Resource Status Report 2023. In: : Status Reports of the Fisheries and Aquatic Resources of Western Australia 2021/22: The State of the Fisheries eds. Newman, S.J., Santoro, K.G., Gaughan, D.J., Department of Primary Industries and Regional Development, Western Australia. pp. 119–127.

Wilkin, S., Shanks, M., How, J., Leaversuch, R., 2023b. North Coast Prawn Resource Status Report 2023. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2021/22: The State of the Fisheries eds. Newman, S.J., Santoro, K.G., Gaughan, D.J., Department of Primary Industries and Regional Development, Western Australia. pp. 161–167.

Williams, A., Ulm, S., Sapienza, T., Lewis, S. Turney, C., 2018. Sea-level change and demography during the last glacial termination and early Holocene across the Australian continent. Quaternary Science Reviews (182), 144–154.

Woodside Energy Limited, 2006. Pluto LNG development draft Public Environment Report / Public. Environment Review (EPBC Act Referral No 2006/98). Woodside Energy Limited, Perth.

Woodside Energy Limited, 2011. Browse LNG Development Draft Upstream Environmental Impact Statement (No. EPBC Referral 2008/4111). Woodside Energy Limited, Perth.

Woodside Energy Limited, 2014. Browse FLNG Development Draft Environmental Impact Statement.

Woodside Energy Limited (Woodside), 2019. Pluto LNG Air Quality Management Plan (Revision 4). Available at: https://www.woodside.com/docs/default-source/our-business---documents-and-files/pluto---documents-and-files/pluto-lng-environmental-compliance-documents/pluto-lng-project---air-quality-management-plan-(rev-4)-2019.pdf.

Woodside Energy Limited, 2022. Climate Report 2022. Perth, Western Australia: Woodside Energy Limited. https://www.woodside.com/docs/default-source/investordocuments/major-reports-(static-pdfs)/2022-climate-report/climate-report-2022.pdf?sfvrsn=240783fc_16.

Woodside Energy Limited, 2023a. Scarborough, Dredging and Spoil Disposal Management Plan. SA0006AH0000002.

Woodside Energy Limited, 2024. Climate Transition Action Plan and 2023 Progress Report, Perth, Western Australia. Woodside Energy Limited. https://www.woodside.com/docs/default-source/investor-documents/major-reports-(static-pdfs)/ctap2023/climate-transition-action-plan-and-2023-progress-report.pdf?sfvrsn=d6f6eed4_11.

Worley Consulting 2025. Produced Water Ecotoxicity and Chemical Characterisation Assessment 2024 – Pluto Alpha. Rev 0 411012-01044 MA-REP-001. February 2025.

Yender, R., Michel, J., Lord, C., 2002. Managing seafood safety after and oil spill. National Oceanic and Atmospheric Administration, Seattle.

Zaunmayr 2016 Cultural collection nationally recognised, National honour for archive. Pilbara News

Zieman, J.C., Orth, R., Phillips, R.C., Thayer, G., Thorhaug, A., 1984. Effects of oil on seagrass ecosystems, in: Cairns Jr., J., Buikema, A.L. (Eds.), Restoration of Habitats Impacted by Oil Spills. Butterworth-Heinemann, Boston, pp. 37–64

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9. GLOSSARY AND ABBREVIATIONS

Acronym	Description
1TL	first trunkline
ABARES	Australian Bureau of Agricultural and Resource Economics and Sciences
ABN	Australian business number
AEP	Australian Energy Producers
AFMA	Australian Fisheries Management Authority
AHS	Australian Hydrographic Service
AHV	anchor handling vessel
AHO	Australian Hydrographic Office
AIMS	Australian Institute of Marine Science
AIS	Automatic Identification System
ALARP	as low as reasonably practicable
AMOSC	Australian Marine Oil Spill Centre
AMP	Australian Marine Park
AMSA	Australian Maritime Safety Authority
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
ANZECC	Australian and New Zealand Environment and Conservation Council
ASV	accommodation support vessel
AUSREP	Australian Ship Reporting System
AUV	autonomous underwater vehicles
bbl	barrel unit
BDV	blowdown valve
BIA	biologically important area
BoM	Bureau of Meteorology
BOP	blowout preventer
BP	boiling point
BTAC	Buurabalayji Thalanyji Aboriginal Corporation
BTEX	benzene, toluene, ethylbenzene and xylenes
BWCMP	Blue Whale Conservation Management Plan
CAES	catch and effort system
CCE	common cause effect
CCR	central control room
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
CFA	Commonwealth Fisheries Association
CHARM	chemical hazard and risk management
CIMT	Corporate Incident Management Team
CITV	chemical injection throttle valve
cm	centimetres

Acronym	Description
CMMS	Computerised Maintenance Management System
CMT	Crisis Management Team
CoP	cessation of production
CP	cathodic protection
CS	cost sacrifice
CSIRO	Commonwealth Scientific and Industrial Research Organisation
Cth	Commonwealth
CV	company values
CVI	close visual inspections
CVS	Contractor Verification Service
DAA	Department of Aboriginal Affairs
DAWE	Department of Agriculture, Water and the Environment
dB	decibel
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DCLM	Department of Conservation and Land Management
DEC	Department of Environment and Conservation
DEWHA	Department of the Environment, Water, Heritage and the Arts
DGPS	differential global surface positioning system
DISER	Department of Industry, Science, Energy and Resources
DMIRS	Department of Mining, Industry Regulation and Safety
DNP	Director of National Parks
DoD	Department of Defence
DoEE	Department of the Environment and Energy
DoT	Department of Transport
DP	dynamic positioning
DPIRD	Department of Primary Industry and Regional Development
DPLH	Department of Planning, Lands and Heritage
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities
DWT	dead weight tonnage
EDS	emergency disconnect sequences
EET	emission estimation techniques
EEZ	Exclusive Economic Zone
EFL	electrical flying lead
EIO	East Indian Ocean
EMBA	environment that may be affected
ENVID	environmental risk identification studies
EP	Environment Plan
EPBC Act	Environment Protection and Biodiversity Conservation Act
EPOs	environmental performance outcomes

Acronym	Description
EPS	environment performance standards
EoFL	end of field life
ERP	Emergency Response Plan
ESD	emergency shutdown
ESDev	ecologically sustainable development
EVP	Executive Vice President
FEED	front end engineering and design
FEWD	formation evaluation while drilling
FFS	fit for services
FPSO	floating production, storage and offloading
FRC	fast rescue craft
GHG	greenhouse gas
GP	good industry practice
GSM	grid stability module
GVI	general visual inspections
GWA	Goodwyn Alpha
HAT	highest astronomical tide
HAZID/ENVID	hazard identification studies
HFL	hydraulic flying lead
HIGF	horizontal induced gas floatation
HIPPS	high integrity pressure protection system
HP	high pressure
HPU	hydraulic power unit
HQ	hazard quotient
HSE	health, safety and environment
HSEC	Health, Safety and Environment Coordinator
HSEQ	health, safety, environment and quality
HVAC	heating, ventilation and air conditioning
ICLDP	Incident and Crisis Leaders Development Program
ILUAs	Indigenous Land Use Agreements
IUCN	International Union for the Conservation of Nature
IMCRA	Integrated Marine and Coastal Regionalisation of Australia
IMMR	inspection, monitoring, maintenance and repair
IMS	invasive marine species
IMSMP	Invasive Marine Species Management Plan
IPIECA	International Petroleum Industry Environmental Conservation Association
ISO	International Organization for Standardization
ISSoW	integrated safe system of work
ISV	IMMR support vessel

Acronym	Description
JRCC	Joint Rescue Coordination Centre
KEF	key ecological feature
Kg	kilogram
KGP	Karratha Gas Plant
km	kilometre
KPI	key performance indicator
L	litres
LAT	lowest astronomical tide
LBL	long baseline
LCS	legislation, codes and standards
LNG	liquefied natural gas
LOA	length overall
LP	low pressure
LTO	licence to operate
LW	Lambert West
m^3	cubic metres
MAEs	major accident events
MAH	monocyclic aromatic hydrocarbons
MBES	multibeam echo sounder
MC	measurement criteria
MCS	master control station
MEEs	major environmental events
MEG	monoethylene glycol
MFO	marine fauna observer
MLCS	mid-line connector system
MNES	matters of environmental significance
MoC	management of change
MODU	mobile offshore drilling unit
MOPO	Manual of Permitted Operation
MoU	Memorandum of Understanding
MPAs	Marine Protected Areas
MPPE	macro porous polymer extraction
MSIN	Maritime Safety Information Notifications
MSPS	Management System Performance Standards
MW	megawatts
NAC	Nanda Aboriginal Corporation
NCVA	National Conservation Values Atlas
NDT	non-destructive testing
NGA	Nganhurra

Acronym	Description
NGERS	National Greenhouse and Energy Reporting
NIMS	non-indigenous marine species
NLPG	National Light Pollution Guidelines
NMFS	National Marine Fisheries Service
nm	nautical miles
NNC	not normally crewed
NOAA	National Oceanic and Atmospheric Administration
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NOPTA	National Offshore Petroleum Titles Administrator
NORM	naturally occurring radioactive material
NPI	National Pollutant Inventory
NRV	non-return valve
NTA	Native Title Act 1993 (Cth)
NTGAC	Nganhurra Thanardi Garrbu Aboriginal Corporation
NTM	Notice to Mariners
NW	north-west
NWBM	non-water-based muds
NWMR	North West Marine Region
NWS	North West Shelf
NWSP	North West Shelf Province
NZE	net zero emissions
OCIMF	Oil Companies International Marine Forum
OCNS	Offshore Chemical Notification Scheme
OIM	Offshore Installation Manager
OIW	oil in water
OMDAMP	Offshore Marine Discharges Adaptive Management Plan
OPEP	Oil Pollution Emergency Plan
OPEX	operational expenditure
OPGGS Act	Offshore Petroleum and Greenhouse Gas Storage Act 2006 (Cth)
OPP	Offshore Project Proposal
OSPAR Convention	Convention for the Protection of the Marine Environment of the North-East Atlantic
OSREC	Oil Spill Response Skills Enhancement Course
OSRO	Oil Spill Response Organisation
OVID	Offshore Vessel Inspection Database
OWS	oily water separator
PAA	Petroleum Activities Area
PAP	Petroleum Activities Program
PAH	polycyclic aromatic hydrocarbon
PBA	pre-emptive baseline areas

Acronym	Description
PBC	Prescribed Bodies Corporates
PER	Public Environment Report
PFW	produced formation water
PHD	process historian database
PIC	person in charge
PJ	professional judgement
PLA	Pluto Alpha platform
PLET	pipeline end termination
PLONOR	pose little or no risk
PLP	Pluto LNG Park
PMST	Protected Matters Search Tool
PNEC	predicted no-effect concentration
POB	personnel on board
PoW	octanol-water partition
ppb	parts per billion
PROC	Pluto Remote Operations Centre
PSM	process safety management
PSRA	process safety risk assessment
PSV	pressure safety valves
PSZ	Petroleum Safety Zone
PTS	permanent threshold shift
PTW	Permit to Work
PW	produced water
PWCS	primary water/condensate separators
RAR	rig anchor release
RATSIB	Representative Aboriginal/Torres Strait Islander Bodies
RBA	risk based analysis
RBI	risk based inspection
RCC	AMSA Rescue Coordination Centre
rms SPL	root mean square sound pressure level
ROV	remotely operated vehicle
SBP	sub-bottom profiling
SBV	standby vessel
SCC	safety and environment critical component
SCE	safety and environmental critical element
SCEW	Standing Council on Environment and Water
SCM	subsea control module
SCSSSV	surface controlled sub-surface safety valves
SEL	sound exposure level

Acronym	Description
SEZ	Safety Exclusion Zone
SIMAP	spill impact mapping and analysis program
SIMOPS	simultaneous operations
SMP	scientific monitoring program
SOPEP	Ship Oil Pollution Emergency Plan
SPL	sound pressure level
SSPL	subsea pipeline
SSS	side scan sonar
SV	societal values
TAP	Threat Abatement Plan
TD	total depth
THS	tubing head spool
TPH	total petroleum hydrocarbon
TSS	total suspended solids
TTS	temporary threshold shift
UK	United Kingdom
µm	micrometre
UPS	uninterruptable power system
USBL	ultra-short baseline
USEPA	United States Environmental Protection Agency
UTA	umbilical termination assemblies
VLS	vertical lay system
VOC	volatile organic compound
VP	Vice President
WA	Western Australia
WAC	Wirrawandi Aboriginal Corporation
WAFIC	Western Australian Fishing Industry Council
WALGA	Western Australia Local Government Association
WBM	water based mud
WHA	World Heritage Area
WLS	Woodside Learning Services
WLSADS	Well Location and Site Appraisal Data Sheet
WMS	Woodside Management System
WOMP	Well Operations Management Plan
YAC	Yindjibarndi Aboriginal Corporation

APPENDIX A: WOODSIDE POLICIES

Climate Policy

BACKGROUND

The Intergovernmental Panel on Climate Change has stated that "it is unequivocal that human influence has warmed the atmosphere, ocean and land". An objective of the Paris Agreement is to hold "the increase in the global average temperature to well below 2ºC above pre-industrial levels" and to pursue "efforts to limit the temperature increase to 1.5ºC". Many countries have set targets to reduce greenhouse gas emissions, including by changing the way they produce and consume energy.

OBJECTIVE

Woodside's objective is to thrive in this energy transition as a low cost, lower carbon energy provider.

PRINCIPLES

Woodside aims to achieve the objective by:

- Setting science-based[1] near, mid, and long-term net emissions reduction targets that are consistent with Paris-aligned[2] scenarios, covering equity scope 1 and 2 emissions, both operated and non-operated.[3]
- Developing and operating oil and gas projects in a manner that is consistent with these targets. This includes the deployment of lower-emission technologies (Design Out), supporting efficient operations (Operate Out) and use of robust offsets (Offset) as methods to reduce and offset greenhouse gas emissions.
- Investing in new energy products and lower carbon services to reduce customers' emissions (part of Woodside's Scope 3 emissions), including but not limited to hydrogen, ammonia and carbon capture, utilisation and storage.
- Publishing transparent climate-related disclosures aligned to the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD) or other recognised global reporting standards.
- Aligning our advocacy to the principles of this Climate Policy.

[1] Woodside is using the draft Prototype IFRS Sustainability Disclosure Standard definition of "science-based" (published 2021) which states "targets are considered 'science-based' if they are in line with what the most recent climate science sets out is necessary to meet the goals of the Paris Agreement—limiting global warming to below 2 degrees Celsius above pre-industrial levels and pursuing efforts to limit warming to 1.5 degrees Celsius.". See https://www.ifrs.org/content/dam/ifrs/groups/trwg/trwg-climate-related-disclosures- prototype.pdf (Appendix A).

[2] Woodside is using the draft Prototype IFRS Sustainability Disclosure Standard definition of "Paris-aligned scenarios" (published 2021) which states "scenarios consistent with limiting global warming to below 2 degrees Celsius above pre-industrial levels and pursuing efforts to limit warming to 1.5 degrees Celsius." See https://www.ifrs.org/content/dam/ifrs/groups/trwg/trwg-climate-related-disclosures- prototype.pdf (Appendix A).

[3] Equity emissions means the share of the total emissions arising from an activity that are attributable to Woodside in proportion to Woodside's ownership interest in the activity, irrespective of whether Woodside operates the activity. Operated emissions are the total emissions arising from an activity that Woodside operates, irrespective of Woodside's ownership interest.

APPLICABILITY

Responsibility for the application of this Policy rests with all Woodside employees, contractors and joint venture participants engaged in activities under Woodside operational control. Woodside managers are also responsible for promotion of this Policy in non-operated joint ventures.

This Policy will be reviewed regularly and updated as required.

Reviewed by the Woodside Energy Group Ltd Board in December 2024.

Risk Management Policy

OBJECTIVES

Woodside recognises that risk is inherent in our business and the effective management of risk is vital to deliver our strategic objectives, continued growth and success. We are committed to managing risks in a proactive and effective manner as a source of competitive advantage.

Our approach protects us against potential negative impacts, enables us to take risk for reward and improves our resilience against emerging risks. The objective of our risk management framework is to provide a single consolidated view of risks across the company to understand our full risk exposure and prioritise risk management and governance.

The success of our approach lies in the responsibility placed on everyone at all levels to proactively identify, assess and treat risks relating to the objectives they are accountable for delivering.

PRINCIPLES

Woodside achieves these objectives by:

- Applying a structured and comprehensive framework for the identification, assessment and treatment of current risks and response to emerging risks;
- Ensuring line of sight of financial and non-financial risks at appropriate levels of the organisation;
- Demonstrating leadership and commitment to integrating risk management into our business activities and governance practices;
- Recognising the value of stakeholder engagement, best available information and proactive identification of potential changes in external and internal context;
- Embedding risk management into our critical business processes and control framework;
- Understanding our exposure to risk and tolerance for uncertainty to inform our decision making and assure that Woodside is operating with due regard to the risk appetite endorsed by the Board; and
- Evaluating and improving the effectiveness and efficiency our approach.

APPLICABILITY

The Managing Director of Woodside is accountable to the Board of Directors for ensuring this Policy is effectively implemented.

Responsibility for the application of this Policy rests with all Woodside employees, contractors and joint venturers engaged in activities under Woodside operational control. Woodside managers are also responsible for promotion of this Policy in non-operated joint ventures.

This Policy will be reviewed regularly and updated as required.

Reviewed by the Woodside Energy Group Ltd Board in December 2024.

Environment and Biodiversity Policy

OBJECTIVE

Woodside recognises the intrinsic value of nature and the importance of conserving biodiversity and ecosystem services to support the sustainable development of our society. We are committed to doing our part. We understand and embrace our responsibility to undertake activities in an environmentally sustainable way.

PRINCIPLES

Woodside commits to:

- Implementing a systematic approach to the management of the impacts and risks of our operating activities on an ongoing basis, including emissions and air quality, discharge and waste management, water management, biodiversity and protected areas.
- Applying the mitigation hierarchy principle (avoid, minimise, restore) and a continuous improvement approach to ensure we maintain compliance, improve resource use efficiency and reduce our environmental impacts.
- Embedding environmental and biodiversity management, and opportunities, in our business planning and decision-making processes.
- Complying with relevant laws and regulations and applying responsible standards where laws do not exist.
- Not undertaking new activities[1] within the boundaries of natural sites on the UNESCO World Heritage List.[2]
- Not undertaking new activities within IUCN Protected Areas[3] unless compatible with management plans in place for the area.
- Achieving net zero deforestation[4] for new activities.
- Developing Biodiversity Management Plans for all new major projects (CAPEX >US$2 billion).
- Supporting positive biodiversity outcomes in regions and areas in which we undertake activities.
- Setting targets and publicly reporting on our environmental and biodiversity performance.

APPLICABILITY

Responsibility for the application of this Policy rests with all Woodside employees, contractors and joint venturers engaged in activities under Woodside operational control. Woodside managers are also responsible for promotion of this Policy in non-operated joint ventures.

This Policy will be reviewed regularly and updated as required.

Revised by the Woodside Energy Group Ltd Board in December 2024.

[1] Does not include non-industrial and existing activities that are compatible with maintenance of the listed outstanding universal values.

[2] New UNESCO World Heritage Listings that overlap existing activities will be assessed at the time of listing.

[3] New IUCN Protected Areas that overlap existing activities will be assessed at the time of listing.

[4] Definition of Forest: 'native trees higher than 5 metres and a canopy cover of more than 10 percent on the land to be cleared'.

APPENDIX B: RELEVANT REQUIREMENTS

Legislation or Regulation	Description	Relevant
Corporations Act 2001	This Act is the principal legislation regulating matters of Australian companies, such as the formation and operation of companies, duties of officers, takeovers and fundraising.	The titleholder has provided ACN details within the meaning of the Act.
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) Environment Protection and Biodiversity Conservation Regulations 2000	Commonwealth Department of Sustainability, Environment, Water, Population & Communities administers Act that provides legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places—defined in the EPBC Act as matters of national environmental significance (NES). These include nationally threatened species and ecological communities, migratory species and Commonwealth marine areas. The Act regulates assessment and approval of proposed actions likely to have a significant impact on a matter of NES. The approval decision is made by a delegate of the Australian Government Environment Minister. Regulations provide for a wide range of detail essential for the operation of the Act, including regulations relating to management of Commonwealth reserves, information requirements for assessment processes, enforcement, granting of various permits, publication requirements and criteria that need to be met in relation to a wide variety of decision-making processes provided for under the Act.	This Act applies to all aspects of the activity that have the potential to impact MNES. NOPSEMA manages compliance with the relevant regulations and plans under the Act for this EP. Where activities have existing approvals under the Act, these will continue to apply.
Environment Protection (Sea Dumping) Act 1981 Environment Protection (Sea Dumping) Regulations 1983	The Act regulates the dumping at sea of controlled material (including certain wastes and other matter), the incineration at sea of controlled material, loading for the purpose of dumping or incineration, export for the purpose of dumping or incineration, and the placement of artificial reefs. Permits are required for any sea dumping activities. Operational discharges from vessels are not defined as 'dumping' under the 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972 and therefore not regulated under the Act.	Prior to permanently leaving any structure in-situ, BHP will obtain a Sea Dumping Permit in accordance with the requirements of the Sea Dumping Act.
Offshore Petroleum and Greenhouse Gas Storage Act 2006	Legislation concerning Australian offshore petroleum exploration & production in Commonwealth Waters. National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) is an independent safety and environmental management Authority funded by levies on industry participants and regulates matters with powers conferred directly from OPGGS Act and via Regulations concerned with: occupational health & safety law at facilities and offshore operations under Schedule 3 environmental management structural integrity of Wells under Resource management regulations.	Applies to all aspects of petroleum activities.

Legislation or Regulation	Description	Relevant
Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009	Regulations administered by NOPSEMA to ensure offshore petroleum activity is carried out in a manner consistent with the principles of ecologically sustainable development and in accordance with an accepted environment plan, in particular: assessment of EPs, including associated OPEPs (previously oil spill contingency plans) investigation of accidents, occurrences and circumstances with regard to deficiencies in environmental management.	Applies to environmental maangement of petroleum activities.
Offshore Petroleum and Greenhouse Gas Storage (Regulatory Levies) Act 2003	Act to impose levies relating to the regulation of offshore petroleum activities, including well levies and environment plan levy.	A levy will be applied to the petroleum activities under this EP.

Industry Standards, Codes of Practice, Guidelines and Commonwealth Guidance Material
NOPSEMA (2012). Control Measures and Performance Standards Guidance Note. N040300-GN0271 Revision No. 4. December 2012
NOPSEMA Guidance note: Environment plan content requirements – (GN1344) 11.9.2020
NOPSEMA Guidance note: Notification and reporting of environmental incidents – (GN0926) 8.6.2020
NOPSEMA Guidance note: ALARP – Rev 6 (GN0166) (2015)
NOPSEMA Policy: Environment plan assessment - (PL1347) 19.5.2020
NOPSEMA Guideline: Environment plan decision making – Rev 7 (GL1721) (2021)
NOPSEMA Guideline: Making submissions to NOPSEMA – (GL0255) 4.5.2020
NOPSEMA Guideline: Consultation with Commonwealth agencies with responsibilities in the marine area
NOPSEMA Bulletin #2: Clarifying Statutory Requirements and Good Practice Consultation – Rev 0 (A696998) (2019)

APPENDIX C: EPBC ACT PROTECTED MATTERS SEARCH TOOL REPORTS

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 04-Dec-2023

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	2
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	23
Listed Migratory Species:	38

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	67
Whales and Other Cetaceans:	28
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	1
Habitat Critical to the Survival of Marine Turtles:	1

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	None
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	34
Key Ecological Features (Marine):	2
Biologically Important Areas:	8
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside a Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area.

Feature Name
Commonwealth Marine Areas (EPBC Act)
Commonwealth Marine Areas (EPBC Act)

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text
BIRD		
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Phaethon lepturus fulvus Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Species or species habitat may occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Scientific Name	Threatened Category	Presence Text
FISH		
Thunnus maccoyii		
Southern Bluefin Tuna [69402]	Conservation Dependent	Breeding known to occur within area
MAMMAL		
Balaenoptera borealis		
Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
Balaenoptera musculus		
Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus		
Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
REPTILE		
Aipysurus apraefrontalis		
Short-nosed Sea Snake, Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat may occur within area
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Congregation or aggregation known to occur within area
SHARK		
Carcharias taurus (west coast population)		
Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sphyrna lewini Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat known to occur within area

Listed Migratory Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text
Migratory Marine Birds		
Anous stolidus Common Noddy [825]		Species or species habitat may occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat may occur within area
Migratory Marine Species		
Anoxypristis cuspidata Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat may occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat likely to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
Isurus paucus Longfin Mako [82947]		Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]		Breeding known to occur within area
Mobula alfredi as Manta alfredi Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat likely to occur within area
Mobula birostris as Manta birostris Giant Manta Ray [90034]		Species or species habitat likely to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Congregation or aggregation known to occur within area
Orcaella heinsohni Australian Snubfin Dolphin [81322]		Species or species habitat may occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Pristis clavata		
Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis pristis		
Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area
Pristis zijsron		
Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sousa sahulensis as Sousa chinensis		
Australian Humpback Dolphin [87942]		Species or species habitat may occur within area
Tursiops aduncus (Arafura/Timor Sea populations)		
Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat likely to occur within area
Migratory Wetlands Species		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris canutus		
Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text
Bird		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat may occur within area
Anous stolidus		
Common Noddy [825]		Species or species habitat may occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris canutus		
Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area overfly marine area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area
Calonectris leucomelas		
Streaked Shearwater [1077]		Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat may occur within area
Phaethon lepturus fulvus Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Species or species habitat may occur within area
Fish		
Acentronura larsonae Helen's Pygmy Pipehorse [66186]		Species or species habitat may occur within area
Bulbonaricus brauni Braun's Pughead Pipefish, Pug-headed Pipefish [66189]		Species or species habitat may occur within area
Campichthys tricarinatus Three-keel Pipefish [66192]		Species or species habitat may occur within area
Choeroichthys brachysoma Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area
Choeroichthys latispinosus Muiron Island Pipefish [66196]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Choeroichthys suillus Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
Corythoichthys flavofasciatus Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area
Cosmocampus banneri Roughridge Pipefish [66206]		Species or species habitat may occur within area
Doryrhamphus dactyliophorus Banded Pipefish, Ringed Pipefish [66210]		Species or species habitat may occur within area
Doryrhamphus excisus Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within area
Doryrhamphus janssi Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area
Doryrhamphus multiannulatus Many-banded Pipefish [66717]		Species or species habitat may occur within area
Doryrhamphus negrosensis Flagtail Pipefish, Masthead Island Pipefish [66213]		Species or species habitat may occur within area
Festucalex scalaris Ladder Pipefish [66216]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
Halicampus nitidus Glittering Pipefish [66224]		Species or species habitat may occur within area
Halicampus spinirostris Spiny-snout Pipefish [66225]		Species or species habitat may occur within area
Haliichthys taeniophorus Ribboned Pipehorse, Ribboned Seadragon [66226]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippocampus angustus Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area
Hippocampus histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area
Hippocampus spinosissimus Hedgehog Seahorse [66239]		Species or species habitat may occur within area
Hippocampus trimaculatus Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Micrognathus micronotopterus Tidepool Pipefish [66255]		Species or species habitat may occur within area
Phoxocampus belcheri Black Rock Pipefish [66719]		Species or species habitat may occur within area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Trachyrhamphus longirostris Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
Reptile		
Aipysurus apraefrontalis Short-nosed Sea Snake, Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat may occur within area
Aipysurus duboisii Dubois' Sea Snake, Dubois' Seasnake, Reef Shallows Sea Snake [1116]		Species or species habitat may occur within area
Aipysurus laevis Olive Sea Snake, Olive-brown Sea Snake [1120]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Aipysurus mosaicus as Aipysurus eydouxii Mosaic Sea Snake [87261]		Species or species habitat may occur within area
Aipysurus tenuis Brown-lined Sea Snake, Mjoberg's Sea Snake [1121]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
Ephalophis greyi Mangrove Sea Snake [1127]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Hydrophis czeblukovi Fine-spined Sea Snake [59233]		Species or species habitat may occur within area
Hydrophis elegans Elegant Sea Snake, Bar-bellied Sea Snake [1104]		Species or species habitat may occur within area
Hydrophis kingii as Disteira kingii Spectacled Sea Snake [93511]		Species or species habitat may occur within area
Hydrophis major as Disteira major Olive-headed Sea Snake [93512]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Hydrophis ornatus Spotted Sea Snake, Ornate Reef Sea Snake [1111]		Species or species habitat may occur within area
Hydrophis peronii as Acalyptophis peronii Horned Sea Snake [93509]		Species or species habitat may occur within area
Hydrophis platurus as Pelamis platurus Yellow-bellied Sea Snake [93517]		Species or species habitat may occur within area
Hydrophis stokesii as Astrotia stokesii Stokes' Sea Snake [93510]		Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Congregation or aggregation known to occur within area

Whales and Other Cetaceans		[Resource Information]
Current Scientific Name	Status	Type of Presence
Mammal		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area

Current Scientific Name	Status	Type of Presence
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Feresa attenuata Pygmy Killer Whale [61]		Species or species habitat may occur within area
Globicephala macrorhynchus Short-finned Pilot Whale [62]		Species or species habitat may occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Kogia breviceps Pygmy Sperm Whale [57]		Species or species habitat may occur within area
Kogia sima Dwarf Sperm Whale [85043]		Species or species habitat may occur within area
Lagenodelphis hosei Fraser's Dolphin, Sarawak Dolphin [41]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]		Breeding known to occur within area
Mesoplodon densirostris Blainville's Beaked Whale, Dense-beaked Whale [74]		Species or species habitat may occur within area
Orcaella heinsohni Australian Snubfin Dolphin [81322]		Species or species habitat may occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
Peponocephala electra Melon-headed Whale [47]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Sousa sahulensis Australian Humpback Dolphin [87942]		Species or species habitat may occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area
Stenella longirostris Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area
Steno bredanensis Rough-toothed Dolphin [30]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat may occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Australian Marine Parks [Resource Information]

Park Name	Zone & IUCN Categories
Montebello	Multiple Use Zone (IUCN VI)

Habitat Critical to the Survival of Marine Turtles

Scientific Name	Behaviour	Presence
Aug - Sep		
Natator depressus Flatback Turtle [59257]	Nesting	Known to occur

Extra Information

EPBC Act Referrals [Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status
Gorgon Gas Development	2003/1294		Post-Approval
Project Highclere Cable Lay and Operation	2022/09203		Completed
Controlled action			
Construct and operate LNG & domestic gas plant including onshore and offshore facilities - Wheatston	2008/4469	Controlled Action	Post-Approval
Equus Gas Fields Development Project, Carnarvon Basin	2012/6301	Controlled Action	Completed
Gorgon Gas Development 4th Train Proposal	2011/5942	Controlled Action	Post-Approval
Pluto Gas Project	2005/2258	Controlled Action	Completed
Pluto Gas Project Including Site B	2006/2968	Controlled Action	Post-Approval
Not controlled action			
Exploration of appraisal wells	2006/3065	Not Controlled Action	Completed
Project Highclere Geophysical Survey	2021/9023	Not Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
To construct and operate an offshore submarine fibre optic cable, WA	2014/7373	Not Controlled Action	Completed
Wheatstone 3D seismic survey, 70km north of Barrow Island	2004/1761	Not Controlled Action	Completed
Not controlled action (particular manner)			
'Tourmaline' 2D marine seismic survey, permit areas WA-323-P, WA-330-P and WA-32	2005/2282	Not Controlled Action (Particular Manner)	Post-Approval
"Leanne" offshore 3D seismic exploration, WA-356-P	2005/1938	Not Controlled Action (Particular Manner)	Post-Approval
3D Marine Seismic Survey in Permit Areas WA-15-R, WA-18-R, WA-205-P, WA-253-P, WA-267-P and WA-268-P	2003/1271	Not Controlled Action (Particular Manner)	Post-Approval
3D seismic survey	2006/2715	Not Controlled Action (Particular Manner)	Post-Approval
Aperio 3D Marine Seismic Survey, WA	2012/6648	Not Controlled Action (Particular Manner)	Post-Approval
Balnaves Condensate Field Development	2011/6188	Not Controlled Action (Particular Manner)	Post-Approval
Cable Seismic Exploration Permit areas WA-323-P and WA-330-P	2008/4227	Not Controlled Action (Particular Manner)	Post-Approval
CGGVERITAS 2010 2D Seismic Survey	2010/5714	Not Controlled Action (Particular Manner)	Post-Approval
Cue Seismic Survey within WA-359-P, WA-361-P and WA-360-P	2007/3647	Not Controlled Action (Particular Manner)	Post-Approval
DAVROS MC 3D marine seismic survey northwaet of Dampier, WA	2013/7092	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Deep Water Northwest Shelf 2D Seismic Survey	2007/3260	Not Controlled Action (Particular Manner)	Post-Approval
Drilling 35-40 offshore exploration wells in deep water	2008/4461	Not Controlled Action (Particular Manner)	Post-Approval
Foxhound 3D Non-Exclusive Marine Seismic Survey	2009/4703	Not Controlled Action (Particular Manner)	Post-Approval
Harmony 3D Marine Seismic Survey	2012/6699	Not Controlled Action (Particular Manner)	Post-Approval
Julimar Brunello Gas Development Project	2011/5936	Not Controlled Action (Particular Manner)	Post-Approval
Moosehead 2D seismic survey within permit WA-192-P	2005/2167	Not Controlled Action (Particular Manner)	Post-Approval
Osprey and Dionysus Marine Seismic Survey	2011/6215	Not Controlled Action (Particular Manner)	Post-Approval
Santos Winchester three dimensional seismic survey - WA-323-P & WA-330-P	2011/6107	Not Controlled Action (Particular Manner)	Post-Approval
West Panaeus 3D seismic survey	2006/3141	Not Controlled Action (Particular Manner)	Post-Approval
Westralia SPAN Marine Seismic Survey, WA & NT	2012/6463	Not Controlled Action (Particular Manner)	Post-Approval
Wheatstone 3D MAZ Marine Seismic Survey	2011/6058	Not Controlled Action (Particular Manner)	Post-Approval
Wheatstone Iago Appraisal Well Drilling	2007/3941	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		Manner)	
Wheatstone Iago Appraisal Well Drilling	2008/4134	Not Controlled Action (Particular Manner)	Post-Approval

Key Ecological Features [Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
Ancient coastline at 125 m depth contour	North-west
Continental Slope Demersal Fish Communities	North-west

Biologically Important Areas

Scientific Name	Behaviour	Presence
Marine Turtles		
Chelonia mydas		
Green Turtle [1765]	Internesting buffer	Known to occur
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Internesting buffer	Known to occur
Natator depressus		
Flatback Turtle [59257]	Internesting buffer	Known to occur
Seabirds		
Ardenna pacifica		
Wedge-tailed Shearwater [84292]	Breeding	Known to occur
Sharks		
Rhincodon typus		
Whale Shark [66680]	Foraging	Known to occur
Whales		
Balaenoptera musculus brevicauda		
Pygmy Blue Whale [81317]	Distribution	Known to occur
Balaenoptera musculus brevicauda		
Pygmy Blue Whale [81317]	Migration	Known to occur

Scientific Name	Behaviour	Presence
Megaptera novaeangliae		
Humpback Whale [38]	Migration (north and south)	Known to occur

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact us page.

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EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 04-Dec-2023

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	2
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	24
Listed Migratory Species:	41

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	74
Whales and Other Cetaceans:	28
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	1
Habitat Critical to the Survival of Marine Turtles:	3

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	None
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	37
Key Ecological Features (Marine):	2
Biologically Important Areas:	11
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside a Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area.

Feature Name
Commonwealth Marine Areas (EPBC Act)
Commonwealth Marine Areas (EPBC Act)

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text
BIRD		
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Phaethon lepturus fulvus Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Species or species habitat may occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Breeding known to occur within area
FISH		

Scientific Name	Threatened Category	Presence Text
Thunnus maccoyii Southern Bluefin Tuna [69402]	Conservation Dependent	Breeding known to occur within area
MAMMAL		
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
REPTILE		
Aipysurus apraefrontalis Short-nosed Sea Snake, Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat likely to occur within area
Aipysurus foliosquama Leaf-scaled Sea Snake, Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Congregation or aggregation known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Congregation or aggregation known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Congregation or aggregation known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Congregation or aggregation known to occur within area
SHARK		

Scientific Name	Threatened Category	Presence Text
Carcharias taurus (west coast population)		
Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat likely to occur within area
Carcharodon carcharias		
White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Pristis clavata		
Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis pristis		
Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area
Pristis zijsron		
Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sphyrna lewini		
Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat known to occur within area

Listed Migratory Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text
Migratory Marine Birds		
Anous stolidus		
Common Noddy [825]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Calonectris leucomelas		
Streaked Shearwater [1077]		Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat may occur within area
Sterna dougallii Roseate Tern [817]		Breeding likely to occur within area
Migratory Marine Species		
Anoxypristis cuspidata Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Congregation or aggregation known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Congregation or aggregation known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
Dugong dugon Dugong [28]		Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Congregation or aggregation known to occur within area
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
Isurus paucus Longfin Mako [82947]		Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]		Breeding known to occur within area
Mobula alfredi as Manta alfredi Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat known to occur within area
Mobula birostris as Manta birostris Giant Manta Ray [90034]		Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Natator depressus Flatback Turtle [59257]	Vulnerable	Congregation or aggregation known to occur within area
Orcaella heinsohni Australian Snubfin Dolphin [81322]		Species or species habitat may occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sousa sahulensis as Sousa chinensis Australian Humpback Dolphin [87942]		Species or species habitat may occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat likely to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text
Bird		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Anous stolidus Common Noddy [825]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area overfly marine area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat may occur within area
Phaethon lepturus fulvus Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Species or species habitat may occur within area
Sterna dougallii Roseate Tern [817]		Breeding likely to occur within area
Fish		

Scientific Name	Threatened Category	Presence Text
Acentronura larsonae Helen's Pygmy Pipehorse [66186]		Species or species habitat may occur within area
Bulbonaricus brauni Braun's Pughead Pipefish, Pug-headed Pipefish [66189]		Species or species habitat may occur within area
Campichthys tricarinatus Three-keel Pipefish [66192]		Species or species habitat may occur within area
Choeroichthys brachysoma Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area
Choeroichthys latispinosus Muiron Island Pipefish [66196]		Species or species habitat may occur within area
Choeroichthys suillus Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
Corythoichthys flavofasciatus Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area
Cosmocampus banneri Roughridge Pipefish [66206]		Species or species habitat may occur within area
Doryrhamphus dactyliophorus Banded Pipefish, Ringed Pipefish [66210]		Species or species habitat may occur within area
Doryrhamphus excisus Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within area
Doryrhamphus janssi Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Doryrhamphus multiannulatus Many-banded Pipefish [66717]		Species or species habitat may occur within area
Doryrhamphus negrosensis Flagtail Pipefish, Masthead Island Pipefish [66213]		Species or species habitat may occur within area
Festucalex scalaris Ladder Pipefish [66216]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within area
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
Halicampus nitidus Glittering Pipefish [66224]		Species or species habitat may occur within area
Halicampus spinirostris Spiny-snout Pipefish [66225]		Species or species habitat may occur within area
Haliichthys taeniophorus Ribboned Pipehorse, Ribboned Seadragon [66226]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippocampus angustus Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Hippocampus histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area
Hippocampus spinosissimus Hedgehog Seahorse [66239]		Species or species habitat may occur within area
Hippocampus trimaculatus Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720]		Species or species habitat may occur within area
Micrognathus micronotopterus Tidepool Pipefish [66255]		Species or species habitat may occur within area
Phoxocampus belcheri Black Rock Pipefish [66719]		Species or species habitat may occur within area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
[Trachyrhamphus bicoarctatus](#) Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
[Trachyrhamphus longirostris](#) Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
Mammal		
[Dugong dugon](#) Dugong [28]		Species or species habitat known to occur within area
Reptile		
[Aipysurus apraefrontalis](#) Short-nosed Sea Snake, Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat likely to occur within area
[Aipysurus duboisii](#) Dubois' Sea Snake, Dubois' Seasnake, Reef Shallows Sea Snake [1116]		Species or species habitat may occur within area
[Aipysurus foliosquama](#) Leaf-scaled Sea Snake, Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat known to occur within area
[Aipysurus laevis](#) Olive Sea Snake, Olive-brown Sea Snake [1120]		Species or species habitat may occur within area
[Aipysurus mosaicus as Aipysurus eydouxii](#) Mosaic Sea Snake [87261]		Species or species habitat may occur within area
[Aipysurus tenuis](#) Brown-lined Sea Snake, Mjoberg's Sea Snake [1121]		Species or species habitat may occur within area
[Caretta caretta](#) Loggerhead Turtle [1763]	Endangered	Congregation or aggregation known to occur within area
[Chelonia mydas](#) Green Turtle [1765]	Vulnerable	Congregation or aggregation known to occur within area

Scientific Name	Threatened Category	Presence Text
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
Emydocephalus annulatus Eastern Turtle-headed Sea Snake [1125]		Species or species habitat may occur within area
Ephalophis greyi Mangrove Sea Snake [1127]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Congregation or aggregation known to occur within area
Hydrelaps darwiniensis Port Darwin Sea Snake, Black-ringed Mangrove Sea Snake [1100]		Species or species habitat may occur within area
Hydrophis czeblukovi Fine-spined Sea Snake [59233]		Species or species habitat may occur within area
Hydrophis elegans Elegant Sea Snake, Bar-bellied Sea Snake [1104]		Species or species habitat may occur within area
Hydrophis kingii as Disteira kingii Spectacled Sea Snake [93511]		Species or species habitat may occur within area
Hydrophis macdowelli as Hydrophis mcdowelli MacDowell's Sea Snake, Small-headed Sea Snake, [75601]		Species or species habitat may occur within area
Hydrophis major as Disteira major Olive-headed Sea Snake [93512]		Species or species habitat may occur within area
Hydrophis ornatus Spotted Sea Snake, Ornate Reef Sea Snake [1111]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Hydrophis peronii as Acalyptophis peronii Horned Sea Snake [93509]		Species or species habitat may occur within area
Hydrophis platurus as Pelamis platurus Yellow-bellied Sea Snake [93517]		Species or species habitat may occur within area
Hydrophis stokesii as Astrotia stokesii Stokes' Sea Snake [93510]		Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Congregation or aggregation known to occur within area

Whales and Other Cetaceans		[Resource Information]
Current Scientific Name	Status	Type of Presence
Mammal		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
Feresa attenuata Pygmy Killer Whale [61]		Species or species habitat may occur within area
Globicephala macrorhynchus Short-finned Pilot Whale [62]		Species or species habitat may occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Kogia breviceps Pygmy Sperm Whale [57]		Species or species habitat may occur within area
Kogia sima Dwarf Sperm Whale [85043]		Species or species habitat may occur within area
Lagenodelphis hosei Fraser's Dolphin, Sarawak Dolphin [41]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]		Breeding known to occur within area
Mesoplodon densirostris Blainville's Beaked Whale, Dense-beaked Whale [74]		Species or species habitat may occur within area
Orcaella heinsohni Australian Snubfin Dolphin [81322]		Species or species habitat may occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Peponocephala electra Melon-headed Whale [47]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Sousa sahulensis Australian Humpback Dolphin [87942]		Species or species habitat may occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area
Stenella longirostris Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area
Steno bredanensis Rough-toothed Dolphin [30]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Australian Marine Parks	[Resource Information]
Park Name	Zone & IUCN Categories
Montebello	Multiple Use Zone (IUCN VI)

Habitat Critical to the Survival of Marine Turtles		
Scientific Name	Behaviour	Presence
Aug - Sep		
Natator depressus		
Flatback Turtle [59257]	Nesting	Known to occur
Dec - Jan		
Chelonia mydas		
Green Turtle [1765]	Nesting	Known to occur
Nov - May		
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Nesting	Known to occur

Extra Information

EPBC Act Referrals			[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status
North West Shelf Project Extension, Carnarvon Basin, WA	2018/8335		Approval
Controlled action			
Construct and operate LNG & domestic gas plant including onshore and offshore facilities - Wheatston	2008/4469	Controlled Action	Post-Approval
Development of Browse Basin Gas Fields (Upstream)	2008/4111	Controlled Action	Completed
Equus Gas Fields Development Project, Carnarvon Basin	2012/6301	Controlled Action	Completed
Gorgon Gas Development 4th Train Proposal	2011/5942	Controlled Action	Post-Approval
Pluto Gas Project	2005/2258	Controlled Action	Completed
Pluto Gas Project Including Site B	2006/2968	Controlled Action	Post-Approval
Not controlled action			

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
Drilling of an exploration well Gats-1 in Permit Area WA-261-P	2004/1701	Not Controlled Action	Completed
Exploration of appraisal wells	2006/3065	Not Controlled Action	Completed
Project Highclere Geophysical Survey	2021/9023	Not Controlled Action	Completed
Telstra North Rankin Spur Fibre Optic Cable	2016/7836	Not Controlled Action	Completed
To construct and operate an offshore submarine fibre optic cable, WA	2014/7373	Not Controlled Action	Completed
Wheatstone 3D seismic survey, 70km north of Barrow Island	2004/1761	Not Controlled Action	Completed
Not controlled action (particular manner)			
'Tourmaline' 2D marine seismic survey, permit areas WA-323-P, WA-330-P and WA-32	2005/2282	Not Controlled Action (Particular Manner)	Post-Approval
"Leanne" offshore 3D seismic exploration, WA-356-P	2005/1938	Not Controlled Action (Particular Manner)	Post-Approval
2D Seismic Survey	2005/2146	Not Controlled Action (Particular Manner)	Post-Approval
3D Marine Seismic Survey in WA 457-P & WA 458-P, North West Shelf, offshore WA	2013/6862	Not Controlled Action (Particular Manner)	Post-Approval
Aperio 3D Marine Seismic Survey, WA	2012/6648	Not Controlled Action (Particular Manner)	Post-Approval
Balnaves Condensate Field Development	2011/6188	Not Controlled Action (Particular Manner)	Post-Approval
Cable Seismic Exploration Permit areas WA-323-P and WA-330-P	2008/4227	Not Controlled Action (Particular Manner)	Post-Approval
CGGVERITAS 2010 2D Seismic Survey	2010/5714	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		Manner)	
DAVROS MC 3D marine seismic survey northwaet of Dampier, WA	2013/7092	Not Controlled Action (Particular Manner)	Post-Approval
Deep Water Northwest Shelf 2D Seismic Survey	2007/3260	Not Controlled Action (Particular Manner)	Post-Approval
Demeter 3D Seismic Survey, off Dampier, WA	2002/900	Not Controlled Action (Particular Manner)	Post-Approval
Harmony 3D Marine Seismic Survey	2012/6699	Not Controlled Action (Particular Manner)	Post-Approval
Julimar Brunello Gas Development Project	2011/5936	Not Controlled Action (Particular Manner)	Post-Approval
Moosehead 2D seismic survey within permit WA-192-P	2005/2167	Not Controlled Action (Particular Manner)	Post-Approval
Reindeer gas reservior development, Devil Creek, Carnarvon Basin - WA	2007/3917	Not Controlled Action (Particular Manner)	Post-Approval
Santos Winchester three dimensional seismic survey - WA-323-P & WA-330-P	2011/6107	Not Controlled Action (Particular Manner)	Post-Approval
Scarborough Development nearshore component, NWS, WA	2018/8362	Not Controlled Action (Particular Manner)	Post-Approval
Stag 4D & Reindeer MAZ Marine Seismic Surveys, WA	2013/7080	Not Controlled Action (Particular Manner)	Post-Approval
Stag Off-bottom Cable Seismic Survey	2007/3696	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Undertake a 3D marine seismic survey	2010/5695	Not Controlled Action (Particular Manner)	Post-Approval
West Panaeus 3D seismic survey	2006/3141	Not Controlled Action (Particular Manner)	Post-Approval
Wheatstone 3D MAZ Marine Seismic Survey	2011/6058	Not Controlled Action (Particular Manner)	Post-Approval
Wheatstone Iago Appraisal Well Drilling	2007/3941	Not Controlled Action (Particular Manner)	Post-Approval
Wheatstone Iago Appraisal Well Drilling	2008/4134	Not Controlled Action (Particular Manner)	Post-Approval

Key Ecological Features [Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
Ancient coastline at 125 m depth contour	North-west
Continental Slope Demersal Fish Communities	North-west

Biologically Important Areas

Scientific Name	Behaviour	Presence
Marine Turtles		
Caretta caretta Loggerhead Turtle [1763]	Internesting buffer	Known to occur
Chelonia mydas Green Turtle [1765]	Internesting buffer	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Internesting buffer	Known to occur
Natator depressus Flatback Turtle [59257]	Internesting buffer	Known to occur

Scientific Name	Behaviour	Presence
Seabirds		
Ardenna pacifica Wedge-tailed Shearwater [84292]	Breeding	Known to occur
Sterna dougallii Roseate Tern [817]	Breeding	Known to occur
Sternula nereis Fairy Tern [82949]	Breeding	Known to occur
Sharks		
Rhincodon typus Whale Shark [66680]	Foraging	Known to occur
Whales		
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Distribution	Known to occur
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Migration	Known to occur
Megaptera novaeangliae Humpback Whale [38]	Migration (north and south)	Known to occur

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact us page.

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EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 20-Feb-2024

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	1
National Heritage Places:	2
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	3
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	53
Listed Migratory Species:	62

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	1
Commonwealth Heritage Places:	2
Listed Marine Species:	103
Whales and Other Cetaceans:	32
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	9
Habitat Critical to the Survival of Marine Turtles:	4

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	24
Regional Forest Agreements:	None
Nationally Important Wetlands:	1
EPBC Act Referrals:	190
Key Ecological Features (Marine):	6
Biologically Important Areas:	37
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

World Heritage Properties		[Resource Information]
Name	State	Legal Status
The Ningaloo Coast	WA	Declared property

National Heritage Places		[Resource Information]
Name	State	Legal Status
Indigenous		
Dampier Archipelago (including Burrup Peninsula)	WA	Listed place
Natural		
The Ningaloo Coast	WA	Listed place

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside a Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area.

Feature Name
Commonwealth Marine Areas (EPBC Act)
Commonwealth Marine Areas (EPBC Act)
Commonwealth Marine Areas (EPBC Act)

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text
BIRD		
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Endangered	Species or species habitat may occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Limnodromus semipalmatus Asian Dowitcher [843]	Vulnerable	Species or species habitat may occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit [86432]	Endangered	Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Malurus leucopterus edouardi White-winged Fairy-wren (Barrow Island), Barrow Island Black-and-white Fairy-wren [26194]	Vulnerable	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Papasula abbotti Abbott's Booby [59297]	Endangered	Species or species habitat may occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area
Phaethon lepturus fulvus Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
[Phaethon rubricauda westralis](#) Red-tailed Tropicbird (Indian Ocean), Indian Ocean Red-tailed Tropicbird [91824]	Endangered	Species or species habitat known to occur within area
[Pterodroma mollis](#) Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
[Rostratula australis](#) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
[Sternula nereis nereis](#) Australian Fairy Tern [82950]	Vulnerable	Breeding known to occur within area
[Thalassarche carteri](#) Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat may occur within area
[Thalassarche impavida](#) Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
[Tringa nebularia](#) Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area
FISH		
[Milyeringa veritas](#) Cape Range Cave Gudgeon, Blind Gudgeon [66676]	Vulnerable	Species or species habitat known to occur within area
[Ophisternon candidum](#) Blind Cave Eel [66678]	Vulnerable	Species or species habitat known to occur within area
[Thunnus maccoyii](#) Southern Bluefin Tuna [69402]	Conservation Dependent	Breeding known to occur within area
MAMMAL		
[Balaenoptera borealis](#) Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Scientific Name	Threatened Category	Presence Text
Balaenoptera musculus Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Bettongia lesueur Barrow and Boodie Islands subspecies Boodie, Burrowing Bettong (Barrow and Boodie Islands) [88021]	Vulnerable	Translocated population known to occur within area
Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat known to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Isoodon auratus barrowensis Golden Bandicoot (Barrow Island) [66666]	Vulnerable	Species or species habitat known to occur within area
Lagorchestes conspicillatus conspicillatus Spectacled Hare-wallaby (Barrow Island) [66661]	Vulnerable	Species or species habitat known to occur within area
Lagorchestes hirsutus Central Australian subspecies Mala, Rufous Hare-Wallaby (Central Australia) [88019]	Endangered	Translocated population known to occur within area
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area
Osphranter robustus isabellinus Barrow Island Wallaroo, Barrow Island Euro [89262]	Vulnerable	Species or species habitat likely to occur within area
Petrogale lateralis lateralis Black-flanked Rock-wallaby, Moororong, Black-footed Rock Wallaby [66647]	Endangered	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Rhinonicteris aurantia (Pilbara form)		
Pilbara Leaf-nosed Bat [82790]	Vulnerable	Species or species habitat known to occur within area
REPTILE		
Aipysurus apraefrontalis		
Short-nosed Sea Snake, Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat known to occur within area
Aipysurus foliosquama		
Leaf-scaled Sea Snake, Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat known to occur within area
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Ctenotus zastictus		
Hamelin Ctenotus [25570]	Vulnerable	Species or species habitat likely to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Liasis olivaceus barroni		
Pilbara Olive Python [66699]	Vulnerable	Species or species habitat known to occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
SHARK		
Carcharias taurus (west coast population)		
Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat likely to occur within area
Carcharodon carcharias		
White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Pristis clavata		
Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis pristis		
Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat likely to occur within area
Pristis zijsron		
Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sphyrna lewini		
Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat known to occur within area

Listed Migratory Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text
Migratory Marine Birds		
Anous stolidus		
Common Noddy [825]		Species or species habitat likely to occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna carneipes		
Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to occur within area
Ardenna pacifica		
Wedge-tailed Shearwater [84292]		Breeding known to occur within area
Calonectris leucomelas		
Streaked Shearwater [1077]		Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
Hydroprogne caspia Caspian Tern [808]		Breeding known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Onychoprion anaethetus Bridled Tern [82845]		Breeding known to occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat known to occur within area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area
Sternula albifrons Little Tern [82849]		Species or species habitat may occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Migratory Marine Species		
Anoxypristis cuspidata Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat known to occur within area
Balaenoptera bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat likely to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Dugong dugon Dugong [28]		Breeding known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Eubalaena australis as Balaena glacialis australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
Isurus paucus Longfin Mako [82947]		Species or species habitat likely to occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]		Breeding known to occur within area
Mobula alfredi as Manta alfredi Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat known to occur within area
Mobula birostris as Manta birostris Giant Manta Ray [90034]		Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Orcaella heinsohni Australian Snubfin Dolphin [81322]		Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Pristis zijsron		
Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sousa sahulensis as Sousa chinensis		
Australian Humpback Dolphin [87942]		Species or species habitat known to occur within area
Tursiops aduncus (Arafura/Timor Sea populations)		
Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
Migratory Terrestrial Species		
Hirundo rustica		
Barn Swallow [662]		Species or species habitat may occur within area
Motacilla cinerea		
Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat known to occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area
Calidris canutus		
Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat may occur within area
[Charadrius leschenaultii](#) Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
[Charadrius veredus](#) Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
[Glareola maldivarum](#) Oriental Pratincole [840]		Species or species habitat may occur within area
[Limnodromus semipalmatus](#) Asian Dowitcher [843]	Vulnerable	Species or species habitat may occur within area
[Limosa lapponica](#) Bar-tailed Godwit [844]		Species or species habitat known to occur within area
[Numenius madagascariensis](#) Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
[Pandion haliaetus](#) Osprey [952]		Breeding known to occur within area
[Thalasseus bergii](#) Greater Crested Tern [83000]		Breeding known to occur within area
[Tringa nebularia](#) Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State
Unknown	
Commonwealth Land - [52236]	WA

Commonwealth Heritage Places [Resource Information]

Name	State	Status
Natural		
Learmonth Air Weapons Range Facility	WA	Listed place
Ningaloo Marine Area - Commonwealth Waters	WA	Listed place

Listed Marine Species [Resource Information]

Scientific Name	Threatened Category	Presence Text
Bird		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous stolidus		
Common Noddy [825]		Species or species habitat likely to occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area
Ardenna carneipes as Puffinus carneipes		
Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to occur within area
Ardenna pacifica as Puffinus pacificus		
Wedge-tailed Shearwater [84292]		Breeding known to occur within area
Bubulcus ibis as Ardea ibis		
Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area overfly marine area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area overfly marine area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat likely to occur within area
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat known to occur within area overfly marine area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area overfly marine area
Chroicocephalus novaehollandiae as Larus novaehollandiae Silver Gull [82326]		Breeding known to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area overfly marine area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area overfly marine area
Hydroprogne caspia as Sterna caspia Caspian Tern [808]		Breeding known to occur within area
Limnodromus semipalmatus Asian Dowitcher [843]	Vulnerable	Species or species habitat may occur within area overfly marine area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Onychoprion anaethetus as Sterna anaethetus Bridled Tern [82845]		Breeding known to occur within area
Onychoprion fuscatus as Sterna fuscata Sooty Tern [90682]		Breeding known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Papasula abbotti Abbott's Booby [59297]	Endangered	Species or species habitat may occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat known to occur within area
Phaethon lepturus fulvus Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Species or species habitat may occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Sternula albifrons as Sterna albifrons Little Tern [82849]		Species or species habitat may occur within area
Sternula nereis as Sterna nereis Fairy Tern [82949]		Breeding known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalasseus bengalensis as Sterna bengalensis Lesser Crested Tern [66546]		Breeding known to occur within area
Thalasseus bergii as Sterna bergii Greater Crested Tern [83000]		Breeding known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area overfly marine area
Fish		
Acentronura larsonae Helen's Pygmy Pipehorse [66186]		Species or species habitat may occur within area
Bulbonaricus brauni Braun's Pughead Pipefish, Pug-headed Pipefish [66189]		Species or species habitat may occur within area
Campichthys tricarinatus Three-keel Pipefish [66192]		Species or species habitat may occur within area
Choeroichthys brachysoma Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Choeroichthys latispinosus Muiron Island Pipefish [66196]		Species or species habitat may occur within area
Choeroichthys suillus Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
Corythoichthys flavofasciatus Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area
Cosmocampus banneri Roughridge Pipefish [66206]		Species or species habitat may occur within area
Doryrhamphus dactyliophorus Banded Pipefish, Ringed Pipefish [66210]		Species or species habitat may occur within area
Doryrhamphus excisus Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within area
Doryrhamphus janssi Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area
Doryrhamphus multiannulatus Many-banded Pipefish [66717]		Species or species habitat may occur within area
Doryrhamphus negrosensis Flagtail Pipefish, Masthead Island Pipefish [66213]		Species or species habitat may occur within area
Festucalex scalaris Ladder Pipefish [66216]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within area
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
Halicampus nitidus Glittering Pipefish [66224]		Species or species habitat may occur within area
Halicampus spinirostris Spiny-snout Pipefish [66225]		Species or species habitat may occur within area
Haliichthys taeniophorus Ribboned Pipehorse, Ribboned Seadragon [66226]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippocampus angustus Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area
Hippocampus histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area
Hippocampus spinosissimus Hedgehog Seahorse [66239]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Hippocampus trimaculatus Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720]		Species or species habitat may occur within area
Micrognathus micronotopterus Tidepool Pipefish [66255]		Species or species habitat may occur within area
Phoxocampus belcheri Black Rock Pipefish [66719]		Species or species habitat may occur within area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Trachyrhamphus longirostris Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
Mammal		
Dugong dugon Dugong [28]		Breeding known to occur within area
Reptile		
Aipysurus apraefrontalis Short-nosed Sea Snake, Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Aipysurus duboisii Dubois' Sea Snake, Dubois' Seasnake, Reef Shallows Sea Snake [1116]		Species or species habitat may occur within area
Aipysurus foliosquama Leaf-scaled Sea Snake, Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat known to occur within area
Aipysurus laevis Olive Sea Snake, Olive-brown Sea Snake [1120]		Species or species habitat may occur within area
Aipysurus mosaicus as Aipysurus eydouxii Mosaic Sea Snake [87261]		Species or species habitat may occur within area
Aipysurus tenuis Brown-lined Sea Snake, Mjoberg's Sea Snake [1121]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Emydocephalus annulatus Eastern Turtle-headed Sea Snake [1125]		Species or species habitat may occur within area
Ephalophis greyae as Ephalophis greyi Mangrove Sea Snake [93738]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Hydrelaps darwiniensis Port Darwin Sea Snake, Black-ringed Mangrove Sea Snake [1100]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Hydrophis czeblukovi Fine-spined Sea Snake [59233]		Species or species habitat may occur within area
Hydrophis elegans Elegant Sea Snake, Bar-bellied Sea Snake [1104]		Species or species habitat may occur within area
Hydrophis kingii as Disteira kingii Spectacled Sea Snake [93511]		Species or species habitat may occur within area
Hydrophis macdowelli as Hydrophis mcdowelli MacDowell's Sea Snake, Small-headed Sea Snake, [75601]		Species or species habitat may occur within area
Hydrophis major as Disteira major Olive-headed Sea Snake [93512]		Species or species habitat may occur within area
Hydrophis ornatus Spotted Sea Snake, Ornate Reef Sea Snake [1111]		Species or species habitat may occur within area
Hydrophis peronii as Acalyptophis peronii Horned Sea Snake [93509]		Species or species habitat may occur within area
Hydrophis platurus as Pelamis platurus Yellow-bellied Sea Snake [93517]		Species or species habitat may occur within area
Hydrophis stokesii as Astrotia stokesii Stokes' Sea Snake [93510]		Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area

Whales and Other Cetaceans		[Resource Information]
Current Scientific Name	Status	Type of Presence
Mammal		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
Balaenoptera bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Feresa attenuata Pygmy Killer Whale [61]		Species or species habitat may occur within area
Globicephala macrorhynchus Short-finned Pilot Whale [62]		Species or species habitat may occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Indopacetus pacificus Longman's Beaked Whale [72]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
Kogia breviceps Pygmy Sperm Whale [57]		Species or species habitat may occur within area
Kogia sima Dwarf Sperm Whale [85043]		Species or species habitat may occur within area
Lagenodelphis hosei Fraser's Dolphin, Sarawak Dolphin [41]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]		Breeding known to occur within area
Mesoplodon densirostris Blainville's Beaked Whale, Dense-beaked Whale [74]		Species or species habitat may occur within area
Mesoplodon ginkgodens Gingko-toothed Beaked Whale, Gingko-toothed Whale, Gingko Beaked Whale [59564]		Species or species habitat may occur within area
Orcaella heinsohni Australian Snubfin Dolphin [81322]		Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Peponocephala electra Melon-headed Whale [47]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area

Current Scientific Name	Status	Type of Presence
Sousa sahulensis Australian Humpback Dolphin [87942]		Species or species habitat known to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area
Stenella longirostris Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area
Steno bredanensis Rough-toothed Dolphin [30]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Australian Marine Parks	[Resource Information]
Park Name	Zone & IUCN Categories
Dampier	Habitat Protection Zone (IUCN IV)
Gascoyne	Habitat Protection Zone (IUCN IV)
Argo-Rowley Terrace	Multiple Use Zone (IUCN VI)

Park Name	Zone & IUCN Categories
Dampier	Multiple Use Zone (IUCN VI)
Gascoyne	Multiple Use Zone (IUCN VI)
Montebello	Multiple Use Zone (IUCN VI)
Dampier	National Park Zone (IUCN II)
Gascoyne	National Park Zone (IUCN II)
Ningaloo	Recreational Use Zone (IUCN IV)

Habitat Critical to the Survival of Marine Turtles		
Scientific Name	Behaviour	Presence
Aug - Sep		
Natator depressus		
Flatback Turtle [59257]	Nesting	Known to occur
Dec - Jan		
Chelonia mydas		
Green Turtle [1765]	Nesting	Known to occur
Nov-Feb		
Caretta caretta		
Loggerhead Turtle [1763]	Nesting	Known to occur
Nov - May		
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Nesting	Known to occur

Extra Information

State and Territory Reserves		[Resource Information]
Protected Area Name	Reserve Type	State
Barrow Island	Nature Reserve	WA
Barrow Island	Marine Management Area	WA
Barrow Island	Marine Park	WA
Bessieres Island	Nature Reserve	WA
Boodie, Double Middle Islands	Nature Reserve	WA
Cape Range	National Park	WA

Protected Area Name	Reserve Type	State
Jurabi Coastal Park	5(1)(h) Reserve	WA
Montebello Islands	Conservation Park	WA
Montebello Islands	Conservation Park	WA
Montebello Islands	Marine Park	WA
Muiron Islands	Nature Reserve	WA
Muiron Islands	Marine Management Area	WA
Murujuga	National Park	WA
Ningaloo	Marine Park	WA
Round Island	Nature Reserve	WA
Serrurier Island	Nature Reserve	WA
Unnamed WA36907	5(1)(h) Reserve	WA
Unnamed WA36909	5(1)(h) Reserve	WA
Unnamed WA36910	5(1)(h) Reserve	WA
Unnamed WA36915	Nature Reserve	WA
Unnamed WA40828	5(1)(h) Reserve	WA
Unnamed WA40877	5(1)(h) Reserve	WA
Unnamed WA41080	5(1)(h) Reserve	WA
Unnamed WA44665	5(1)(h) Reserve	WA

Nationally Important Wetlands

[Resource Information]

Wetland Name	State
Cape Range Subterranean Waterways	WA

EPBC Act Referrals

[Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status
Browse to North West Shelf Development, Indian Ocean, WA	2018/8319		Approval
Gorgon Gas Development	2003/1294		Post-Approval
North West Shelf Project Extension, Carnarvon Basin, WA	2018/8335		Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Project Highclere Cable Lay and Operation	2022/09203		Completed
Action clearly unacceptable			
Highlands 3D Marine Seismic Survey	2012/6680	Action Clearly Unacceptable	Completed
Controlled action			
'Van Gogh' Petroleum Field Development	2007/3213	Controlled Action	Post-Approval
Construct and operate LNG & domestic gas plant including onshore and offshore facilities - Wheatston	2008/4469	Controlled Action	Post-Approval
Develop Jansz-Io deepwater gas field in Permit Areas WA-18-R, WA-25-R and WA-26-	2005/2184	Controlled Action	Post-Approval
Development of Angel gas and condensate field, North West Shelf	2004/1805	Controlled Action	Post-Approval
Development of Browse Basin Gas Fields (Upstream)	2008/4111	Controlled Action	Completed
Development of Coniston/Novara fields within the Exmouth Sub-basin	2011/5995	Controlled Action	Post-Approval
Development of Stybarrow petroleum field incl drilling and facility installation	2004/1469	Controlled Action	Post-Approval
Echo-Yodel Production Wells	2000/11	Controlled Action	Post-Approval
Enfield full field development	2001/257	Controlled Action	Post-Approval
Equus Gas Fields Development Project, Carnarvon Basin	2012/6301	Controlled Action	Completed
Eramurra Industrial Salt Project	2021/9027	Controlled Action	Assessment Approach
Eramurra Industrial Salt Project, near Karratha, WA	2019/8448	Controlled Action	Completed
Gorgon Gas Development 4th Train Proposal	2011/5942	Controlled Action	Post-Approval
Greater Enfield (Vincent) Development	2005/2110	Controlled Action	Post-Approval
Light Crude Oil Production	2001/365	Controlled Action	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Controlled action			
Perdaman Urea Project, near Karratha, WA	2018/8383	Controlled Action	Post-Approval
Pluto Gas Project	2005/2258	Controlled Action	Completed
Pluto Gas Project Including Site B	2006/2968	Controlled Action	Post-Approval
Pyrenees Oil Fields Development	2005/2034	Controlled Action	Post-Approval
The Scarborough Project - FLNG & assoc subsea infrastructure, Carnarvon Basin	2013/6811	Controlled Action	Post-Approval
Vincent Appraisal Well	2000/22	Controlled Action	Post-Approval
Not controlled action			
'Goodwyn A' Low Pressure Train Project	2003/914	Not Controlled Action	Completed
'Van Gogh' Oil Appraisal Drilling Program, Exploration Permit Area WA-155-P(1)	2006/3148	Not Controlled Action	Completed
Bollinger 2D Seismic Survey 200km North of North West Cape WA	2004/1868	Not Controlled Action	Completed
Bultaco-2, Laverda-2, Laverda-3 and Montesa-2 Appraisal Wells	2000/103	Not Controlled Action	Completed
Carnarvon 3D Marine Seismic Survey	2004/1890	Not Controlled Action	Completed
Cazadores 2D seismic survey	2004/1720	Not Controlled Action	Completed
Construction and operation of an unmanned sea platform and connecting pipeline to Varanus Island for	2004/1703	Not Controlled Action	Completed
Controlled Source Electromagnetic Survey	2007/3262	Not Controlled Action	Completed
Development of Halyard Field off the west coast of WA	2010/5611	Not Controlled Action	Completed
Development of Mutineer and Exeter petroleum fields for oil production, Permit	2003/1033	Not Controlled Action	Completed
Drilling of an exploration well Gats-1 in Permit Area WA-261-P	2004/1701	Not Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
Eagle-1 Exploration Drilling, North West Shelf, WA	2019/8578	Not Controlled Action	Completed
Echo A Development WA-23-L, WA-24-L	2005/2042	Not Controlled Action	Completed
Exploration drilling well WA-155-P(1)	2003/971	Not Controlled Action	Completed
Exploration of appraisal wells	2006/3065	Not Controlled Action	Completed
Exploration Well in Permit Area WA-155-P(1)	2002/759	Not Controlled Action	Completed
Exploratory drilling in permit area WA-225-P	2001/490	Not Controlled Action	Completed
HCA05X Macedon Experimental Survey	2004/1926	Not Controlled Action	Completed
Hess Exploration Drilling Programme	2007/3566	Not Controlled Action	Completed
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed
Infill Production Well (Griffin-9)	2001/417	Not Controlled Action	Completed
Jansz-2 and 3 Appraisal Wells	2002/754	Not Controlled Action	Completed
Klammer 2D Seismic Survey	2002/868	Not Controlled Action	Completed
Maia-Gaea Exploration wells	2000/17	Not Controlled Action	Completed
Manaslu - 1 and Huascaran - 1 Offshore Exploration Wells	2001/235	Not Controlled Action	Completed
Montesa-1 and Bultaco-1 Exploration Wells	2000/102	Not Controlled Action	Completed
Murujuga archaeological excavation, collection and sampling, Dampier Archipelago, WA	2014/7160	Not Controlled Action	Completed
North Rankin B gas compression facility	2005/2500	Not Controlled Action	Completed
Pipeline System Modifications Project	2000/3	Not Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
Port Expansion and Dredging	2003/1265	Not Controlled Action	Completed
Project Highclere Geophysical Survey	2021/9023	Not Controlled Action	Completed
Searipple gas and condensate field development	2000/89	Not Controlled Action	Completed
Spool Base Facility	2001/263	Not Controlled Action	Completed
Subsea Gas Pipeline From Stybarrow Field to Griffin Venture Gas Export Pipeline	2005/2033	Not Controlled Action	Completed
sub-sea tieback of Perseus field wells	2004/1326	Not Controlled Action	Completed
Telstra North Rankin Spur Fibre Optic Cable	2016/7836	Not Controlled Action	Completed
Thevenard Island Retirement Project	2015/7423	Not Controlled Action	Completed
To construct and operate an offshore submarine fibre optic cable, WA	2014/7373	Not Controlled Action	Completed
WA-295-P Kerr-McGee Exploration Wells	2001/152	Not Controlled Action	Completed
Wanda Offshore Research Project, 80 km north-east of Exmouth, WA	2018/8293	Not Controlled Action	Completed
Western Flank Gas Development	2005/2464	Not Controlled Action	Completed
Wheatstone 3D seismic survey, 70km north of Barrow Island	2004/1761	Not Controlled Action	Completed
Not controlled action (particular manner)			
'Kate' 3D marine seismic survey, exploration permits WA-320-P and WA-345-P, 60km	2005/2037	Not Controlled Action (Particular Manner)	Post-Approval
'Tourmaline' 2D marine seismic survey, permit areas WA-323-P, WA-330-P and WA-32	2005/2282	Not Controlled Action (Particular Manner)	Post-Approval
"Leanne" offshore 3D seismic exploration, WA-356-P	2005/1938	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
2D and 3D seismic surveys	2005/2151	Not Controlled Action (Particular Manner)	Post-Approval
2D marine seismic survey	2012/6296	Not Controlled Action (Particular Manner)	Post-Approval
2D seismic survey	2008/4493	Not Controlled Action (Particular Manner)	Post-Approval
2D Seismic Survey	2005/2146	Not Controlled Action (Particular Manner)	Post-Approval
2D Seismic Survey Permit Area WA-352-P	2008/4628	Not Controlled Action (Particular Manner)	Post-Approval
2D seismic survey within permit WA-291	2007/3265	Not Controlled Action (Particular Manner)	Post-Approval
3D marine seismic survey	2008/4281	Not Controlled Action (Particular Manner)	Post-Approval
3D Marine Seismic Survey (WA-482-P, WA-363-P), WA	2013/6761	Not Controlled Action (Particular Manner)	Post-Approval
3D Marine Seismic Survey in Permit Areas WA-15-R, WA-18-R, WA-205-P, WA-253-P, WA-267-P and WA-268-P	2003/1271	Not Controlled Action (Particular Manner)	Post-Approval
3D Marine Seismic Survey in WA 457-P & WA 458-P, North West Shelf, offshore WA	2013/6862	Not Controlled Action (Particular Manner)	Post-Approval
3D marine seismic survey over petroleum title WA-268-P	2007/3458	Not Controlled Action (Particular Manner)	Post-Approval
3D Marine Seismic Surveys - Contos CT-13 & Supertubes CT-13, offshore WA	2013/6901	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		Manner)	
3D seismic survey	2006/2715	Not Controlled Action (Particular Manner)	Post-Approval
3D Seismic Survey, WA	2008/4428	Not Controlled Action (Particular Manner)	Post-Approval
3D Seismic Survey in the Carnarvon Bsin on the North West Shelf	2002/778	Not Controlled Action (Particular Manner)	Post-Approval
3D sesmic survey	2006/2781	Not Controlled Action (Particular Manner)	Post-Approval
Acheron Non-Exclusive 2D Seismic Survey	2008/4565	Not Controlled Action (Particular Manner)	Post-Approval
Acheron Non-Exclusive 2D Seismic Survey	2009/4968	Not Controlled Action (Particular Manner)	Post-Approval
Agrippina 3D Seismic Marine Survey	2009/5212	Not Controlled Action (Particular Manner)	Post-Approval
Apache Northwest Shelf Van Gogh Field Appraisal Drilling Program	2007/3495	Not Controlled Action (Particular Manner)	Post-Approval
Aperio 3D Marine Seismic Survey, WA	2012/6648	Not Controlled Action (Particular Manner)	Post-Approval
Artemis-1 Drilling Program (WA-360-P)	2010/5432	Not Controlled Action (Particular Manner)	Post-Approval
Babylon 3D Marine Seismic Survey, Commonwealth Waters, nr Exmouth WA	2013/7081	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Balnaves Condensate Field Development	2011/6188	Not Controlled Action (Particular Manner)	Post-Approval
Bonaventure 3D seismic survey	2006/2514	Not Controlled Action (Particular Manner)	Post-Approval
Cable Seismic Exploration Permit areas WA-323-P and WA-330-P	2008/4227	Not Controlled Action (Particular Manner)	Post-Approval
CGGVERITAS 2010 2D Seismic Survey	2010/5714	Not Controlled Action (Particular Manner)	Post-Approval
Charon 3D Marine Seismic Survey	2007/3477	Not Controlled Action (Particular Manner)	Post-Approval
Coverack Marine Seismic Survey	2001/399	Not Controlled Action (Particular Manner)	Post-Approval
Cue Seismic Survey within WA-359-P, WA-361-P and WA-360-P	2007/3647	Not Controlled Action (Particular Manner)	Post-Approval
CVG 3D Marine Seismic Survey	2012/6654	Not Controlled Action (Particular Manner)	Post-Approval
DAVROS MC 3D marine seismic survey northwaet of Dampier, WA	2013/7092	Not Controlled Action (Particular Manner)	Post-Approval
Decommissioning of the Legendre facilities	2010/5681	Not Controlled Action (Particular Manner)	Post-Approval
Deep Water Drilling Program	2010/5532	Not Controlled Action (Particular Manner)	Post-Approval
Deep Water Northwest Shelf 2D Seismic Survey	2007/3260	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		Manner)	
Demeter 3D Seismic Survey, off Dampier, WA	2002/900	Not Controlled Action (Particular Manner)	Post-Approval
Diesel Fuel Bunker Operation	2012/6289	Not Controlled Action (Particular Manner)	Post-Approval
Draeck 3D Marine Seismic Survey, WA-205-P	2006/3067	Not Controlled Action (Particular Manner)	Post-Approval
Drilling 35-40 offshore exploration wells in deep water	2008/4461	Not Controlled Action (Particular Manner)	Post-Approval
Eendracht Multi-Client 3D Marine Seismic Survey	2009/4749	Not Controlled Action (Particular Manner)	Post-Approval
Enfield M3 & Vincent 4D Marine Seismic Surveys	2008/3981	Not Controlled Action (Particular Manner)	Completed
Enfield M3 4D, Vincent 4D & 4D Line Test Marine Seismic Surveys	2008/4122	Not Controlled Action (Particular Manner)	Post-Approval
Enfield M4 4D Marine Seismic Survey	2008/4558	Not Controlled Action (Particular Manner)	Post-Approval
Enfield oilfield 3D Seismic Survey	2006/3132	Not Controlled Action (Particular Manner)	Post-Approval
Exmouth West 2D Marine Seismic Survey	2008/4132	Not Controlled Action (Particular Manner)	Post-Approval
Exploration drilling of Zeus-1 well	2008/4351	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Fletcher-Finucane Development, WA26-L and WA191-P	2011/6123	Not Controlled Action (Particular Manner)	Post-Approval
Foxhound 3D Non-Exclusive Marine Seismic Survey	2009/4703	Not Controlled Action (Particular Manner)	Post-Approval
Gazelle 3D Marine Seismic Survey in WA-399-P and WA-42-L	2010/5570	Not Controlled Action (Particular Manner)	Post-Approval
Geco Eagle 3D Marine Seismic Survey	2008/3958	Not Controlled Action (Particular Manner)	Post-Approval
Glencoe 3D Marine Seismic Survey WA-390-P	2007/3684	Not Controlled Action (Particular Manner)	Post-Approval
Greater Western Flank Phase 1 gas Development	2011/5980	Not Controlled Action (Particular Manner)	Post-Approval
Grimalkin 3D Seismic Survey	2008/4523	Not Controlled Action (Particular Manner)	Post-Approval
Guacamole 2D Marine Seismic Survey	2008/4381	Not Controlled Action (Particular Manner)	Post-Approval
Harmony 3D Marine Seismic Survey	2012/6699	Not Controlled Action (Particular Manner)	Post-Approval
Harpy 1 exploration well	2001/183	Not Controlled Action (Particular Manner)	Post-Approval
Honeycombs MC3D Marine Seismic Survey	2012/6368	Not Controlled Action (Particular Manner)	Post-Approval
Huzzas MC3D Marine Seismic Survey (HZ-13) Carnarvon Basin, offshore WA	2013/7003	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		Manner)	
Huzzas phase 2 marine seismic survey, Exmouth Plateau, Northern Carnarvon Basin, WA	2013/7093	Not Controlled Action (Particular Manner)	Post-Approval
INDIGO Marine Cable Route Survey (INDIGO)	2017/7996	Not Controlled Action (Particular Manner)	Post-Approval
John Ross & Rosella Off Bottom Cable Seismic Exploration Program	2008/3966	Not Controlled Action (Particular Manner)	Post-Approval
Judo Marine 3D Seismic Survey within and adjacent to WA-412-P	2009/4801	Not Controlled Action (Particular Manner)	Post-Approval
Judo Marine 3D Seismic Survey within and adjacent to WA-412-P	2008/4630	Not Controlled Action (Particular Manner)	Post-Approval
Julimar Brunello Gas Development Project	2011/5936	Not Controlled Action (Particular Manner)	Post-Approval
Klimt 2D Marine Seismic Survey	2007/3856	Not Controlled Action (Particular Manner)	Post-Approval
Laverda 3D Marine Seismic Survey and Vincent M1 4D Marine Seismic Survey	2010/5415	Not Controlled Action (Particular Manner)	Post-Approval
Leopard 2D marine seismic survey	2005/2290	Not Controlled Action (Particular Manner)	Post-Approval
Lion 2D Marine Seismic Survey	2007/3777	Not Controlled Action (Particular Manner)	Post-Approval
Macedon Gas Field Development	2008/4605	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Marine reconnaissance survey	2008/4466	Not Controlled Action (Particular Manner)	Post-Approval
Moosehead 2D seismic survey within permit WA-192-P	2005/2167	Not Controlled Action (Particular Manner)	Post-Approval
Munmorah 2D seismic survey within permits WA-308/9-P	2003/970	Not Controlled Action (Particular Manner)	Post-Approval
Ocean Bottom Cable Seismic Program, WA-264-P	2007/3844	Not Controlled Action (Particular Manner)	Post-Approval
Ocean Bottom Cable Seismic Survey	2005/2017	Not Controlled Action (Particular Manner)	Post-Approval
Offshore Canning Multi Client 2D Marine Seismic Survey	2010/5393	Not Controlled Action (Particular Manner)	Post-Approval
Offshore Drilling Campaign	2011/5830	Not Controlled Action (Particular Manner)	Post-Approval
Orcus 3D Marine Seismic Survey in WA-450-P	2010/5723	Not Controlled Action (Particular Manner)	Post-Approval
Osprey and Dionysus Marine Seismic Survey	2011/6215	Not Controlled Action (Particular Manner)	Post-Approval
Palta-1 exploration well in Petroleum Permit Area WA-384-P	2011/5871	Not Controlled Action (Particular Manner)	Post-Approval
Pomodoro 3D Marine Seismic Survey in WA-426-P and WA-427-P	2010/5472	Not Controlled Action (Particular Manner)	Post-Approval
Pyrenees 4D Marine Seismic Monitor Survey, HCA12A	2012/6579	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		Manner)	
Pyrenees-Macedon 3D marine seismic survey	2005/2325	Not Controlled Action (Particular Manner)	Post-Approval
Quiberon 2D Seismic Survey, permit area WA-385P, offshore of Carnarvon	2009/5077	Not Controlled Action (Particular Manner)	Post-Approval
Reindeer gas reservior development, Devil Creek, Carnarvon Basin - WA	2007/3917	Not Controlled Action (Particular Manner)	Post-Approval
Repsol 3d & 2D Marine Seismic Survey	2012/6658	Not Controlled Action (Particular Manner)	Post-Approval
Rose 3D Seismic Program	2008/4239	Not Controlled Action (Particular Manner)	Post-Approval
Rydal-1 Petroleum Exploration Well, WA	2012/6522	Not Controlled Action (Particular Manner)	Post-Approval
Salsa 3D Marine Seismic Survey	2010/5629	Not Controlled Action (Particular Manner)	Post-Approval
Santos Winchester three dimensional seismic survey - WA-323-P & WA-330-P	2011/6107	Not Controlled Action (Particular Manner)	Post-Approval
Scarborough Development nearshore component, NWS, WA	2018/8362	Not Controlled Action (Particular Manner)	Post-Approval
Skorpion Marine Seismic Survey WA	2001/416	Not Controlled Action (Particular Manner)	Post-Approval
Sovereign 3D Marine Seismic Survey	2011/5861	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Stag 4D & Reindeer MAZ Marine Seismic Surveys, WA	2013/7080	Not Controlled Action (Particular Manner)	Post-Approval
Stag Off-bottom Cable Seismic Survey	2007/3696	Not Controlled Action (Particular Manner)	Post-Approval
Stybarrow 4D Marine Seismic Survey	2011/5810	Not Controlled Action (Particular Manner)	Post-Approval
Stybarrow Baseline 4D marine seismic survey	2008/4530	Not Controlled Action (Particular Manner)	Post-Approval
Tantabiddi Boat Ramp Sand Bypassing	2015/7411	Not Controlled Action (Particular Manner)	Post-Approval
The Dampier Heavy Load Out Facility Berth and Swing Basin Expansion	2012/6271	Not Controlled Action (Particular Manner)	Post-Approval
Tidepole Maz 3D Seismic Survey Campaign	2007/3706	Not Controlled Action (Particular Manner)	Post-Approval
Tortilla 2D Seismic Survey, WA	2011/6110	Not Controlled Action (Particular Manner)	Post-Approval
Triton 3D Marine Seismic Survey, WA-2-R and WA-3-R	2006/2609	Not Controlled Action (Particular Manner)	Post-Approval
Undertake a 3D marine seismic survey	2010/5695	Not Controlled Action (Particular Manner)	Post-Approval
Undertake a three dimensional marine seismic survey	2010/5715	Not Controlled Action (Particular Manner)	Post-Approval
Undertake a three dimensional marine seismic survey	2010/5679	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		Manner)	
Vincent M1 and Enfield M5 4D Marine Seismic Survey	2010/5720	Not Controlled Action (Particular Manner)	Post-Approval
Warramunga Non-Inclusive 3D Seismic Survey	2008/4553	Not Controlled Action (Particular Manner)	Post-Approval
West Anchor 3D Marine Seismic Survey	2008/4507	Not Controlled Action (Particular Manner)	Post-Approval
West Panaeus 3D seismic survey	2006/3141	Not Controlled Action (Particular Manner)	Post-Approval
Westralia SPAN Marine Seismic Survey, WA & NT	2012/6463	Not Controlled Action (Particular Manner)	Post-Approval
Wheatstone 3D MAZ Marine Seismic Survey	2011/6058	Not Controlled Action (Particular Manner)	Post-Approval
Wheatstone Iago Appraisal Well Drilling	2007/3941	Not Controlled Action (Particular Manner)	Post-Approval
Wheatstone Iago Appraisal Well Drilling	2008/4134	Not Controlled Action (Particular Manner)	Post-Approval
Referral decision			
3D Seismic Survey	2008/4219	Referral Decision	Completed
Bianchi 3D Marine Seismic Survey, Carnavon Basin, WA	2013/7078	Referral Decision	Completed
CVG 3D Marine Seismic Survey	2012/6270	Referral Decision	Completed
Enfield 4D Marine Seismic Surveys, Production Permit WA-28-L	2005/2370	Referral Decision	Completed
Rose 3D Seismic acquisition survey	2008/4220	Referral Decision	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Referral decision			
Stybarrow Baseline 4D Marine Seismic Survey (Permit Areas WA-255-P, WA-32-L, WA-	2008/4165	Referral Decision	Completed
Two Dimensional Transition Zone Seismic Survey - TP/7 (R1)	2010/5507	Referral Decision	Completed

Key Ecological Features [Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
Ancient coastline at 125 m depth contour	North-west
Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula	North-west
Commonwealth waters adjacent to Ningaloo Reef	North-west
Continental Slope Demersal Fish Communities	North-west
Exmouth Plateau	North-west
Glomar Shoals	North-west

Biologically Important Areas

Scientific Name	Behaviour	Presence
Dugong		
Dugong dugon Dugong [28]	Breeding	Known to occur
Dugong dugon Dugong [28]	Calving	Known to occur
Dugong dugon Dugong [28]	Foraging (high density seagrass beds)	Known to occur
Dugong dugon Dugong [28]	Nursing	Known to occur
Marine Turtles		
Caretta caretta Loggerhead Turtle [1763]	Internesting buffer	Known to occur

Scientific Name	Behaviour	Presence
Caretta caretta Loggerhead Turtle [1763]	Nesting	Known to occur
Chelonia mydas Green Turtle [1765]	Aggregation	Known to occur
Chelonia mydas Green Turtle [1765]	Basking	Known to occur
Chelonia mydas Green Turtle [1765]	Foraging	Known to occur
Chelonia mydas Green Turtle [1765]	Internesting	Known to occur
Chelonia mydas Green Turtle [1765]	Internesting buffer	Known to occur
Chelonia mydas Green Turtle [1765]	Mating	Known to occur
Chelonia mydas Green Turtle [1765]	Migration corridor	Known to occur
Chelonia mydas Green Turtle [1765]	Nesting	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Foraging	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Internesting	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Internesting buffer	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Mating	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Migration corridor	Known to occur

Scientific Name	Behaviour	Presence
Eretmochelys imbricata Hawksbill Turtle [1766]	Nesting	Known to occur
Natator depressus Flatback Turtle [59257]	Aggregation	Known to occur
Natator depressus Flatback Turtle [59257]	Foraging	Known to occur
Natator depressus Flatback Turtle [59257]	Internesting	Known to occur
Natator depressus Flatback Turtle [59257]	Internesting buffer	Known to occur
Natator depressus Flatback Turtle [59257]	Mating	Known to occur
Natator depressus Flatback Turtle [59257]	Migration corridor	Known to occur
Natator depressus Flatback Turtle [59257]	Nesting	Known to occur
Seabirds		
Ardenna pacifica Wedge-tailed Shearwater [84292]	Breeding	Known to occur
Sterna dougallii Roseate Tern [817]	Breeding	Known to occur
Sternula nereis Fairy Tern [82949]	Breeding	Known to occur
Thalasseus bengalensis Lesser Crested Tern [66546]	Breeding	Known to occur
Sharks		
Rhincodon typus Whale Shark [66680]	Foraging	Known to occur
Rhincodon typus Whale Shark [66680]	Foraging (high density	Known to occur

Scientific Name	Behaviour	Presence
	prey)	
Whales		
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Distribution	Known to occur
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Foraging	Known to occur
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Migration	Known to occur
Megaptera novaeangliae Humpback Whale [38]	Migration (north and south)	Known to occur

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact us page.

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APPENDIX D: CULTURAL HERITAGE SEARCHES

Aboriginal Cultural Heritage Inquiry System

List of Aboriginal Cultural Heritage (ACH) Register

Search Criteria

No Aboriginal Cultural Heritage (ACH) Register in Shapefile - Pluto Operations and Drilling - Petroleum Activities Area. Warning: Search area complex so results may be inaccurate. Contact DPLH for assistance.

Disclaimer

Aboriginal heritage holds significant value to Aboriginal people for their social, spiritual, historical, scientific, or aesthetic importance within Aboriginal traditions, and provides an essential link for Aboriginal people to their past, present and future. In Western Australia Aboriginal heritage is protected under the *Aboriginal Heritage Act 1972*.

All Aboriginal cultural heritage in Western Australia is protected, whether or not the ACH has been reported or exists on the Register.

The information provided is made available in good faith and is predominately based on the information provided to the Department of Planning, Lands and Heritage by third parties. The information is provided solely on the basis that readers will be responsible for making their own assessment as to the accuracy of the information. If you find any errors or omissions in our records, including our maps, it would be appreciated if you provide the details to the Department via https://achknowledge.dplh.wa.gov.au/ach-enquiry-form and we will make every effort to rectify it as soon as possible.

Copyright

Coordinates

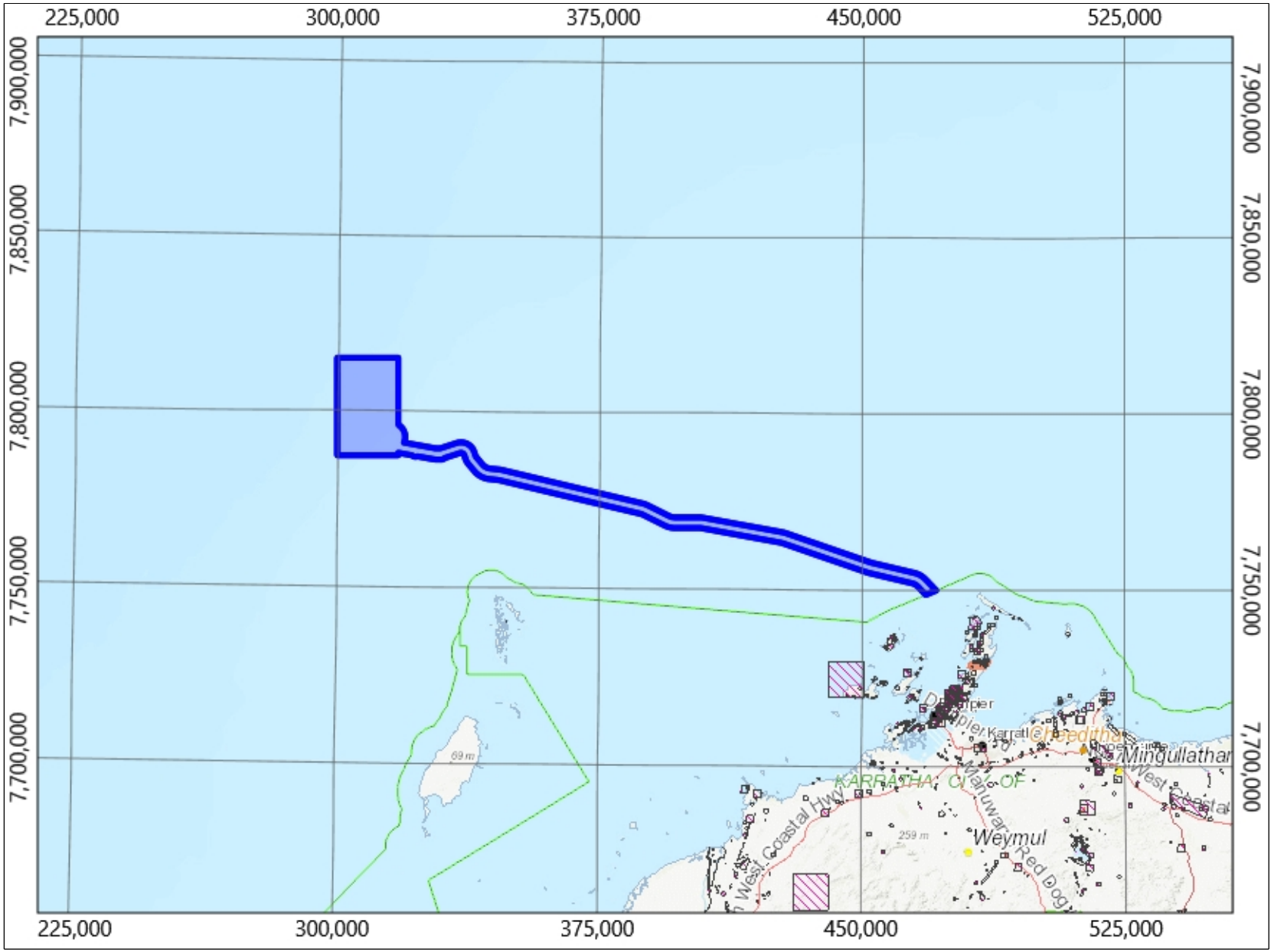
Map coordinates are based on the GDA 94 Datum.

Basemap Copyright

Department of Planning, Lands and Heritage

Aboriginal Cultural Heritage Inquiry System

Map of Aboriginal Cultural Heritage (ACH) Register



Legend

- Aboriginal Cultural Heritage (ACH) Register
- Search Area
- Aboriginal Community
  - *Permanent*
  - *Seasonal*
  - *Town Based*
- Town
- Road
- River
- Local Government Authority

58.03 kilometres

Map Scale 1 : 1,760,000

MGA Zone 50 (GDA94)

Aboriginal Cultural Heritage Inquiry System

List of Aboriginal Cultural Heritage (ACH) Register

Search Criteria

55 Aboriginal Cultural Heritage (ACH) Register in Shapefile - Consultation EMBA

Disclaimer

Aboriginal heritage holds significant value to Aboriginal people for their social, spiritual, historical, scientific, or aesthetic importance within Aboriginal traditions, and provides an essential link for Aboriginal people to their past, present and future. In Western Australia Aboriginal heritage is protected under the Aboriginal Heritage Act 1972.

All Aboriginal cultural heritage in Western Australia is protected, whether or not the ACH has been reported or exists on the Register.

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Copyright

Terminology

ID: ACH on the Register is assigned a unique ID by the Department of Planning, Lands and Heritage using the format: ACH-00000001. For ACH on the former Register the ID numbers remain unchanged and use the new format. For example the ACH ID of the place Swan River was previously '3536' and is now 'ACH-00003536'.

Access and Restrictions:

- Boundary Reliable (Yes/No): Indicates whether to the best knowledge of the Department, the location and extent of the ACH boundary is considered reliable.
- Boundary Restricted = No: Represents the actual location of the ACH as understood by the Department..
- Boundary Restricted = Yes: To preserve confidentiality the exact location and extent of the place is not displayed on the map. However, the shaded region (generally with an area of at least 4km²) provides a general indication of where the ACH is located. If you are a landowner and wish to find out more about the exact location of the place, please contact the Department of Planning, Lands and Heritage.
- Culturally Sensitive = No: Availability of information that the Department of Planning, Lands and Heritage holds in relation to the ACH is not restricted in any way.
- Culturally Sensitive = Yes: Some of the information that the Department of Planning, Lands and Heritage holds in relation to the ACH is restricted if it is considered culturally sensitive information. This information will only be made available if the Department of Planning, Lands and Heritage receives written approval from the people who provided the information. To request access please contact via https://achknowledge.dplh.wa.gov.au/ach-enquiry-form.
- Culturally Sensitive Nature:
  - No Gender / Initiation Restrictions: Anyone can view the information.
  - Men only: Only males can view restricted information.
  - Women only: Only females can view restricted information.

Status:

- Register: Aboriginal cultural heritage places that are assessed as meeting Section 5 of the Aboriginal Heritage Act 1972.
- Lodged: Information which has been received in relation to an Aboriginal cultural heritage place, but is yet to be assessed under Section 5 of the Aboriginal Heritage Act 1972.
- Historic: Aboriginal heritage places assessed as not meeting the criteria of Section 5 of the Aboriginal Heritage Act 1972. Includes places that no longer exist as a result of land use activities with existing approvals.

Place Type: The type of Aboriginal cultural heritage place. For example an artefact scatter place or engravings place.

Legacy ID: This is the former unique number that the former Department of Aboriginal Sites assigned to the place.

Coordinates

Map coordinates are based on the GDA 94 Datum.

Basemap Copyright

Aboriginal Cultural Heritage Inquiry System

List of Aboriginal Cultural Heritage (ACH) Register

ID	Name	Boundary Restricted	Boundary Reliable	Culturally Sensitive	Culturally Sensitive Nature	Status	Place Type	Knowledge Holders	Legacy ID
919	ENDERBY IS.27: GOODWYN VIEW	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P07279
927	ENDERBY IS.16: WHITE BASIN	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P07233
933	ENDERBY IS.22: TEREBRALIA	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P07239
934	ENDERBY IS.23: GRINDING	No	No	No	No Gender / Initiation Restrictions	Register	Engraving; Grinding areas / Grooves	*Registered Knowledge Holder names available from DPLH	P07240
937	ENDERBY IS.26: NORTH POINT	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden; Quarry	*Registered Knowledge Holder names available from DPLH	P07243
966	ROSEMARY IS.11: CHOOKIE BAY	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P07219
967	ROSEMARY IS.12: CHOOKIE BAY	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Quarry	*Registered Knowledge Holder names available from DPLH	P07220
968	ROSEMARY IS.13	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Grinding areas / Grooves; Midden	*Registered Knowledge Holder names available from DPLH	P07221
969	ROSEMARY IS.14	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Grinding areas / Grooves; Midden	*Registered Knowledge Holder names available from DPLH	P07222
970	ROSEMARY IS.15: AIRSTRIP	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Grinding areas / Grooves; Midden	*Registered Knowledge Holder names available from DPLH	P07223
971	ROSEMARY IS.16: AIRSTRIP	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden; Quarry	*Registered Knowledge Holder names available from DPLH	P07224
972	ROSEMARY IS.17: AIRSTRIP	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Quarry	*Registered Knowledge Holder names available from DPLH	P07225
973	ROSEMARY IS.18: DEEP WATER	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P07226
974	ROSEMARY IS.19: CHITON	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P07227
975	ROSEMARY IS.20: HALFWAY CK	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P07228
977	ROSEMARY IS.22	No	No	No	No Gender / Initiation Restrictions	Register	Engraving; Traditional Structure	*Registered Knowledge Holder names available from DPLH	P07230
978	ROSEMARY IS.23: WADJURU R/H	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Engraving; Grinding areas / Grooves; Traditional Structure; Midden; Water Source	*Registered Knowledge Holder names available from DPLH	P07231

ID	Name	Boundary Restricted	Boundary Reliable	Culturally Sensitive	Culturally Sensitive Nature	Status	Place Type	Knowledge Holders	Legacy ID
979	ROSEMARY IS.24: HUNGERFORD	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P07232
1112	LEGENDRE 09.	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Shell	*Registered Knowledge Holder names available from DPLH	P07202
1113	LEGENDRE 10.	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Rock Shelter; Shell	*Registered Knowledge Holder names available from DPLH	P07203
6078	ROSEMARY ISLAND 10	No	Yes	No	No Gender / Initiation Restrictions	Register	Engraving	*Registered Knowledge Holder names available from DPLH	P07019
6079	ENDERBY ISLAND 12	No	Yes	No	No Gender / Initiation Restrictions	Register	Traditional Structure	*Registered Knowledge Holder names available from DPLH	P07020
6080	ENDERBY ISLAND 13	No	Yes	No	No Gender / Initiation Restrictions	Register	Engraving	*Registered Knowledge Holder names available from DPLH	P07021
6081	ENDERBY ISLAND 14	No	Yes	No	No Gender / Initiation Restrictions	Register	Engraving	*Registered Knowledge Holder names available from DPLH	P07022
6082	ENDERBY ISLAND 15	No	Yes	No	No Gender / Initiation Restrictions	Register	Engraving	*Registered Knowledge Holder names available from DPLH	P07023
6185	ENDERBY ISLAND 10: N.	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Camp; Engraving; Midden; Quarry	*Registered Knowledge Holder names available from DPLH	P06918
6186	ENDERBY ISLAND 11: NE.	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Camp; Ritual / Ceremonial; Engraving; Grinding areas / Grooves; Traditional Structure	*Registered Knowledge Holder names available from DPLH	P06919
6227	MALUS ISLAND.	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Camp; Engraving; Grinding areas / Grooves; Traditional Structure	*Registered Knowledge Holder names available from DPLH	P06908
6229	WEST LEWIS ISLAND: NW ARM 1	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Ritual / Ceremonial; Engraving; Grinding areas / Grooves; Traditional Structure	*Registered Knowledge Holder names available from DPLH	P06910
6230	WEST LEWIS ISLAND: NW ARM 2	Yes	Yes	Yes	Men only	Register	Artefacts / Scatter; Ritual / Ceremonial; Engraving; Grinding areas / Grooves; Traditional Structure	*Registered Knowledge Holder names available from DPLH	P06911
6232	WEST LEWIS ISLAND: N	No	Yes	No	No Gender / Initiation Restrictions	Register	Engraving; Traditional Structure	*Registered Knowledge Holder names available from DPLH	P06913
6966	ENDERBY ISLAND 08	No	No	No	No Gender / Initiation Restrictions	Register	Engraving	*Registered Knowledge Holder names available from DPLH	P05955
7899	MALUS ISLAND	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter	*Registered Knowledge Holder names available from DPLH	P04947

Aboriginal Cultural Heritage Inquiry System

List of Aboriginal Cultural Heritage (ACH) Register

ID	Name	Boundary Restricted	Boundary Reliable	Culturally Sensitive	Culturally Sensitive Nature	Status	Place Type	Knowledge Holders	Legacy ID
9737	ENDERBY ISLAND 06: BOILER B	No	Yes	No	No Gender / Initiation Restrictions	Register	Engraving; Quarry	*Registered Knowledge Holder names available from DPLH	P02449
11328	GAP WELL	No	No	No	No Gender / Initiation Restrictions	Register	Engraving	*Registered Knowledge Holder names available from DPLH	P00836
11698	ANGELA COVE	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Engraving	*Registered Knowledge Holder names available from DPLH	P00457
11699	GIDLEY BAY, GIDLEY ISLAND.	No	No	No	No Gender / Initiation Restrictions	Register	Camp; Engraving	*Registered Knowledge Holder names available from DPLH	P00458
11714	GIDLEY ISLAND	No	No	No	No Gender / Initiation Restrictions	Register	Engraving	*Registered Knowledge Holder names available from DPLH	P00474
11715	RIM ROCK GORGE.	No	No	No	No Gender / Initiation Restrictions	Register	Camp; Engraving	*Registered Knowledge Holder names available from DPLH	P00475
11729	NGARLUMA POINT, GIDLEY IS.	No	Yes	No	No Gender / Initiation Restrictions	Register	Engraving; Traditional Structure	*Registered Knowledge Holder names available from DPLH	P00434
11730	MORS HILL, GIDLEY ISLAND.	No	No	No	No Gender / Initiation Restrictions	Register	Burial; Artefacts / Scatter; Engraving; Shell	*Registered Knowledge Holder names available from DPLH	P00435
11771	ENDERBY ISLAND 05	No	No	No	No Gender / Initiation Restrictions	Register	Engraving	*Registered Knowledge Holder names available from DPLH	P00368
11772	ROSEMARY ISLAND 09	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P00369
11773	ROSEMARY ISLAND 08	No	No	No	No Gender / Initiation Restrictions	Register	Engraving; Grinding areas / Grooves; Traditional Structure	*Registered Knowledge Holder names available from DPLH	P00370
11774	ROSEMARY ISLAND 07	No	No	No	No Gender / Initiation Restrictions	Register	Engraving	*Registered Knowledge Holder names available from DPLH	P00371
11775	ROSEMARY ISLAND 06	No	No	No	No Gender / Initiation Restrictions	Register	Engraving	*Registered Knowledge Holder names available from DPLH	P00372
11776	ROSEMARY ISLAND 04.	No	No	No	No Gender / Initiation Restrictions	Register	Camp; Engraving	*Registered Knowledge Holder names available from DPLH	P00373
11777	ROSEMARY ISLAND 03	No	No	No	No Gender / Initiation Restrictions	Register	Engraving	*Registered Knowledge Holder names available from DPLH	P00374
11789	ROSEMARY ISLAND 01	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Engraving; Midden; Quarry	*Registered Knowledge Holder names available from DPLH	P00386
11818	ROSEMARY ISLAND 02	No	No	No	No Gender / Initiation Restrictions	Register	Engraving	*Registered Knowledge Holder names available from DPLH	P00362

Aboriginal Cultural Heritage Inquiry System

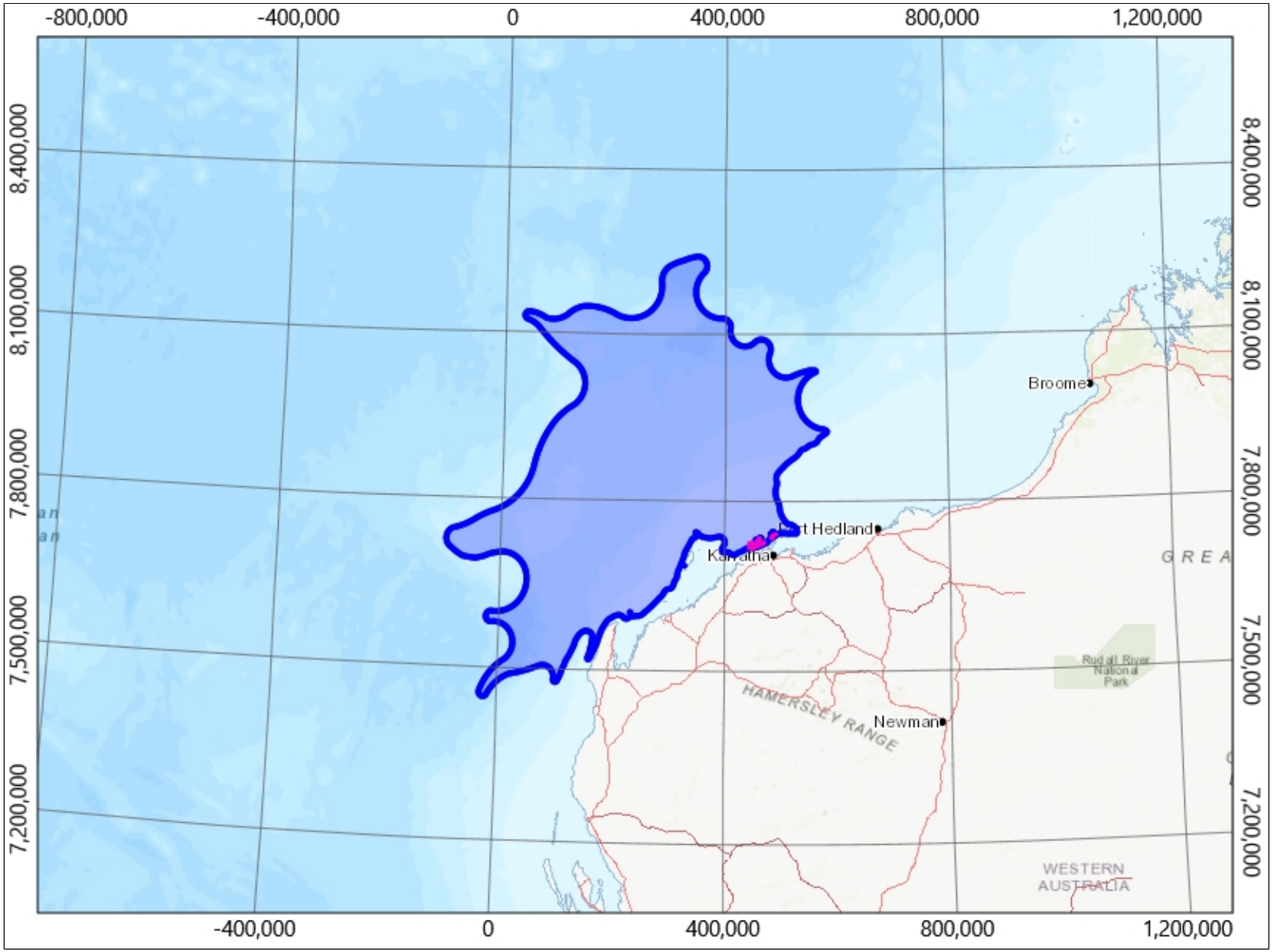
List of Aboriginal Cultural Heritage (ACH) Register

ID	Name	Boundary Restricted	Boundary Reliable	Culturally Sensitive	Culturally Sensitive Nature	Status	Place Type	Knowledge Holders	Legacy ID
11819	ROSEMARY ISLAND 05	No	No	No	No Gender / Initiation Restrictions	Register	Engraving	*Registered Knowledge Holder names available from DPLH	P00363
11820	ENDERBY ISLAND 01	No	No	No	No Gender / Initiation Restrictions	Register	Engraving	*Registered Knowledge Holder names available from DPLH	P00364
11821	ENDERBY ISLAND 02	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P00365
11823	ENDERBY ISLAND 04	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Engraving; Midden	*Registered Knowledge Holder names available from DPLH	P00367
38533	Cape Bruguieres Channel	No	Yes	No		Register	Artefacts / Scatter	*Registered Knowledge Holder names available from DPLH	

Department of Planning, Lands and Heritage

Aboriginal Cultural Heritage Inquiry System

Map of Aboriginal Cultural Heritage (ACH) Register



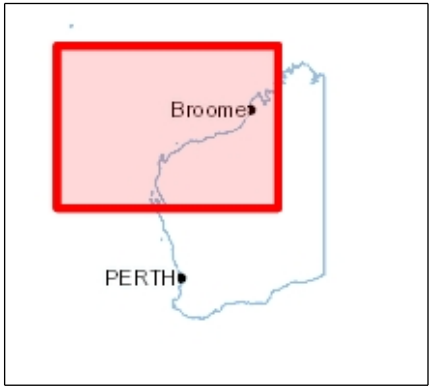
Legend

- Aboriginal Cultural Heritage (ACH) Register
- Search Area
- Aboriginal Community
  - *Permanent*
  - *Seasonal*
  - *Town Based*
- Town
- Road
- River
- Local Government Authority

363.06 kilometres

Map Scale 1 : 11,000,000

MGA Zone 50 (GDA94)



APPENDIX E: NOPSEMA REPORTING FORMS

NOPSEMA Recordable Environmental Incident Monthly Reporting Form

https://www.nopsema.gov.au/assets/Forms/A198750.doc

Report of an Accident, Dangerous Occurrence or Environmental Incident

https://www.nopsema.gov.au/assets/Forms/N-03000-FM0831-Report-of-an-Accident-Dangerous-Occurrence-or-Environmental-Incident-Rev-8-Jan-2015-MS-Word-2010.docx

APPENDIX F: CONSULTATION

Appendix F

Pluto Facility Operations Environment Plan

- **Consultation Approach**
- **Table 1: Assessment of Relevance**
- **Consultation Activities**
- **Table 2: Consultation Report with Relevant Persons or Organisations**
- **Table 3: Engagement Report with Persons or Organisations Assessed as Not Relevant**
- **Record of Consultation**

Date: April 2025

Revision: 2

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CONSULTATION APPROACH

Consultation under regulation 25 of the OPGGS(E) Regulations provides that a titleholder must consult each relevant person (regulation 25(1)), must give each relevant person sufficient information to allow the relevant person to make an informed assessment of the possible consequences of the activity on the functions, interests or activities of the relevant person (regulation 25(2)), and must allow a relevant person a reasonable period for consultation (regulation 25(3)).

A titleholder must also give a relevant person a reasonable opportunity to consult – this means that a titleholder will need to demonstrate that what it did constituted consultation appropriate and adapted to the nature of the interests of the relevant person (see Tipakalippa Full Court paragraph 104). The EP must contain a report that contains an assessment of the merits of any objection or claim about the adverse impact of each activity to which the EP relates and a statement of the titleholder's response, or proposed response, if any, to each objection or claim (regulation 24(b)).

The criteria for acceptance of an EP includes that the EP demonstrates that the measures (if any) that the titleholder has adopted, or proposes to adopt, because of the consultations are appropriate (regulation 34(g)).

For the Pluto Facility Operations Environment Plan, Woodside has taken a broad and proactive tiered consultation approach over a period of up to 13 months.

This approach was aimed at raising public awareness of the consultation opportunity and enable self-identification. It included a social media campaign and advertising in national, state, regional and Indigenous newspapers.

The tiered consultation approach discharges regulation 25 of the Environment Regulations' requirements. The approach is proactive, extended, has enabled self-identification, and has raised broad awareness of Woodside's activities related to this EP.

Consultation Tiered Approach

Regulation 25	Woodside's consultation approach assessed and identified relevant persons, enabled two-way dialogue and engagement, and included email and phone call follow up. The approach taken satisfies the requirements of regulation 25 to give relevant persons sufficient information and allow a reasonable period of time for consultation (see Section 5 of this EP).
Proactive	To raise awareness of the consultation process, and to enable grass-roots consultation, Woodside undertook advertised regional consultation roadshows and facilitated consultation at regional community events.
Extended	A reasonable consultation period was provided to enable an informed assessment of possible consequences on functions, interests or activities. Consultation with stakeholders extended beyond the initial period as required.
Self-Identification	Broad communication activities were undertaken to build awareness of consultation and enable self-identification, supported by targeted education materials.
Broad Understanding	Broad proactive communication activities were undertaken with the public to raise awareness of Woodside's activities.

Building on the Existing Consultation Approach

For this EP, Woodside has built on its consultation methodology and undertaken additional consultation activities throughout the consultation period to ensure a reasonable period of time and sufficient information has been provided to relevant persons so that they can make an informed assessment of the possible consequences of the activity on their functions, interests or activities.

The approach included:

- A consultation period of up to 13 months
- Undertaking proactive consultation activities to provide sufficient information to relevant persons
- Raising awareness of the consultation process and opportunity to provide feedback
- Driving participation in the consultation process.

An overview of this approach is shown below:

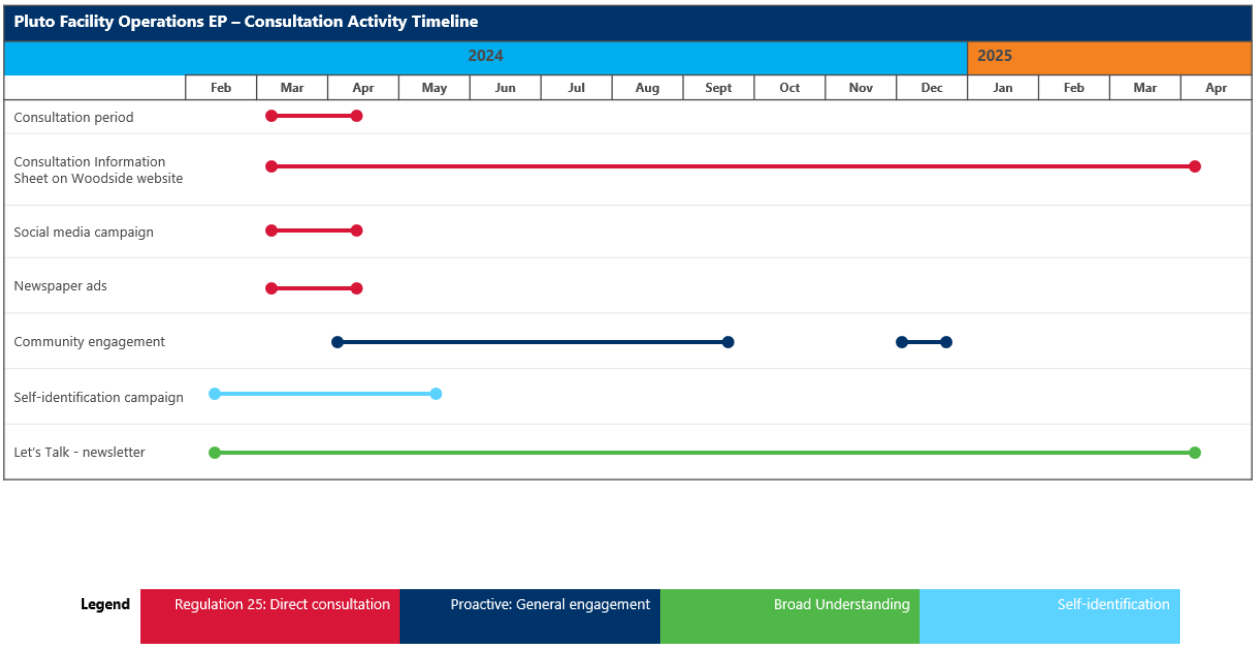

Figure 1: Pluto Facility Operations Consultation Activity

Traditional Custodian Consultation Approach

Woodside has meaningful long-term relationships with relevant Traditional Custodians specifically tailored to provide for effective engagement which is continuous and is not confined to individual EPs, instead covering all EPs and other issues that are relevant at the time of engagement.

To this end, consultation on any particular EP, including the Pluto Facility Operations EP, happens before, during and after the designated consultation period in a more holistic manner allowing for an understanding of the bigger picture and accommodating cultural requirements. Ongoing consultation remains an important part of consulting with Traditional Custodians based on availability, cultural protocols and the preferred method of consultation for each relevant person.

Since February 2024, when requested, Woodside has been working with nominated representative bodies to develop Consultation Agreement Frameworks which aim to enable each group to be consulted in a manner requested by the group on how they would like to be consulted (eg what is sufficient information; what is a reasonable period for consultation) so as to enable each group to be consulted in a manner appropriately adapted to their interests. While the Consultation Agreements have been useful in prompting conversations with groups about how they wish to be consulted, there has been limited interest from groups in finalising the detail in the Consultation Agreements. Generally, feedback is that groups have higher order priority matters to focus on. Consultation on this EP therefore progressed in parallel to discussions on the Consultation Agreements and Woodside will remain open to progressing Consultation Agreements should groups seek them.

NGO Consultation Approach

Woodside has an established history of consulting with environmental non-government organisations (NGOs) as part of its EP consultation. In its methodology **(Section 5.3.4, Table 5-2)**, NGOs are considered "Other non-government groups or organisations" and "Research institutes and local conservation groups or organisations". Relevant person identification for these categories is based on registered non-government groups or organisations with current targeted public website material specific to the proposed activity at the time of developing the EP and who have demonstrated functions, interests or activities relevant to the potential risks and impacts associated with planned activities in accordance with the intended outcome of consultation.

So that NGOs were given sufficient information and a reasonable period of time to consult, Woodside:

- Advertised the consultation period (social and traditional media)
- Directly consulted NGOs
- Participated in regional community events (which were advertised) in the Pilbara which could be attended by any NGOs including local groups (if NGOs attended these sessions, they did not identify themselves).

NGO Response

Woodside witnessed a pattern in NGO responses to the consultation process and information provided. Woodside received feedback and request for further information on the last day of consultation. The delayed responses followed an initial four week consultation period, and generally assert that Woodside has not met regulatory requirements as it has not provided sufficient information or a reasonable period of time for consultation. One further NGO self-identified a month following consultation closing.

RELEVANCY ASSESSMENT

Assessment of Relevant Persons for the Proposed Activity

The result of Woodside's assessment of relevant persons in accordance with regulation 25 (1) of the Environment Regulations is outlined below at **Table 1** and **Table 2**.

Persons or organisations that Woodside assessed as not relevant but nonetheless chose to contact at its discretion in accordance with **Section 5.3.4** in the EP or self-identified and Woodside assessed as not relevant are summarised below at **Table 1** and **Table 3**.

As per Woodside's methodology (Section 5), assessment of relevant persons is based on the EMBA (Figure 2 and 3). Figure 2 also shows the revised Operational Area for this activity, which has been updated to reflect the Operational Area described in the EP. Woodside re-assessed relevant persons based on the revised Operational Area. No additional relevant persons were identified.

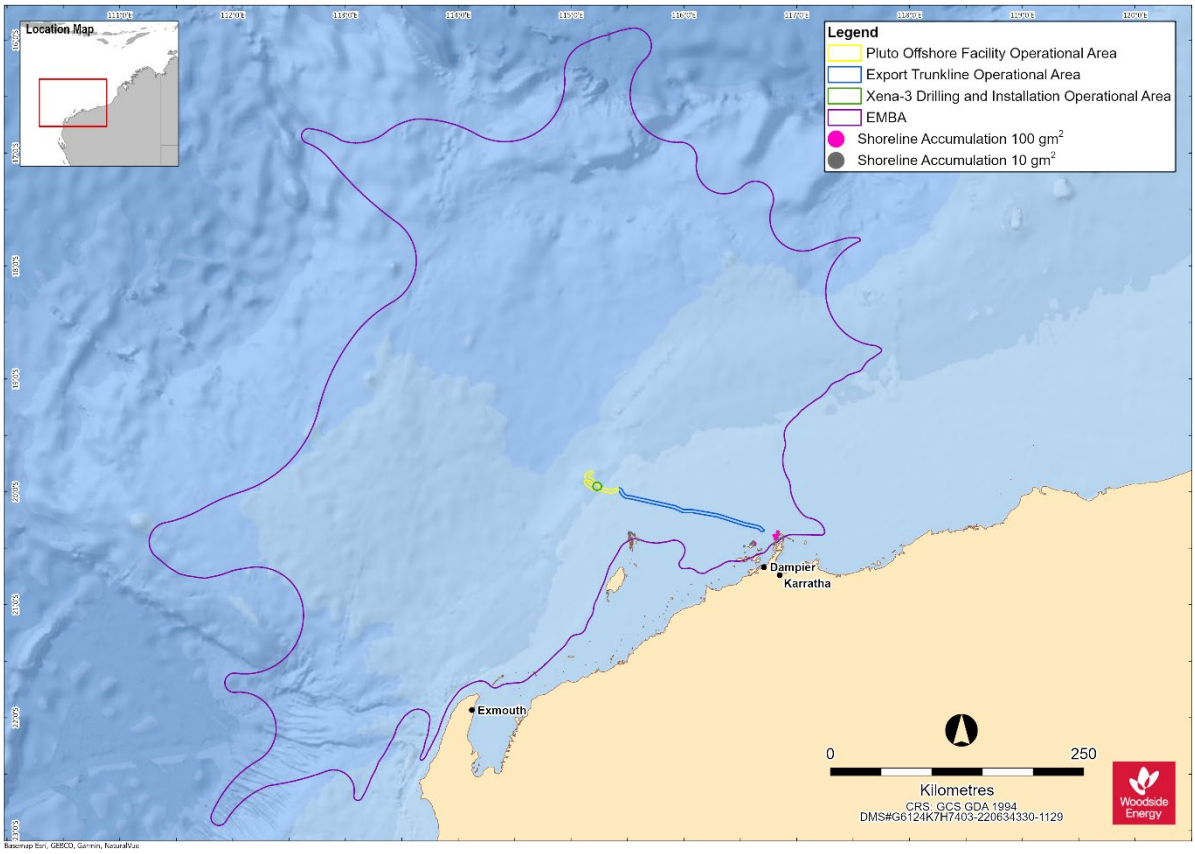

Figure 2: Revised Operational Area and EMBA for this EP

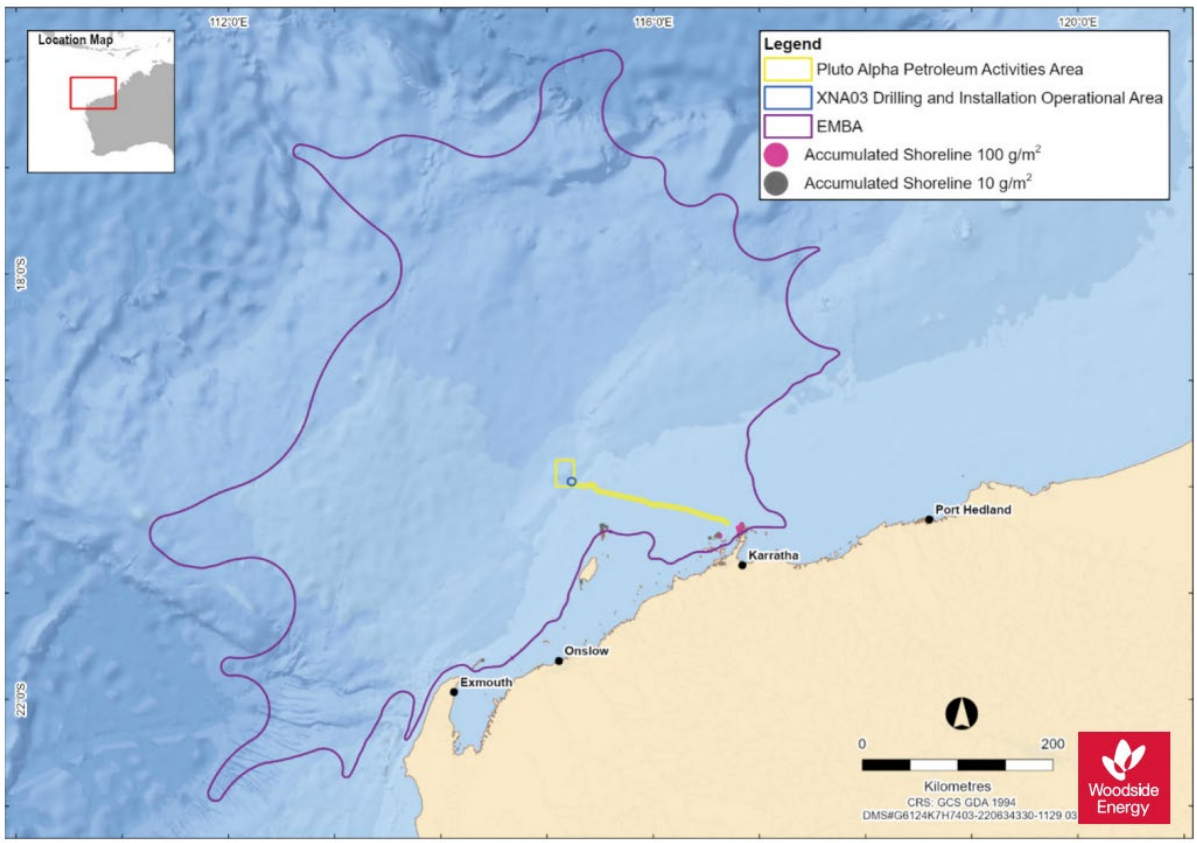

Figure 3: Original Operational Area and EMBA for this EP

Table 1: Assessment of Relevance

Person or Organisation	Summary of responsibilities and/or functions, interests or activities	Assessment of relevance	Relevant person
Commonwealth and WA State Government Departments or Agencies – Marine			
Australian Border Force (ABF)	Responsible for coordinating maritime security	Woodside has applied its methodology for 'Government departments / agencies – marine' under regulation 25(1)(a) of the Environment Regulations. ABF's responsibilities may be relevant to the activity as there are proposed vessel activities.	Yes
Australian Communications and Media Authority (ACMA)	Regulator for communications and media	Woodside has applied its methodology for 'Government departments / agencies – marine' under regulation 25(1)(a) of the Environment Regulations. ACMA's responsibilities may be relevant to the activity as there may be telecommunications lines that intersect the Operational Area.	Yes
Australian Fisheries Management Authority (AFMA)	Responsible for managing Commonwealth fisheries	Woodside has applied its methodology for 'Government departments / agencies – marine' under regulation 25(1)(a) of the Environment Regulations. The North West Slope Trawl Fishery is active in the Operational Area. The North West Slope Trawl Fishery and the Western Deepwater Trawl Fishery are active in the EMBA. AFMA's responsibilities may be relevant to the activity as the North West Slope Trawl Fishery and the Western Deepwater Trawl Fishery are active in the EMBA.	Yes
Australian Hydrographic Office (AHO)	Responsible for maritime safety and Notices to Mariners	Woodside has applied its methodology for 'Government departments / agencies – marine' under regulation 25(1)(a) of the Environment Regulations. AHO's responsibilities may be relevant to the activity as there are proposed vessel activities.	Yes
Australian Maritime Safety Authority (AMSA) – Marine Safety	Statutory agency for vessel safety and navigation	Woodside has applied its methodology for 'Government departments / agencies – marine' under regulation 25(1)(a) of the Environment Regulations. AMSA – Marine Safety's responsibilities may be relevant to the activity as there are proposed vessel activities.	Yes
Australian Maritime Safety Authority (AMSA) – Marine Pollution	Legislated responsibility for oil pollution response in Commonwealth waters	Woodside has applied its methodology for 'Government departments / agencies – marine' under regulation 25(1)(a) of the Environment Regulations. AMSA – Marine Pollution's responsibilities may be relevant to the activity as the proposed activity has a hydrocarbon spill risk which may require AMSA response in Commonwealth waters.	Yes

Person or Organisation	Summary of responsibilities and/or functions, interests or activities	Assessment of relevance	Relevant person
Department of Agriculture, Fisheries and Forestry (DAFF) – Fisheries	Responsible for implementing Commonwealth policies and programs to support agriculture, fishery, food and forestry industries	Woodside has applied its methodology for 'Government departments / agencies – marine' under regulation 25(1)(a) of the Environment Regulations. The North West Slope Trawl Fishery is active in the Operational Area. The North West Slope Trawl Fishery and the Western Deepwater Trawl Fishery are active in the EMBA. DAFF – Fisheries' responsibilities may be relevant to the activity as the North West Slope Trawl Fishery and the Western Deepwater Trawl Fishery are active in the EMBA.	Yes
Department of Defence (DoD)	Responsible for defending Australia and its national interests	Woodside has applied its methodology for 'Government departments / agencies – marine' under regulation 25(1)(a) of the Environment Regulations. DoD's responsibilities may be relevant to the activity as defence training areas lie within the EMBA.	Yes
Department of Primary Industries and Regional Development (DPIRD)	Responsible for managing State fisheries	Woodside has applied its methodology for 'Government departments / agencies – marine' under regulation 25(1)(b) of the Environment Regulations. The West Australian Sea Cucumber Fishery, Hermit Crab Fishery, Mackerel Managed Fishery (Area 2), Marine Aquarium Fish Managed Fishery, Onslow Prawn Managed Fishery, Pilbara Crab Managed Fishery, Pilbara Fish Trawl Managed Fishery, Pilbara Line Fishery, Specimen Shell Managed Fishery are active in the Operational Area. The Exmouth Gulf Prawn Managed Fishery, West Australian Sea Cucumber Fishery, Hermit Crab Fishery, Mackerel Managed Fishery (Area 2), Marine Aquarium Fish Managed Fishery, Nickol Bay Prawn Managed Fishery, Onslow Prawn Managed Fishery, Pilbara Crab Managed Fishery, Pilbara Fish Trawl Fishery, Specimen Shell Managed Fishery, West Coast Deep Sea Crustacean Managed Fishery have been active in the EMBA within the last 5 years. DPIRD's responsibilities may be relevant to the activity as the government department responsible for State fisheries.	Yes
Department of Transport (DoT)	Legislated responsibility for oil pollution response in State waters	Woodside has applied its methodology for 'Government departments / agencies – marine' under regulation 25(1)(b) of the Environment Regulations. The proposed activity has a hydrocarbon spill risk, which may require DoT response in State waters.	Yes
Department of Planning, Lands and Heritage (DPLH)	Responsible for state level land use planning and management, and oversight of Aboriginal	Woodside has applied its methodology for 'Government departments / agencies – marine' under regulation 25(1)(b) of the Environment Regulations. There is known Maritime Cultural Heritage overlapping the EMBA.	Yes

Person or Organisation	Summary of responsibilities and/or functions, interests or activities	Assessment of relevance	Relevant person
	cultural heritage and built heritage matters		
Western Australian Museum	Manages 200 shipwreck sites of the 1,500 known to be located off the Western Australian coast	Woodside has applied its methodology for 'Historical cultural heritage groups or organisations' under regulation 25(1)(d) of the Environment Regulations. There is known shipwrecks overlapping the EMBA which the Western Australian Museum may be responsible for.	Yes
Pilbara Ports Authority	Responsible for the operation of the Port of Dampier	Woodside has applied its methodology for 'Government departments / agencies – marine' under regulation 25(1)(b) of the Environment Regulations. The proposed activity has the potential to impact Pilbara Ports Authority's responsibilities as the EMBA overlaps the Pilbara Ports Authority's area of responsibility.	Yes
Commonwealth and WA State Government Departments or Agencies – Environment			
Department of Agriculture, Fisheries and Forestry (DAFF) – Biosecurity (marine pests, vessels, aircraft and personnel)	DAFF administers, implements and enforces the Biosecurity Act 2015. The Department requests to be consulted where an activity has the potential to transfer marine pests. DAFF also has inspection and reporting requirements to ensure that all conveyances (vessels, installations and aircraft) arriving in Australian territory comply with international health regulations and that any biosecurity risk is managed. The Dept requests to be consulted where an activity	Woodside has applied its methodology for 'Government departments / agencies – environment' under regulation 25(1)(a) of the Environment Regulations. DAFF – Biosecurity's responsibilities may be relevant to the proposed activities in the EMBA in the prevention of introduced marine species.	Yes

Person or Organisation	Summary of responsibilities and/or functions, interests or activities	Assessment of relevance	Relevant person
	involves the movement of aircraft or vessels between Australia and offshore petroleum activities either inside or outside Australian territory.		
Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Responsible for implementing Commonwealth policies and programs to support climate change, sustainable energy use, water resources, the environment and our heritage. Administers the *Underwater Cultural Heritage Act 2018* in collaboration with the States, Northern Territory and Norfolk Island, which is responsible for the protection of shipwrecks, sunken aircraft and other types of underwater heritage and their associated artefacts in Commonwealth waters.	Woodside has applied its methodology for 'Government departments / agencies – environment' under regulation 25(1)(a) of the Environment Regulations. DCCEEW's responsibilities may be relevant to the proposed activities in the EMBA as there are potential environmental impacts from the proposed activity. There is known Maritime Cultural Heritage overlapping the EMBA.	Yes
Director of National Parks (DNP)	Responsible for the management of Commonwealth parks and conservation zones.	Woodside has applied its methodology for 'Government departments / agencies – environment' under regulation 25(1)(a) of the Environment Regulations. DNP's responsibilities may be relevant to the activity as DNP requires an awareness of activities that occur within AMPs, and an understanding of potential impacts and risks to the values of parks (NOPSEMA guidance note: N-04750-GN1785 A620236, June 2020). Titleholders are required to	Yes

Person or Organisation	Summary of responsibilities and/or functions, interests or activities	Assessment of relevance	Relevant person
		consult DNP on offshore petroleum and greenhouse gas exploration activities if they occur in, or may impact on the values of marine parks, including where potential spill response activities may occur in the event of a spill (i.e. scientific monitoring).	
Ningaloo Coast World Heritage Advisory Committee (NCWHAC)	Supports the DBCA to manage the Ningaloo Coast World Heritage Area.	Woodside has applied its methodology for 'Government departments / agencies – environment' under regulation 25(1)(a) of the Environment Regulations. The NCWHAC's responsibilities may be relevant to the activity as the EMBA overlaps the Ningaloo Marine Park.	Yes
Department of Biodiversity, Conservation and Attractions (DBCA)	Responsible for managing WA's parks, forests and reserves to achieve wildlife conservation and provide sustainable recreation and tourism opportunities.	Woodside has applied its methodology for 'Government departments / agencies – environment' under regulation 25(1)(b) of the Environment Regulations. The DBCA's responsibilities may be relevant to the activity as EMBA overlaps WA parks, forests or reserves. Activities have the potential to impact marine tourism in the EMBA.	Yes
Clean Energy Regulator (CER) The Clean Energy Regulator administers schemes legislated by the Australian Government for measuring, managing, reducing or offsetting Australia's carbon emissions.	The CER administers schemes legislated by the Australian Government (e.g. National Greenhouse and Energy Reporting Scheme, Emissions Reduction Fund, Renewable Energy Target and Australian National Registry of Emissions Units) for measuring, managing, reducing or offsetting Australia's carbon emissions, determined by climate change law.	Woodside has applied its methodology for 'Government departments / agencies – environment' under regulation 25(1)(a) of the Environment Regulations. CER's responsibilities will be relevant to operational EPs in relation to emissions and climate related matters.	Yes
Commonwealth and State Government Departments or Agencies – Industry			

Person or Organisation	Summary of responsibilities and/or functions, interests or activities	Assessment of relevance	Relevant person
Department of Industry, Science and Resources (DISR)	Department of relevant Commonwealth Minister.	Required to be consulted under regulation 25(1)(a) of the Environment Regulations.	Yes
Department of Energy, Mines, Industry Regulation and Safety (DEMIRS)	Department of relevant State Minister.	Required to be consulted under regulation 25(1)(c) of the Environment Regulations.	Yes
Commonwealth Commercial fisheries and representative bodies			
North West Slope Trawl Fishery	Commonwealth commercial fishery.	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under regulation 25(1)(d) of the Environment Regulations. The fishery overlaps the Operational Area and EMBA and has been active in the Operational Area and EMBA within the last 5 years.	Yes
Southern Bluefin Tuna Fishery	Commonwealth commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under regulation 25(1)(d) of the Environment Regulations. Although the fishery overlaps the Operational Area and EMBA, it has not been active in the Operational Area or EMBA within the last 5 years. Woodside does not consider that the proposed activity will present a risk to licence holders, given since 1992, the majority of Australian catch has concentrated in south-eastern Australia. (Patterson et al., 2022). In addition, given fishing methods by licence holders for species fished in this fishery (Australia has a 35% share of total global allowable catch of Southern Bluefin Tuna, which is value-added through tuna ranching near Port Lincoln (South Australia), or fishing effort in New South Wales (Australian Southern Bluefin Tuna Industry Association).	No
Western Deepwater Trawl Fishery	Commonwealth commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under regulation 25(1)(d) of the Environment Regulations. The fishery does not overlap the Operational Area. The fishery overlaps EMBA and has been active in the EMBA within the last 5 years.	Yes
Western Skipjack Fishery	Commonwealth commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under regulation 25(1)(d) of the Environment Regulations. Although the fishery overlaps the Operational Area and EMBA, it has not been active in the	No

Person or Organisation	Summary of responsibilities and/or functions, interests or activities	Assessment of relevance	Relevant person
		Operational Area or EMBA within the last 5 years. Woodside does not consider that the activity will present a risk to licence holders, given the fishery spans the Australian Fishing Zone west of Victoria and the Torres Strait. The Fishery is not currently active and no fishing has occurred since 2009 (Patterson et al., 2022). In addition, interactions are not expected given the species' pelagic distribution fishing methods for species fished by licence holders.	
Western Tuna and Billfish Fishery	Commonwealth commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under regulation 25(1)(d) of the Environment Regulations. Although the fishery overlaps the Operational Area and EMBA, it has not been active in the Operational Area or EMBA within the last 5 years.	No
Commonwealth Fisheries Association (CFA)	Represents the interests of commercial fishers with licences in Commonwealth waters	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under regulation 25(1)(d) of the Environment Regulations. The North West Slope Trawl Fishery is active in the Operational Area. The North West Slope Trawl Fishery and Western Deepwater Trawl Fishery are active in the EMBA. CFA's functions may be relevant to the activity as the North West Slope Trawl Fishery is active in the Operational Area and the North West Slope Trawl Fishery and Western Deepwater Trawl Fishery are active in the EMBA.	Yes
Australian Southern Bluefin Tuna Industry Association (ASBTIA)	Represents the interests of the Southern Bluefin Tuna Fishery and Western Skipjack Fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under regulation 25(1)(d) of the Environment Regulations. The Southern Bluefin Tuna Fishery has been assessed as not relevant to the proposed activity. As the peak representative body for the Southern Bluefin Tuna Fishery, the ASBTIA has also been assessed as not relevant. The Southern Bluefin Tuna Fishery has been assessed as not relevant to the proposed activity. As the peak representative body for the Southern Bluefin Tuna Fishery, the ASBTIA has also been assessed as not relevant. Woodside has provided information to the ASBTIA at its discretion in line with Section 5.3.4 on AFMA advice that it expects all Commonwealth fishers who have entitlements to fish within the proposed area to be consulted, which can be through the relevant fishing industry associations.	No
Tuna Australia	Represents the interests of the Western Tuna and	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under regulation 25(1)(d) of the Environment Regulations.	No

Person or Organisation	Summary of responsibilities and/or functions, interests or activities	Assessment of relevance	Relevant person
	Billfish Fishery	The Western Tuna and Billfish Fishery has been assessed as not relevant to the proposed activity. As the peak representative body for the Western Tuna and Billfish Fishery, Tuna Australia has also been assessed as not relevant. The Western Tuna and Billfish Fishery has been assessed as not relevant to the proposed activity. As the peak representative body for the Western Tuna and Billfish Fishery, Tuna Australia has also been assessed as not relevant. Woodside has provided information to Tuna Australia at its discretion in line with Section 5.3.4 on AFMA advice that it expects all Commonwealth fishers who have entitlements to fish within the proposed area to be consulted, which can be through the relevant fishing industry associations.	
Pearl Producers Association (PPA)	Peak representative organisation of The Australian South Sea Pearling Industry, with members in Western Australia and the Northern Territory	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under regulation 25(1)(d) of the Environment Regulations. The Pearl Oyster Managed Fishery has been assessed as not relevant to the proposed activity. As the peak representative body for the Pearl Oyster Managed Fishery, the PPA has also been assessed as not relevant.	No
State Commercial fisheries and representative bodies			
Marine Aquarium Managed Fishery	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under regulation 25(1)(d) of the Environment Regulations. The fishery overlaps the Operational Area and EMBA and has been active in the Operational Area and EMBA within the last 5 years. While Woodside assessed the fishery as relevant in the Operational Area, WAFIC has advised there is no need to consult this fishery given the proposed activities operate in depths~180-850m which is outside the depth of the hand collection and diving methods used by this fishery. As per WAFIC's Commercial Fishing Consultation Framework for the Offshore Oil and Gas Sector and Consultation Approach for Unplanned Events, consultation with State fisheries relevant to the EMBA of the proposed activity would however be undertaken only in the event of an unplanned emergency scenario.	No
South West Coast Salmon Managed Fishery	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under regulation 25(1)(d) of the Environment Regulations. Although the fishery overlaps the Operational Area and EMBA, the fishery has not been active in	No

Person or Organisation	Summary of responsibilities and/or functions, interests or activities	Assessment of relevance	Relevant person
		the Operational Area or EMBA within the last 5 years. Woodside does not consider that the activity will present a risk to licence holders, given fishers are active south of Perth and from the beach (previous WAFIC advice). Further, no fishing occurs north of the Perth Metropolitan Area and therefore, no effort occurs within the Operational Area or EMBA.	
Mackerel Managed Fishery (Area 2)	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under regulation 25(1)(d) of the Environment Regulations. The fishery overlaps the Operational Area and EMBA and has been active in the Operational Area and EMBA within the last 5 years. Woodside acknowledges WAFIC's consultation guidance and has applied this by consulting, via WAFIC, fisheries that are assessed as having a potential for interaction in the Operational Area. As per WAFIC's Commercial Fishing Consultation Framework for the Offshore Oil and Gas Sector and Consultation Approach for Unplanned Events, consultation with State fisheries relevant to the EMBA of the proposed activity would however be undertaken only in the event of an unplanned emergency scenario.	Yes
Pilbara Crab Managed Fishery	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under regulation 25(1)(d) of the Environment Regulations. The fishery overlaps the Operational Area and EMBA and has been active in the Operational Area and EMBA within the last 5 years. Woodside acknowledges WAFIC's consultation guidance and has applied this by consulting, via WAFIC, fisheries that are assessed as having a potential for interaction in the Operational Area. As per WAFIC's Commercial Fishing Consultation Framework for the Offshore Oil and Gas Sector and Consultation Approach for Unplanned Events, consultation with State fisheries relevant to the EMBA of the proposed activity would however be undertaken only in the event of an unplanned emergency scenario.	Yes
West Coast Deep Sea Crustacean Managed Fishery	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under regulation 25(1)(d) of the Environment Regulations. Although the fishery overlaps the Operational Area, it has not been active in the Operational Area within the last 5 years. The fishery overlaps the EMBA and has been active in the EMBA within the last 5 years. While Woodside assessed the fishery as relevant in the EMBA, WAFIC has advised there is no	No

Person or Organisation	Summary of responsibilities and/or functions, interests or activities	Assessment of relevance	Relevant person
		need to consult this fishery given the proposed activities. As per WAFIC's Commercial Fishing Consultation Framework for the Offshore Oil and Gas Sector and Consultation Approach for Unplanned Events, consultation with State fisheries relevant to the EMBA of the proposed activity would however be undertaken only in the event of an unplanned emergency scenario.	
Specimen Shell Managed Fishery	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under regulation 25(1)(d) of the Environment Regulations. The fishery overlaps the Operational Area and EMBA and has been active in the Operational Area and EMBA within the last 5 years. While Woodside assessed the fishery as relevant in the EMBA, WAFIC has advised there is no need to consult this fishery given the proposed activities. As per WAFIC's Commercial Fishing Consultation Framework for the Offshore Oil and Gas Sector and Consultation Approach for Unplanned Events, consultation with State fisheries relevant to the EMBA of the proposed activity would however be undertaken only in the event of an unplanned emergency scenario.	No
Abalone Managed Fishery	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under regulation 25(1)(d) of the Environment Regulations. Although the fishery overlaps the Operational Area and EMBA, the fishery has not been active in the Operational Area or EMBA within the last 5 years.	No
Pearl Oyster Managed Fishery	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under regulation 25(1)(d) of the Environment Regulations. Although the fishery overlaps the Operational Area and EMBA, the fishery has not been active in the Operational Area or EMBA within the last 5 years.	No
Land Hermit Crab Fishery	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under regulation 25(1)(d) of the Environment Regulations. The fishery overlaps the Operational Area and EMBA and has been active in the Operational Area and EMBA within the last 5 years. While Woodside assessed the fishery as relevant in the Operational Area and EMBA, WAFIC has advised there is no need to consult this fishery given the proposed activities. As per WAFIC's Commercial Fishing Consultation Framework for the Offshore Oil and Gas Sector	No

Person or Organisation	Summary of responsibilities and/or functions, interests or activities	Assessment of relevance	Relevant person
		and Consultation Approach for Unplanned Events, consultation with State fisheries relevant to the EMBA of the proposed activity would however be undertaken only in the event of an unplanned emergency scenario.	
Onslow Prawn Managed Fishery	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under regulation 25(1)(d) of the Environment Regulations. The fishery overlaps the Operational Area and EMBA and has been active in the Operational Area and EMBA within the last 5 years. Woodside acknowledges WAFIC's consultation guidance and has applied this by consulting, via WAFIC, fisheries that are assessed as having a potential for interaction in the Operational Area. As per WAFIC's Commercial Fishing Consultation Framework for the Offshore Oil and Gas Sector and Consultation Approach for Unplanned Events, consultation with State fisheries relevant to the EMBA of the proposed activity would however be undertaken only in the event of an unplanned emergency scenario.	Yes
Western Australian Sea Cucumber Fishery	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under regulation 25(1)(d) of the Environment Regulations. The fishery overlaps the Operational Area and EMBA and has been active in the Operational Area and EMBA within the last 5 years. While Woodside assessed the fishery as relevant in the Operational Area and EMBA, WAFIC has advised there is no need to consult this fishery given the proposed activities. As per WAFIC's Commercial Fishing Consultation Framework for the Offshore Oil and Gas Sector and Consultation Approach for Unplanned Events, consultation with State fisheries relevant to the EMBA of the proposed activity would however be undertaken only in the event of an unplanned emergency scenario.	No
Exmouth Gulf Prawn Managed Fishery	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under regulation 25(1)(d) of the Environment Regulations. The fishery does not overlap the Operational Area. The fishery overlaps the EMBA and has been active in the EMBA within the last 5 years. While Woodside assessed the fishery as relevant in the EMBA, WAFIC has advised there is no need to consult this fishery given the proposed activities. As per WAFIC's Commercial Fishing Consultation Framework for the Offshore Oil and Gas Sector and Consultation Approach for Unplanned Events, consultation with State fisheries relevant to the	No

Person or Organisation	Summary of responsibilities and/or functions, interests or activities	Assessment of relevance	Relevant person
		EMBA of the proposed activity would however be undertaken only in the event of an unplanned emergency scenario.	
Gascoyne Demersal Scalefish Fishery	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under regulation 25(1)(d) of the Environment Regulations. The fishery does not overlap the Operational Area and EMBA.	No
West Coast Demersal Scalefish Fishery	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under regulation 25(1)(d) of the Environment Regulations. The fishery does not overlap the Operational Area and EMBA.	No
West Coast Rock Lobster Fishery	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under regulation 25(1)(d) of the Environment Regulations. The fishery does not overlap the Operational Area. Although the fishery overlaps the EMBA, the fishery has not been active in the EMBA within the last 5 years. Woodside does not consider that the activity will present a risk to licence holders, given fishers are active south of Perth and from the beach (previous WAFIC advice). Further, no fishing occurs north of the Perth Metropolitan Area and therefore, no effort occurs within the Operational Area or EMBA.	No
Nickol Bay Prawn Managed Fishery	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under regulation 25(1)(d) of the Environment Regulations. The fishery does not overlap the Operational Area. The fishery overlaps the EMBA and has been active in the EMBA within the last 5 years. While Woodside assessed the fishery as relevant in the EMBA, WAFIC has advised there is no need to consult this fishery given the proposed activities. As per WAFIC's Commercial Fishing Consultation Framework for the Offshore Oil and Gas Sector and Consultation Approach for Unplanned Events, consultation with State fisheries relevant to the EMBA of the proposed activity would however be undertaken only in the event of an unplanned emergency scenario.	No
Exmouth Gulf Beach Seine and Mesh Net Managed Fishery	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under regulation 25(1)(d) of the Environment Regulations. The fishery does not overlap the Operational Area and EMBA.	No

Person or Organisation	Summary of responsibilities and/or functions, interests or activities	Assessment of relevance	Relevant person
WA North Coast Shark Managed Fishery	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under regulation 25(1)(d) of the Environment Regulations. Although the fishery overlaps the Operational Area and EMBA, the fishery has not been active in the Operational Area or EMBA within the last 5 years. Woodside does not consider that the activity will present a risk to licence holders, given fishers are active south of Perth and from the beach (previous WAFIC advice). Further, no fishing occurs north of the Perth Metropolitan Area and therefore, no effort occurs within the Operational Area or EMBA.	No
Demersal Scalefish Fishery: Pilbara Trawl Fishery	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under regulation 25(1)(d) of the Environment Regulations. The fishery overlaps the Operational Area and EMBA and has been active in the Operational Area and EMBA within the last 5 years. Woodside acknowledges WAFIC's consultation guidance and has applied this by consulting, via WAFIC, fisheries that are assessed as having a potential for interaction in the Operational Area. As per WAFIC's Commercial Fishing Consultation Framework for the Offshore Oil and Gas Sector and Consultation Approach for Unplanned Events, consultation with State fisheries relevant to the EMBA of the proposed activity would however be undertaken only in the event of an unplanned emergency scenario.	Yes
Pilbara Trap Fishery	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under regulation 25(1)(d) of the Environment Regulations. The fishery overlaps the Operational Area and EMBA and has been active in the Operational Area and EMBA within the last 5 years. While Woodside assessed the fishery as relevant in the Operational Area and EMBA, WAFIC has advised there is no need to consult this fishery given the proposed activities. As per WAFIC's Commercial Fishing Consultation Framework for the Offshore Oil and Gas Sector and Consultation Approach for Unplanned Events, consultation with State fisheries relevant to the EMBA of the proposed activity would however be undertaken only in the event of an unplanned emergency scenario.	No
Pilbara Line Fishery	State commercial fishery	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under regulation 25(1)(d) of the Environment Regulations.	Yes

Person or Organisation	Summary of responsibilities and/or functions, interests or activities	Assessment of relevance	Relevant person
		The fishery overlaps the Operational Area and EMBA and has been active in the Operational Area and EMBA within the last 5 years. Woodside acknowledges WAFIC's consultation guidance and has applied this by consulting, via WAFIC, fisheries that are assessed as having a potential for interaction in the Operational Area. As per WAFIC's Commercial Fishing Consultation Framework for the Offshore Oil and Gas Sector and Consultation Approach for Unplanned Events, consultation with State fisheries relevant to the EMBA of the proposed activity would however be undertaken only in the event of an unplanned emergency scenario.	
Western Australian Fishing Industry Council (WAFIC)	Represents the interests of commercial fishers with licences in State waters.	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under regulation 25(1)(d) of the Environment Regulations. The West Australian Sea Cucumber Fishery, Hermit Crab Fishery, Mackerel Managed Fishery (area 2), Marine Aquarium Managed Fishery, Onslow Prawn Managed Fishery, Pilbara Crab Managed Fishery, Pilbara Trawl Managed Fishery, Pilbara Line Fishery and Specimen Shell Managed Fishery have been active in the Operational Area within the last 5 years. The Exmouth gulf Prawn Managed Fishery, West Australian Sea Cucumber Fishery, Hermit Crab Fishery, Mackerel Managed Fishery (Area 2), Marine Aquarium Fish Managed Fishery, Nickol Bay Prawn Managed Fishery, Onslow Prawn Managed Fishery, Pilbara Crab Managed Fishery, Pilbara Trawl Managed Fishery, Pilbara Line Fishery, Specimen Shell Managed Fishery and West Coast Deep Sea Crustacean Managed Fishery have been active in the EMBA within the last 5 years. WAFIC's functions may be relevant to the activity as the peak representative body for State fisheries. WAFIC issued consultation materials to relevant commercial fisheries licence holders. Woodside acknowledges WAFIC's consultation guidance and has applied this by consulting, via WAFIC, fisheries that are assessed as having a potential for interaction in the Operational Area. As per WAFIC's Commercial Fishing Consultation Framework for the Offshore Oil and Gas Sector and Consultation Approach for unplanned Events, consultation with State fisheries relevant to the EMBA of the proposed activity would be undertaken only in the event of an unplanned emergency scenario.	Yes

Person or Organisation	Summary of responsibilities and/or functions, interests or activities	Assessment of relevance	Relevant person
Western Rock Lobster Council	Represents the interests of the Western Rock Lobster Managed Fishery.	Woodside has applied its methodology for 'Commercial fisheries (Commonwealth and State) and peak representative bodies' under regulation 25(1)(d). The West Coast Rock Lobster Managed Fishery has been assessed as not relevant to the proposed activity. As the peak representative body for the West Coast Rock Lobster Managed Fishery, the Western Rock Lobster Council has also been assessed as not relevant.	No
Recreational marine users and representative bodies			
Gascoyne Recreational Marine Users	Gascoyne-based dive, tourism and charter operators	Woodside has applied its methodology for 'Recreational marine users and representative bodies' under regulation 25(1)(d) of the Environment Regulations. Andro Maritime Services Australia, Aquatic Adventure Exmouth, Birds Eye View, Blue Horizon Charters, Blue Lightning Charters, Cape Immersion Tours, Coastal Adventure Tours, Coral Bay Ecotours, Cruise Ningaloo, Dampier Island Tourism, Dive Ningaloo, Evolution Fishing Charters, Exmouth adventure co., Exmouth Dive Centre, Indian Chief Charters, Innkeeper Sport Fishing, Innkeeper Sport Fishing Charter, Kings Ningaloo Reef Tours, Live Ningaloo, Mahi Mahi Fishing Charters, Montebello Island Safaris, Ningaloo Aviation, Ningaloo Blue, Ningaloo Coral Bay Boats, Ningaloo Discovery, Ningaloo Ecology Cruises, Ningaloo Fly Fishing, Ningaloo Marine Interaction, Ningaloo Reef Dive, Ningaloo Reef To Range Tours, Ningaloo Safari Tours, Ningaloo Sportfishing Charters, Ningaloo Whaleshark N Dive, Ningaloo Whaleshark Swim, Ocean Eco Adventures, Peak Sportfishing Charters, Pelican Charters, Sail Ningaloo, Sea Force Charters, Set The Hook, Three Islands, Top Gun Charters, Ultimate Watersports, Venture Ningaloo, View Ningaloo, Warrior Princess Charters, Yardi Creek Boat Tours, Aoa International Pty Ltd, Austanley Pty Ltd, Blue Juice Tours Pty Ltd, Bondall Pty Ltd, C Emery Fishing Pty Ltd, Chapel Nominees Pty Ltd, D & N Nominees Pty Ltd, Eco-Abrolhos Pty Ltd, Fawesome Expeditions Pty Ltd, Fire Tiger Pty Ltd, G. C. Bass nominees pty ltd, Jostan Holdings Pty Ltd, Km Charters Pty Ltd, Kw Marine Pty Ltd, L & S Family Holdings Pty Ltd, Lulamanzi Investments Pty Ltd, Lyons Family Super Pty Ltd, Makalee Pty Ltd, Maritime Engineering Services Pty Ltd, Melkit Pty Ltd, Millennial Charters Pty Ltd, Monkey Mia Yacht Charters Pty Ltd, Monster Sportfishing Adventures Pty Ltd, North Star Cruises Australia Pty Ltd, On Strike Charters (Wa) Pty Ltd, Reel Force Charters Pty Ltd, Regalchoice Holdings Pty Ltd, Seafresh Holdings Pty Ltd, Sharkbay Charters Pty Ltd, Surefire Marine Services Pty Ltd, The Great Escape Charter Company Pty Ltd, W.A Maritime Investments Pty Ltd. Activities have the potential to impact Gascoyne-based dive, tourism and charter operator's functions, interests or activities due to the location of activities and there has been recorded charter	Yes

Person or Organisation	Summary of responsibilities and/or functions, interests or activities	Assessment of relevance	Relevant person
		effort in the EMBA in the past 5 years.	
Pilbara/Kimberley Recreational Marine Users	Pilbara/Kimberley-based dive, tourism and charter operators	Woodside has applied its methodology for 'Recreational marine users and representative bodies' under regulation 25(1)(d) of the Environment Regulations. Marine Rescue Dampier, Port Walcott Volunteer Marine Rescue , West Pilbara Volunteer Sea Search and Rescue Group, Archipelago Adventures, Hampton Harbour Boat & Sailing Club, Port Walcott Yacht Club , Reef Seeker Charters, King Bay Game Fishing Club, Nickol Bay Sport Fishing Club, Bardina Pty Ltd, Down the Line Charters Pty Ltd, Mackerel Islands Pty Ltd, Ocean Charters Pty Ltd, Serenity Isles Trading Company Pty Ltd, Wyndham Fishing Tours Pty Ltd, Charter Travel Company Pty Ltd, Kw Marine Pty Ltd, Norbrick Pty Ltd, Sail Ningaloo Pty Ltd, Tiffom Pty Ltd, Aoa International Pty Ltd, Australian Port And Marine Services Pty Ltd, Bloor Street Investments Pty Ltd, Blue Juice Tours Pty Ltd, Bondall Pty Ltd, Brefjen Nominees Pty Ltd, Broome Chiropractic Pty Ltd, Broome Tours Pty Ltd, C Emery Fishing Pty Ltd, Chapel Nominees Pty Ltd, Charter Express Pty Ltd, CM Ventures Pty Ltd, Coastway Investments Pty Ltd, Coral Princess Cruises (Nq) Pty Ltd, Discovery Holiday Parks Pty Limited, Diversity Charter Company Wa Pty Ltd, Eco-Abrolhos Pty Ltd Fawesome Expeditions Pty Ltd, G. C. Bass nominees pty ltd, Hartley Motorcycles Pty Ltd, Hotel And Resort Investments Pty Ltd, Humbug Fishing Pty Ltd, Kcc Group Pty Ltd, Kimberley Getaway Cruises Pty Ltd, Kimberley Marine Pty Ltd, Kimberley Quest Adventures Pty Ltd, King Sound Resort Hotel Pty Ltd, Kw Marine Pty Ltd, L & S Family Holdings Pty Ltd, Lake Argyle Cruises Pty Ltd, Lombadina Aboriginal Corporationm, Lugger Enterprises Pty Ltd, Lulamanzi Investments Pty Ltd, Mackerel Islands Pty Ltd, Mal Miles Adventures Pty Ltd, Marine Agents Australia Pty Ltd, Maritime Engineering Services Pty Ltd, Melkit Pty Ltd, Millennial Charters Pty Ltd, Monster Sportfishing Adventures Pty Ltd, North Star Cruises Australia Pty Ltd, Ocean Charters Pty Ltd, RSTG Pty Limited, Sea 2 Pty Ltd, Sealife Charters Pty Ltd, Split Tide Pty Ltd, Steven Douglas Chambers, Super Yachts Perth Pty Ltd, The Great Escape Charter Company Pty Ltd, W.A Maritime Investments Pty Ltd, Willie Creek Pearl Farm Pty Ltd. Activities have the potential to impact Pilbara/Kimberley-based dive, tourism and charter operator's functions, interests or activities due to the location of activities and there has been recorded charter effort in the EMBA in the past 5 years.	Yes
Recfishwest	Represents the interests of recreational fishers in WA.	Woodside has applied its methodology for 'Recreational marine users and representative bodies' under regulation 25(1)(d) of the Environment Regulations. Activities have the potential to impact recreational fishers' functions, interests or activities due to the	Yes

Person or Organisation	Summary of responsibilities and/or functions, interests or activities	Assessment of relevance	Relevant person
		location offshore and there has been recorded charter effort in the EMBA in the past 5 years.	
Marine Tourism WA	Represents the interests of marine tourism in WA.	Woodside has applied its methodology for 'Recreational marine users and representative bodies' under regulation 25(1)(d) of the Environment Regulations. Activities have the potential to impact recreational fishers' functions, interests or activities due to the location offshore and there has been recorded charter effort in the EMBA in the past 5 years.	Yes
WA Game Fishing Association	Represents the interests of game fishers in WA.	Woodside has applied its methodology for 'Recreational marine users and representative bodies' under regulation 25(1)(d) of the Environment Regulations. Activities have the potential to impact game fishers' functions, interests or activities due to the location offshore and there has been recorded charter effort in the EMBA in the past 5 years.	Yes
Titleholders and Operators			
Chevron Australia	Titleholder or Operator	Woodside has applied its methodology for 'Titleholders and Operators' under regulation 25(1)(d) of the Environment Regulations. Titleholder or Operator's permit areas overlaps the EMBA.	Yes
Western Gas	Titleholder or Operator	Woodside has applied its methodology for 'Titleholders and Operators' under regulation 25(1)(d) of the Environment Regulations. Titleholder or Operator's permit areas overlaps the EMBA.	Yes
Exxon Mobil Australia Resources Company	Titleholder or Operator	Woodside has applied its methodology for 'Titleholders and Operators' under regulation 25(1)(d) of the Environment Regulations. Titleholder or Operator's permit areas overlaps the EMBA.	Yes
Shell Australia	Titleholder or Operator	Woodside has applied its methodology for 'Titleholders and Operators' under regulation 25(1)(d) of the Environment Regulations. Titleholder or Operator's permit areas overlaps the EMBA.	Yes
BP Developments Australia	Titleholder or Operator	Woodside has applied its methodology for 'Titleholders and Operators' under regulation 25(1)(d) of the Environment Regulations. Titleholder or Operator's permit areas overlaps the EMBA.	Yes
Carnarvon Energy	Titleholder or Operator	Woodside has applied its methodology for 'Titleholders and Operators' under regulation 25(1)(d) of the Environment Regulations.	Yes

Person or Organisation	Summary of responsibilities and/or functions, interests or activities	Assessment of relevance	Relevant person
		Titleholder or Operator's permit areas overlaps the EMBA.	
Osaka Gas Gorgon	Titleholder or Operator	Woodside has applied its methodology for 'Titleholders and Operators' under regulation 25(1)(d) of the Environment Regulations. Titleholder or Operator's permit areas overlaps the EMBA.	Yes
Tokyo Gas Gorgon	Titleholder or Operator	Woodside has applied its methodology for 'Titleholders and Operators' under regulation 25(1)(d) of the Environment Regulations. Titleholder or Operator's permit areas overlaps the EMBA.	Yes
JERA Gorgon	Titleholder or Operator	Woodside has applied its methodology for 'Titleholders and Operators' under regulation 25(1)(d) of the Environment Regulations. Titleholder or Operator's permit areas overlaps the EMBA.	Yes
PE Wheatstone	Titleholder or Operator	Woodside has applied its methodology for 'Titleholders and Operators' under regulation 25(1)(d) of the Environment Regulations. Titleholder or Operator's permit areas overlaps the EMBA.	Yes
Kyushu Electric Wheatstone	Titleholder or Operator	Woodside has applied its methodology for 'Titleholders and Operators' under regulation 25(1)(d) of the Environment Regulations. Titleholder or Operator's permit areas overlaps the EMBA.	Yes
Eni Australia	Titleholder or Operator	Woodside has applied its methodology for 'Titleholders and Operators' under regulation 25(1)(d) of the Environment Regulations. Titleholder or Operator's permit areas overlaps the EMBA.	Yes
Finder Energy	Titleholder or Operator	Woodside has applied its methodology for 'Titleholders and Operators' under regulation 25(1)(d) of the Environment Regulations. Titleholder or Operator's permit areas overlaps the EMBA.	Yes
Jadestone Energy	Titleholder or Operator	Woodside has applied its methodology for 'Titleholders and Operators' under regulation 25(1)(d) of the Environment Regulations. Titleholder or Operator's permit areas overlaps the EMBA.	Yes

Person or Organisation	Summary of responsibilities and/or functions, interests or activities	Assessment of relevance	Relevant person
KUFPEC Australia	Titleholder or Operator	Woodside has applied its methodology for 'Titleholders and Operators' under regulation 25(1)(d) of the Environment Regulations. Titleholder or Operator's permit areas overlaps the EMBA.	Yes
Vermilion Oil & Gas	Titleholder or Operator	Woodside has applied its methodology for 'Titleholders and Operators' under regulation 25(1)(d) of the Environment Regulations. Titleholder or Operator's permit areas overlaps the EMBA.	Yes
Santos NA Energy Holdings / Santos Ltd / Santos WA Northwest / Santos Offshore / Santos WA Southwest / Santos (BOL) / Santos WA PVG	Titleholder or Operator	Woodside has applied its methodology for 'Titleholders and Operators' under regulation 25(1)(d) of the Environment Regulations. Titleholder or Operator's permit areas overlaps the EMBA.	Yes
Coastal Oil and Gas / Fox Resources	Titleholder or Operator	Woodside has applied its methodology for 'Titleholders and Operators' under regulation 25(1)(d) of the Environment Regulations. Titleholder or Operator's permit areas overlaps the EMBA.	Yes
Bounty Oil and Gas	Titleholder or Operator	Woodside has applied its methodology for 'Titleholders and Operators' under regulation 25(1)(d) of the Environment Regulations. Titleholder or Operator's permit areas overlaps the EMBA.	Yes
OMV Australia	Titleholder or Operator	Woodside has applied its methodology for 'Titleholders and Operators' under regulation 25(1)(d) of the Environment Regulations. Titleholder or Operator's permit areas overlaps the EMBA.	Yes
KATO Energy / KATO Corowa	Titleholder or Operator	Woodside has applied its methodology for 'Titleholders and Operators' under regulation 25(1)(d) of the Environment Regulations. Titleholder or Operator's permit areas overlaps the EMBA.	Yes
INPEX Alpha	Titleholder or Operator	Woodside has applied its methodology for 'Titleholders and Operators' under regulation 25(1)(d) of the Environment Regulations.	Yes

Person or Organisation	Summary of responsibilities and/or functions, interests or activities	Assessment of relevance	Relevant person
		Titleholder or Operator's permit areas overlaps the EMBA.	
Beagle No. 1	Titleholder or Operator	Woodside has applied its methodology for 'Titleholders and Operators' under regulation 25(1)(d) of the Environment Regulations. Titleholder or Operator's permit areas overlaps the EMBA.	Yes
JX Nippon O&G Exploration (Australia)	Titleholder or Operator	Woodside has applied its methodology for 'Titleholders and Operators' under regulation 25(1)(d) of the Environment Regulations. Titleholder or Operator's permit areas overlaps the EMBA.	Yes
Peak Industry Representative bodies			
Australian Energy Producers (AEP)	Represents the interests of oil and gas explorers and producers in Australia.	Woodside has applied its methodology for 'Peak Industry Representative bodies' under regulation 25(1)(d) of the Environment Regulations. AEP's responsibilities are identified as having an intersect with Woodside's planned activities in the EMBA.	Yes
Traditional Custodians and nominated representative corporations			
Murujuga Aboriginal Corporation (MAC)	Representative Aboriginal Corporation	Woodside has applied its methodology for 'Traditional Custodians and Nominated Representative Corporations' under regulation 25(1)(d) of the Environment Regulations. MAC is the Nominated Representative Corporation under the Burrup and Maitland Industrial Estates Agreement (BMIEA), which is coastally adjacent to the EMBA. The EMBA does not overlap the Murujuga National Park. MAC was established to represent the members of competing Native Title claims over Murujuga, collectively known as the Ngarda Ngarli and comprising Mardudhunera, Ngarluma, Yaburara, Yindjibarndi and Wong-Goo-Tt-Oo people. The determination of the competing Native Title claims resulted in no native title being found over the lands subject to the BMIEA or below the low water mark. MAC also owns and co-manages the Murujuga National Park, is responsible for the Dampier Archipelago National Heritage Place and is progressing the World Heritage nomination of the Murujuga Cultural Landscape.	Yes

Person or Organisation	Summary of responsibilities and/or functions, interests or activities	Assessment of relevance	Relevant person
Nganhurra Thanardi Garrbu Aboriginal Corporation (NTGAC)	Representative Aboriginal Corporation	Woodside has applied its methodology for 'Traditional Custodians and Nominated Representative Corporations' under regulation 25(1)(d) of the Environment Regulations. The Gnulli, Gnulli #2 and Gnulli #3 - Yinggarda, Baiyungu and Thalanyji People native title claim, which the Baiyungu, Thalanyji and Yinggarda people are party to, overlaps the EMBA. The NTGAC and YAC are the Registered Native Title Bodies Corporate holding native title on behalf of the Baiyungu, Thalanyji and Yinggarda people. NTGAC is also party to the Ningaloo Conservation Estate Indigenous Land Use Agreement (the ILUA), which is coastally adjacent to the EMBA. The NTGAC is responsible for the joint management of the inner Ningaloo Marine Park (State Waters), the Cape Range National Park and new conservation areas extending along the Ningaloo Coast, which runs in parallel to the outer Ningaloo Marine Park in Commonwealth waters. The NTGAC's nominated representative is the Yamatji Marlpa Aboriginal Corporation (YMAC) and the NTGAC executive officer and contact officer pursuant to the Corporations (Aboriginal and Torres Strait Islander) Act 2006 is employed by YMAC. Woodside has therefore consulted the NTGAC, via YMAC.	Yes
Buurabalayji Thalanyji Aboriginal Corporation (BTAC)	Representative Aboriginal Corporation	Woodside has applied its methodology for 'Traditional Custodians and Nominated Representative Corporations' under regulation 25(1)(d) of the Environment Regulations. The Thalanyji native title claim does not overlap the EMBA. The claim is coastally adjacent to the EMBA, for which BTAC is the Registered Native Title Body Corporate. BTAC is also party to the Macedon ILUA which is coastally adjacent to the EMBA.	Yes
Yinggarda Aboriginal Corporation (YAC)	Representative Aboriginal Corporation	Woodside has applied its methodology for 'Traditional Custodians and Nominated Representative Corporations' under regulation 25(1)(d) of the Environment Regulations. The Gnulli, Gnulli #2 and Gnulli #3 - Yinggarda, Baiyungu and Thalanyji People native title claim, which the Baiyungu, Thalanyji and Yinggarda people are party to, overlaps the EMBA. The NTGAC and YAC are the Registered Native Title Bodies Corporate holding native title on behalf of the Baiyungu, Thalanyji and Yinggarda people. The Yinggarda Aboriginal Corporation's nominated representative is Gumala Aboriginal Corporation.	Yes
Kariyarra Aboriginal Corporation	Representative Aboriginal Corporation	Woodside has applied its methodology for 'Traditional Custodians and Nominated Representative Corporations' under regulation 25(1)(d) of the Environment Regulations. The Kariyarra native title claim does not overlap the EMBA. The claim is coastally adjacent to the EMBA, for which the Kariyarra Aboriginal Corporation is the Registered Native Title Body	Yes

Person or Organisation	Summary of responsibilities and/or functions, interests or activities	Assessment of relevance	Relevant person
		Corporate. The Kariyarra Aboriginal Corporation is also party to the Kariyarra and State ILUA, which is coastally adjacent to the EMBA.	
Wirrawandi Aboriginal Corporation (WAC)	Representative Aboriginal Corporation	Woodside has applied its methodology for 'Traditional Custodians and Nominated Representative Corporations' under regulation 25(1)(d) of the Environment Regulations. The Yaburara & Mardudhunera People native title claim, for which WAC is the Registered Native Title Body Corporate, overlaps the EMBA. WAC is party to the Cape Preston Project Deed (YM Mardie ILUA), which overlaps the EMBA.	Yes
Robe River Kuruma Aboriginal Corporation	Representative Aboriginal Corporation	Woodside has applied its methodology for 'Traditional Custodians and Nominated Representative Corporations' under regulation 25(1)(d) of the Environment Regulations. The Robe River Kuruma Aboriginal Corporation is party to the Cape Preston West Export Facility ILUA and the RTIO Kuruma Marthudunera People ILUA, which are coastally adjacent to the EMBA.	Yes
Ngarluma Aboriginal Corporation (NAC)	Representative Aboriginal Corporation	Woodside has applied its methodology for 'Traditional Custodians and Nominated Representative Corporations' under regulation 25(1)(d) of the Environment Regulations. The Ngarluma/Yindjibarndi People native title claim, for which NAC and the Yindjibarndi Aboriginal Corporation are the Registered Native Title Bodies Corporate, overlaps the EMBA. NAC is also party to the Anketell Port, Infrastructure Corridor and Industrial Estates ILUA and the RTIO Ngarluma Indigenous Land Use Agreement (Body Corporate Agreement), which are coastally adjacent to the EMBA.	Yes
Yindjibarndi Aboriginal Corporation	Representative Aboriginal Corporation	Woodside has applied its methodology for 'Traditional Custodians and Nominated Representative Corporations' under regulation 25(1)(d) of the Environment Regulations. The Ngarluma/Yindjibarndi People native title claim, for which NAC and the Yindjibarndi Aboriginal Corporation are the Registered Native Title Bodies Corporate, overlaps the EMBA.	Yes
Wanparta Aboriginal Corporation	Representative Aboriginal Corporation	Woodside has applied its methodology for 'Traditional Custodians and Nominated Representative Corporations' under regulation 25(1)(d) of the Environment Regulations. Wanparta Aboriginal Corporation jointly manages 80 Mile Beach Marine Park which is adjacent to the EMBA.	Yes
Native Title Representative Bodies			

Person or Organisation	Summary of responsibilities and/or functions, interests or activities	Assessment of relevance	Relevant person
Yamatji Marlpa Aboriginal Corporation (YMAC)	Native Title Representative Body (NTRB)	Woodside has applied its methodology for 'Native Title Representative Bodies' under regulation 25(1)(d) of the Environment Regulations. YMAC is the NTRB for the Yamatji and Pilbara regions of Western Australia. As such, they are not a Prescribed or Registered Native Title Body Corporate but exist to assist native title claimants and holders. The NTGAC's nominated representative is YMAC. Woodside has therefore consulted the NTGAC via YMAC. Woodside contacted YMAC to seek guidance with respect to the appropriate Traditional Custodian group(s) to engage with respect to the proposed activity where this was not clear. YMAC's functions may be relevant to the proposed activity in relation to its facilitation and coordination function as a NTRB under applicable federal legislation.	Yes
Self-identified First Nations groups			
Ngarluma Yindjibarndi Foundation Ltd (NYFL)	Representative Aboriginal Corporation	Woodside has applied its methodology for 'Traditional Custodians and Nominated Representative Corporations' under regulation 25(1)(d) of the Environment Regulations. In 1998 [prior to resolution of the Ngarluma and Yinjibarndi native title claim], Elders of the Ngarluma and Yindjibarndi people [native title claimants] signed an Agreement with the North West Shelf JV partners covering a number of matters including how payment would be made for land use on the Burrup Peninsula. The Ngarluma Yindjibarndi Foundation Ltd (NYFL) was formed and incorporated in 2000 to receive those payments. Subsequent to that, the Ngarluma people settled their native title claim and established their nominated representative corporation, the Ngarluma Aboriginal Corporation (NAC). The Yindjibarndi people also settled their native title claim and established their nominated representative corporation, the Yindjibarndi Aboriginal Corporation (Yindjibarndi). The Ngarluma Aboriginal Corporation and the Yindjibarndi Aboriginal Corporation are the appropriate representative bodies for consultation in relation to cultural interests. While the NYFL's members have been assessed as being relevant persons (and have been consulted on this EP), NYFL's own functions interests and activities were not considered to overlap with the EMBA for this EP and NYFL was therefore not assessed as being relevant for this EP. In the course of consultation, NYFL self-identified and has advised it is relevant for this EP. Woodside has therefore consulted with NYFL on this EP.	Yes

Local government and community representative groups or organisations			
Shire of Exmouth	Local government governed by the *Local Government Act 1995* representing the suburbs and localities of Exmouth, Learmonth and North West Cape.	Woodside has applied its methodology for 'Local government and community representative groups or organisations' under regulation 25(1)(d) of the Environment Regulations. The Shire of Exmouth's area of responsibility overlaps the EMBA.	Yes
Shire of Ashburton	Local government governed by the *Local Government Act 1995* representing the suburbs and localities of Onslow, Pannawonica, Paraburdoo and Tom Price.	Woodside has applied its methodology for 'Local government and community representative groups or organisations' under regulation 25(1)(d) of the Environment Regulations. The Shire of Ashburton's area of responsibility overlaps the EMBA.	Yes
City of Karratha	Local government governed by the Local Government Act 1995 representing the suburbs and localities of Baynton, Baynton West, Bulgarra, Cossack, Dampier, Gap Ridge, Karratha, Karratha Industrial Estate, Jingarri, Madigan, Millars Well, Nickol, Pegs Creek, Point Samson, Roebourne, Whim Creek and Wickham.	Woodside has applied its methodology for 'Local government and community representative groups or organisations' under regulation 25(1)(d) of the Environment Regulations. The City of Karratha's area of responsibility overlaps the EMBA.	Yes
Town of Port Hedland	Local government governed by the Local Government Act 1995 representing the suburbs and localities of Cooke Point, Port Hedland, Pretty Pool, Redbank, South Hedland, Wedgefield and Yandeyarra.	Woodside has applied its methodology for 'Local government and community representative groups or organisations' under regulation 25(1)(d) of the Environment Regulations. The Town of Port Hedland's area of responsibility does not overlap the EMBA.	No
Shire of Shark Bay	Local government governed by the Local Government	Woodside has applied its methodology for 'Local government and community representative groups or organisations' under regulation 25(1)(d) of the Environment Regulations.	No

	Act 1995 representing the suburbs and localities of Billabong, Denham, Monkey Mia, Nanga, Overlander, Useless Loop	The Shire of Shark Bay's area of responsibility does not overlap the EMBA.	
Exmouth Community Liaison Group (CLG)	The Exmouth CLG represents the interests of a range of local government, industry and community organisations in relation to oil and gas matters in the Exmouth region.	Woodside has applied its methodology for 'Local government and community representative groups or organisations' under regulation 25(1)(d) of the Environment Regulations. Base Marine, Bgahwan Marine, Cape Conservation Group Inc., DBCA, Department of Defence, Department of Transport, Exmouth Bus Charter, Exmouth Chamber of Commerce and Industry, Exmouth District High School, Exmouth Freight and Logistics, Exmouth Game Fishing Club, Exmouth Tackle and Camping Supplies, Exmouth Visitors Centre, Exmouth Volunteer Marine Rescue, Fat Marine, Gascoyne Development Commission, Gun Marine Services, Ningaloo Lodge, Offshore Unlimited, Shire of Exmouth, BHP Petroleum, Santos, Community Member The Exmouth CLG's area of responsibility under its terms of reference overlaps the EMBA.	Yes
Karratha Community Liaison Group (CLG)	The Karratha CLG is the recognised community group that represents the interests of a range of local government, industry and community organisations in relation to oil and gas matters in the Pilbara region.	Woodside has applied its methodology for 'Local government and community representative groups or organisations' under regulation 25(1)(d) of the Environment Regulations. The Karratha CLG's area of responsibility under its terms of reference does not overlap the EMBA. WA Police, Karratha Health Care, Development WA, Ngarluma Yindjibarndi Foundation Ltd (NYFL)*, Department of Education, Pilbara Ports Authority, Regional Development Australia, Pilbara Development Commission, Dampier Community Association, City of Karratha, Karratha & Districts Chamber of Commerce and Industry, Horizon Power, Murujuga Aboriginal Corporation (MAC)*, Department of Local Government, Sport and Cultural Industries **NFYL and MAC were consulted directly as described above.* The Karratha CLG's area of responsibility under its terms of reference overlaps the EMBA.	Yes
Onslow Chamber of Commerce and Industry	Independent not-for-profit organisation responsible for promoting the interests of its members in the business community in the town of Onslow and surrounding areas.	Woodside has applied its methodology for 'Local government and community representative groups or organisations' under regulation 25(1)(d) of the Environment Regulations. The Onslow Chamber of Commerce and Industry's interests have the potential to be impacted by the proposed activities.	Yes

Port Hedland Chamber of Commerce and Industry	Independent not-for-profit organisation responsible for promoting the interests of its members in the business community in the town of Port Hedland and surrounding areas.	Woodside has applied its methodology for 'Local government and community representative groups or organisations' under regulation 25(1)(d) of the Environment Regulations. The Port Hedland Chamber of Commerce and Industry's interests do not have the potential to be impacted by the proposed activities.	No
Other non-government groups or organisations			
Australian Conservation Foundation (ACF)	Non-government organisation	Woodside has applied its methodology for 'Other non-government groups or organisations' under regulation 25(1)(d) of the Environment Regulations. Woodside has assessed that ACF's public website material does not demonstrate an interest with the potential risks and impacts associated with planned activities in accordance with the intended outcome of consultation (as set out in Section 5.2 of the EP). Woodside acknowledges the reference to the Pluto onshore processing facility in the context of the Scarborough Project and chose to contact ACF at its discretion in line with Section 5.3.7 of the EP.	No
Australian Marine Conservation Society (AMCS)	Non-government organisation	Woodside has applied its methodology for 'Other non-government groups or organisations' under regulation 25(1)(d) of the Environment Regulations. Woodside has assessed that AMCS's public website material does not demonstrate an interest with the potential risks and impacts associated with planned activities in accordance with the intended outcome of consultation (as set out in Section 5.2 of the EP). Woodside chose to contact AMCS at its discretion in line with Section 5.3.7 of the EP.	No
Conservation Council of Western Australia (CCWA)	Non-government organisation	Woodside has applied its methodology for 'Other non-government groups or organisations' under regulation 25(1)(d) of the Environment Regulations. Woodside has assessed that CCWA's public website material does not demonstrate an interest with the potential risks and impacts associated with planned activities in accordance with the intended outcome of consultation (as set out in Section 5.2 of the EP). Woodside chose to contact CCWA at its discretion in line with Section 5.3.7 of the EP.	No
Greenpeace Australia Pacific (GAP)	Non-government organisation	Woodside has applied its methodology for 'Other non-government groups or organisations' under regulation 25(1)(d) of the Environment Regulations. Woodside has assessed that GAP's public website material does not demonstrate an interest with the potential risks and impacts associated with planned activities in accordance with the intended outcome of consultation (as set out in Section 5.2 of the EP). Woodside chose to contact GAP at its discretion in line with Section 5.3.7 of the EP.	No

350 Australia (350A)	Non-government organisation	Woodside has applied its methodology for 'Other non-government groups or organisations' under regulation 25(1)(d) of the Environment Regulations. Woodside has assessed that 350A's public website material does not demonstrate an interest with the potential risks and impacts associated with planned activities in accordance with the intended outcome of consultation (as set out in Section 5.2 of the EP). Woodside chose to contact 350A at its discretion in line with Section 5.3.7 of the EP.	No
Australasian Centre for Corporate Responsibility (ACCR)	Non-government organisation	Woodside has applied its methodology for 'Other non-government groups or organisations' under regulation 25(1)(d) of the Environment Regulations. Woodside has assessed that ACCR's public website material does not demonstrate an interest with the potential risks and impacts associated with planned activities in accordance with the intended outcome of consultation (as set out in Section 5.2 of the EP). Woodside chose to contact ACCR at its discretion in line with Section 5.3.7 of the EP.	No
Friends of Australian Rock Art. Inc (FARA)	Non-government organisation	Woodside has applied its methodology for 'Other non-government groups or organisations' under regulation 25(1)(d) of the Environment Regulations. Woodside has assessed that FARA's public website material demonstrates an interest with the potential risks and impacts associated with planned activities in accordance with the intended outcome of consultation (as set out in Section 5.2 of the EP).	Yes
Market Forces	Non-government organisation	Woodside has applied its methodology for 'Other non-government groups or organisations' under regulation 25(1)(d) of the Environment Regulations. Woodside has assessed that Market Forces' public website material does not demonstrate an interest with the potential risks and impacts associated with planned activities in accordance with the intended outcome of consultation (as set out in Section 5.2 of the EP). Woodside chose to contact Market Forces at its discretion in line with Section 5.3.7 of the EP.	No
Telstra	Non-government organisation	Woodside has applied its methodology for 'Other non-government groups or organisations' under Regulation 25(1)(d) of the Environment Regulations to determine Telstra's relevance for the proposed activity. There are known Telstra communication cables that intersect within the Operational Area.	Yes
Vocus	Non-government organisation	Woodside has applied its methodology for 'Other non-government groups or organisations' under Regulation 25(1)(d) of the Environment Regulations to determine Vocus' relevance for the proposed activity. There are known Vocus communication cables that intersect within the Operational Area.	Yes

Doctors for the Environment Australia (DEA)	Non-government organisation	During the course of preparing this EP, DEA self-identified, provided comment on another EP and requested to receive more information about the activities under this EP. Woodside has applied its methodology for 'Other non-government groups or organisations or individuals' under regulation 25(1)(d) of the Environment Regulations. Woodside has assessed that DEA's feedback demonstrates an interest with the potential risks and impacts associated with planned activities in accordance with the intended outcome of consultation (as set out in Section 5.3.4).	Yes
Research institutes and local conservation groups or organisations			
Cape Conservation Group (CCG)	Local conservation group focused on protecting the terrestrial and marine environment of the North West Cape	Woodside has applied its methodology for 'Research institutes and local conservation groups or organisations' under regulation 25(1)(d) of the Environment Regulations. CCG's conservation activities have the potential to intersect with the EMBA as the EMBA overlaps North West Cape.	Yes
Protect Ningaloo	Local conservation group focused on protecting the Exmouth Gulf and Ningaloo Reef and Cape Range	Woodside has applied its methodology for 'Research institutes and local conservation groups or organisations' under regulation 25(1)(d) of the Environment Regulations. Protect Ningaloo's conservation activities have the potential to intersect with the EMBA as the EMBA overlaps North West Cape and Ningaloo Reef.	Yes
University of Western Australia (UWA)	Research institute	Woodside has applied its methodology for 'Research institutes and local conservation groups or organisations' under regulation 25(1)(d). There is no known research being undertaken by UWA that intersects within the EMBA. Woodside chose to contact UWA at its discretion in line with Section 5.3.7 of the EP.	No
Curtin University	Research institute	Woodside has applied its methodology for 'Research institutes and local conservation groups or organisations' under regulation 25(1)(d). There is no known research being undertaken by Curtin University that intersects within the EMBA. Woodside chose to contact Curtin University at its discretion in line with Section 5.3.7 of the EP.	No
Edith Cowan University (ECU)	Research institute	Woodside has applied its methodology for 'Research institutes and local conservation groups or organisations' under regulation 25(1)(d). There is no known research being undertaken by ECU that intersects within the EMBA. Woodside chose to contact ECU at its discretion in line with Section 5.3.7 of the EP.	No
Murdoch University	Research institute	Woodside has applied its methodology for 'Research institutes and local conservation groups or organisations' under regulation 25(1)(d). There is no known research being undertaken by Murdoch University that intersects within the EMBA.	No

		Woodside chose to contact Murdoch University at its discretion in line with Section 5.3.7 of the EP.	
Commonwealth Scientific and Industrial Research Organisation (CSIRO)	Research institute	Woodside has applied its methodology for 'Research institutes and local conservation groups or organisations' under regulation 25(1)(d). There is no known research being undertaken by CSIRO that intersects within the EMBA. Woodside chose to contact CSIRO at its discretion in line with Section 5.3.7 of the EP.	No
Australian Institute of Marine Science (AIMS)	Research institute	Woodside has applied its methodology for 'Research institutes and local conservation groups or organisations' under regulation 25(1)(d). There is no known research being undertaken by AIMS that intersects within the EMBA. Woodside chose to contact AIMS at its discretion in line with Section 5.3.7 of the EP.	No
Other			
Save Our Songlines (SOS) and/ or [Individual 1]	Representatives of Non-Government Organisation Save Our Songlines and/ or [Individual 1]	Woodside has applied its methodology for 'Traditional Custodians and nominated representative corporations' and 'Other non-government groups or organisations' under regulation 25(1)(d) to determine Save Our Songlines (SOS) and/ or [Individual 1] relevance for the proposed activity. As [Individual 1] is a founder of SOS and now appears to be its primary spokesperson, Woodside understands that the views of SOS and [Individual 1] are the same. On this basis Woodside has consulted [Individual 1] and SOS as one entity. Correspondence has been via [Individual 1's] legal representative in this capacity. Save Our Songlines and/ or [Individual 1] stated interest is to stop or pause Scarborough gas and to stop new industry on the Burrup; and oppose planned expansion of the Burrup Hub industry by Woodside, Perdaman and Yara. In addition, their stated interests also include the protection of Murujuga rock art. As Save Our Songlines have raised concerns relating to the processing of greenhouse gases on Murujuga, Woodside considers that Save Our Songlines and/ or [Individual 1] are relevant for this activity.	Yes

CONSULTATION ACTIVITIES

Pluto Facility Operations EP Consultation Activities

Woodside has been conducting extensive consultation with relevant persons and other parties for this EP since February 2024 when consultation commenced with interested and affected stakeholders as part of a planned, integrated and consistent approach to stakeholder engagement for Woodside's proposed activities.

A broad consultation process has been undertaken with relevant persons for the Pluto Facility Operations EP. Consultation aims to be inclusive, transparent, voluntary, respectful and two-way. Consultation was undertaken by email, letter, phone calls (where required), meetings (where required), and through advertising.

Discharging Regulation 25 of the Environment Regulations

Woodside advertised the planned activities proposed for this EP in national, state and relevant local newspapers (see Record of Consultation, reference 4). Regional newspapers do not require subscription and are available (and in some cases delivered) directly to households. All communities within or adjacent to the EMBA had access to this information via this media. No direct comments or feedback were received from the advertisements.

Newspaper	Coverage	Publication dates
The Australian	National	28 February 2024
The West Australian	Regional (WA)	28 February 2024
Pilbara News	Local (WA)	28 February 2024
North West Telegraph	Local (WA)	28 February 2024
Koori Mail	Indigenous	28 February 2024
National Indigenous Times	Indigenous	26 February 2024

A Consultation Information Sheet was provided to relevant persons and persons Woodside chose to contact (see Section 5.3.7 in the EP), which included details such as an activity overview, maps, a summary of key risks and/or impacts and management measures (Record of Consultation, reference 1.1).

An updated Consultation Information Sheet was provided to relevant persons and persons Woodside chose to contact (see Section 5.3.7), which included an update regarding planned activities (Record of Consultation, reference 1.3).

Since the commencement of the initial consultation period in February 2024, the Consultation Information Sheet has been available on Woodside's website and the updated Consultation Information Sheet since March 2024. The Woodside Consultation Information Sheets include a toll-free 1800 phone number and Woodside's feedback email address (feedback@woodside.com.au).

The Woodside Consultation Activities webpage (that is accessible on the Consultation Information Sheet, via a QR code, banners at community events, and via social media content and advertisements) includes Consultation Information Sheets for the EPs on which Woodside is currently consulting, including this EP. The website page also features a subscribe field for EP-focussed communications from Woodside.

Additional targeted information was provided to relevant persons. This information included maps and additional information relevant to the specific category of persons. The relevant persons had a 30-day period in which to provide feedback.

Where appropriate, Woodside conducted phone calls and meetings with relevant persons.

Where appropriate, targeted follow-up emails were sent to relevant persons who had not provided a response prior to the close of the target feedback period.

Woodside considered relevant person responses and assessed the merits and relevance of objections and claims about the potential adverse impact of the proposed activity set out in the EP, in accordance with the intended outcome of consultation (see Section 5.2 in the EP).

Consultation activities undertaken with relevant persons are summarised at Appendix F, Table 2.

Engagement undertaken with persons or organisations Woodside assessed as not relevant but chose to contact (see Section 5.3.7 in the EP) or self-identified and Woodside assessed as not relevant are summarised at Appendix F, Table 3.

From February 2024, Woodside commenced a geotargeted sponsored social media campaign (Record of Consultation, reference 4.9) to various local government authorities within or coastally adjacent to the EMBA for the proposed activities. The campaign brought the proposed activity to the attention of persons who may be interested and advised persons or organisations on how they can find out about Woodside's proposed activities by visiting Woodside's website.

Proactive Consultation

Community engagement

From March 2024, Woodside held a number of Community information sessions where this EP Consultation Information Sheet was available and discussed. See tables in Record of Consultation, reference 5.1 and 5.2. Woodside published advertisements ahead of these sessions and events in relevant local newspapers and on social media to support attendance.

Date	Location	Event (if applicable)
22 March 2024	Roebourne Woodside office	Community Consultation Roadshow
23 March 2024	Karratha Shopping Centre	Community Consultation Roadshow
24 March 2024	Dampier	Dampier Beachside Markets
3 and 10 April 2024	North West Shelf Visitor Centre	Community Information Session
5 May 2024	Dampier	Dampier Beachside Markets
15 June 2024	Karratha	WA Day Festival
26 and 27 June 2024	Karratha	Pilbara Summit
26 July 2024	Karratha	Community pop-up at Lo's Café
3–4 August 2024	Karratha	FeNaClNg Festival
26–28 August 2024	Karratha	Developing Northern Australian Conference
12 October 2024	Dampier	Dampier Beachside Markets
2 November 2024	Dampier	Dampier Beachside Markets
14 November 2024	Exmouth	Community Pop-up Exmouth Mall
18 March 2025	Dampier	Dampier Community Association

Community Liaison Group Engagement

The Exmouth and Karratha Community Liaison Groups (CLGs) represent the interests of a range of local government, industry and community organisations in relation to oil and gas matters in the Exmouth and Karratha region. Woodside regularly meets with the two CLGs to discuss a range of issues including consultation of specific EPs.

Let's Talk – EP Newsletter

In March 2024, Woodside launched its first EP-focussed newsletter as a new communication avenue to reach existing and potential stakeholders. Subsequent editions were released in

April 2024, July 2024, November 2024 and March 2025. Woodside is building on its existing consultation approach, providing additional resources to inform relevant persons about its EP consultation. The newsletter aims to provide periodic updates to relevant persons about EP consultation activities, case studies on effective consultation with relevant persons and other EP focussed updates such as upcoming events where Woodside personnel will be consulting with the local community. It is distributed in a variety of locations as well as across digital platforms including on woodside.com, and social media platforms. People can also subscribe to receive it (Record of Consultation, reference 5.6).

Social Media Platform	Geotargeted Reach	Let's Talk Social Media Campaign Dates	Impact
Facebook and Instagram	18-70 year olds Pilbara – Karratha, Dampier, Roebourne Regional Fishing Marine users Traditional Custodians Local communities	18 March – 3 April 2024	Reach: 158,167 Frequency: 3.94 Impressions: 623,845 Link clicks: 854 CTR%: 0.14%

Let's Talk Newsletter – Social Media Campaign

Woodside also publishes the Karratha Community Update newsletter which includes a QR code and encourages people to go to the Woodside Consultation Activities webpage to subscribe and find information about EPs (Record of Consultation, reference 5.8).

Extended Consultation

In addition to the initial 30 day consultation period, Woodside continues to receive, assess and respond to feedback and comments from relevant persons during preparation of the EP.

For this EP, Woodside addressed and responded to relevant persons for a period of up to 13 months.

Self-Identification

Social media campaign - Are you a relevant person?

In October 2023, Woodside commenced a targeted social media campaign, both organic and sponsored, aimed at community members of key towns within the Kimberley, Pilbara, Gascoyne and Murchison regions. The campaign delivered targeted information to several profiled relevant person groups via story and feed content with text and a short accessible video (Record of Consultation, reference 4.10).

The campaign aims to support self-identification and provides information about Woodside's consultation with relevant persons when preparing EPs and encourages participation in the consultation process.

Six different videos with specific information to potential relevant persons groups were launched on Facebook and Instagram:

- Local communities – volunteering
- Local communities - apprentices/trainees

- Commercial fishing
- Recreational fishing
- Recreational marine users
- Traditional Owners.

Results as at April 2024 are as follows:

Categories	Reach	Frequency	Impressions	Clicks	Click-through rate %
Marine Users	389,383	4.37	1,701,418	2,298	0.14%
Commercial Fisheries Demersal	297,701	2.84	846,530	853	0.10%
Commercial Fisheries Crab	207,104	2.54	526,472	484	0.09%
Volunteering	172,750	2.11	364,635	373	0.10%
Apprentices & trainees	97,083	2.21	214,324	311	0.15%
Traditional Owner Groups	92,209	1.56	143,965	212	0.15%

Are you a Relevant Person campaign – October 2023 to March 2024

Categories	Reach	Frequency	Impressions	Clicks	Click-through rate %
Marine Users	251,096	3.48	873,689	1,342	0.15%
Commercial Fisheries Demersal	208,759	2.53	529,021	540	0.10%
Commercial Fisheries Crab	71,468	1.65	118,068	152	0.13%
Volunteering	46,354	1.54	71,335	114	0.16%
Apprentices & trainees	50,776	1.43	72,363	101	0.14%
Traditional Owner Groups	192,257	2.47	475,112	566	0.12%

Are you a Relevant Person campaign – March to April 2024

The commercial fisheries, recreational fisheries and Traditional Owners videos are available on the Woodside Consultation Activities webpage.

Traditional Custodian Specific Consultation

In addition to the approaches above, including community information sessions, additional activities were undertaken with relevant Traditional Custodians, which were specifically designed to provide for effective engagement with Traditional Custodians and so that information was provided in a form that was readily accessible and appropriate (Section 5.5 in the EP). Consultation undertaken specifically with Traditional Custodians for this Environment Plan includes:

- Direct engagement with nominated representative bodies via the contact listed on the ORIC website, requesting advice on how they would like to be engaged and asking whether other members and/or individuals should be consulted. This has resulted in:
  - Meetings with directors, elders and any nominated representatives, on country or in Perth
  - Requests and offers of resourcing to enable and support consultation
  - Exchange of written feedback and correspondence
  - Summary Consultation Information Sheet, developed and reviewed by Indigenous representatives in collaboration with technical experts to ensure content is appropriate to the intended recipients, was provided to relevant Traditional Custodian groups (Record of Consultation, reference 1.2) and phone calls to provide context to the consultation made.

Ongoing efforts were made to engage and develop relationships with these bodies via a variety of means such as email, phone calls, alternative contacts, texts, social media and in some cases physical visits.

Consultation meetings with attendees decided by Traditional Custodian groups, supported by senior Woodside representatives, subject matter experts, First Nations Relations advisers with skills and experience in community engagement. Meetings are developed through a two-way consultation process to enable effective information sharing via:

- Mutually agreed agenda
- Encouraging Traditional Custodian attendees to control the pace of the meeting and pause at any time to ask questions, seek clarification or provide feedback
- Visual aids such as posters, presentations, simplified technical videos and real-world pictures and footage
- Emphasis on potential planned and unplanned risks and impacts of the activity
- Ample opportunity for questions and feedback
- Discussion about ongoing relationship development and opportunities
- Distribution of hard-copy Consultation Information Sheets (Record of Consultation, reference 1.1) and Summary Consultation Information Sheets (Record of Consultation, reference 1.2)
- Meeting all costs such as sitting fees, travel, legal support and executive support and other support required
- Advertising in Indigenous publications such as the National Indigenous Times and Koori Mail (Record of Consultation, reference 4.1 and 4.2).

Woodside ran a geotargeted sponsored social media campaign (Record of Consultation, reference 4.9) to various communities that are coastally adjacent to the EMBA for the proposed activities.

The wide-reaching campaign brought the proposed activity to the attention of persons who may be interested and advised persons or organisations how they can find out about Woodside's proposed activities by visiting Woodside's website, which details the intent of consultation with relevant persons under the *Offshore Petroleum and Greenhouse Gas*

Storage (Environment) Regulations 2023 (Cth). The campaign reached more than two million people across various regions as shown in Record of Consultation, reference 4.9.

These social media posts were developed with input from Indigenous representatives. Social media is a highly effective means to engage Indigenous audiences as outlined in Indigenous Digital Life (Professor Carlson, 2021). Advertisements used language and information appropriate to Indigenous audiences. Feedback from community engagements indicates a high level of penetration for this technique.

Woodside has employed a diverse range of techniques to allow relevant persons to become aware of the proposed activity and how it may affect their functions, interests or activities, and to understand their ability to provide feedback. The combination of PBC engagement meetings, traditional print media, social media and face-to face community interaction was designed with input from Indigenous representatives and adapted to the audience, so that it provides a wide-ranging opportunity to consult.

The black numbering **(N)** in Table 2 and Table 3 denotes an item raised by persons and organisations. The green numbering **(N)** denotes Woodside's response to that item.

Table 2: Consultation Report with Relevant Persons and Organisations

Commonwealth and WA State Government Departments or Agencies – Marine

Australian Border Force (ABF)

Summary of information provided and record of consultation for this EP:

- On 26 February 2024, Woodside emailed ABF advising of the proposed activity (Record of Consultation, reference 2.1), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure Consultation on offshore petroleum environment plans: Information for the community.
- On 18 March 2024, as no response had been received, Woodside proactively sent an email reminder to ABF, following up on the proposed activity (Record of Consultation, reference 3.1) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to ABF regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with ABF for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given ABF sufficient information to allow ABF to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to ABF on 26 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed ABF a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to ABF advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed ABF 30 days for consultation. For consultation on EPs, 30 days is the usual period for ABF.
- In this context, Woodside allowed ABF a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with ABF is appropriate and adapted to the nature of interests of ABF:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- In line with NOPSEMA's guideline for engagement with Commonwealth government departments or agencies, Woodside used email for its consultation with ABF.
- In absence of feedback, Woodside proactively sent a follow-up consultation email on 18 March 2024, reminding ABF of the opportunity to provide feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as ABF did not provide feedback for this EP.

- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on ABF's functions, interests or activities.

Australian Communications and Media Authority (ACMA)

Summary of information provided and record of consultation for this EP:

- On 26 February 2024, Woodside emailed ACMA advising of the proposed activity (Record of Consultation, reference 2.1), provided a Consultation Information Sheet, a map of the Submarine Communication Cables and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- On 27 February 2024, ACMA responded and thanked Woodside for the opportunity to comment on this EP (SI Report, reference 3.1) and:
  - **(1)** confirmed the operational areas are not in the vicinity of existing protection zones.
  - **(2)** noted Woodside is aware of submarine cables in the area operated by Telstra and recently installed cables operated by Vocus.
  - **(3)** recommended that Woodside contact the AHO for further assistance identifying submarine cables that may be impacted by the proposed activities.
  - **(4)** advised no additional consultation is required for this activity.
- On 29 February 2024, Woodside emailed ACMA (SI Report 3.2) and:
  - **(1)** acknowledged the advice regarding the protection zones.
  - **(2)** confirmed consultation information was provided to Telstra and Vocus.
  - **(3)** noted that AHO can be contacted for further assistance identifying submarine cables.
  - **(4)** noted that ACMA does not require additional consultation for this activity.
- On 27 March 2024, Woodside provided an activity update to ACMA regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.5).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
(1) Operational areas are not in the vicinity of any existing protection zones.	**(1)** **Woodside assessment:** Woodside noted ACMA's confirmation that the operational areas was not in the vicinity of existing protection zones. **Woodside response:** Woodside acknowledged the advice regarding existing protection zones.	**(1)** Not required.

(2) Operational areas are in the vicinity of submarine cables.	**(2)** **Woodside assessment:** Woodside noted ACMA's advice that the operational areas was in the vicinity of submarine cables. **Woodside response:** Woodside confirmed it consulted with Telstra and Vocus.	**(2)** As referenced in Section 4.10.6 of the EP..
(3) Contact the AHO for further assistance identifying cables.	**(3)** **Woodside assessment:** Woodside noted ACMA's recommendation to contact the AHO for further assistance identifying cables. **Woodside response:** Woodside confirmed that the AHO could be contacted should further assistance be required to identify submarine cables.	**(3)** Not required.
(4) No further consultation required for this activity.	**(4)** **Woodside assessment:** Woodside accepts that ACMA does not require further consultation. **Woodside response:** Woodside noted that ACMA does not require further consultation.	**(4)** Not required.
While feedback has been received, there were no objections or claims.	Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. Woodside engages in ongoing consultation throughout the life of an EP. Woodside notes that further feedback may be received as part of ongoing consultation. Should further feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.
Summary Report – Consultation Complete		

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with ACMA for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient information

Woodside has given ACMA sufficient information to allow ACMA to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to ACMA on 26 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with regulation 25(4) of the Environment Regulations).
- In addition to the Consultation Information Sheet, Woodside provided ACMA with information tailored to ACMA by including a map of submarine communication cables.
- On 27 February 2024, ACMA consulted and shared its feedback, claims or objections regarding this activity, indicating the information provided was sufficient to enable ACMA to make an informed assessment of the possible consequences of the activity on its functions, interests or activities.
- In addition to the information provided in the Consultation Information Sheet, Woodside provided ACMA with further information in response to ACMA's feedback (email of 29 February 2024).

Reasonable Period

Woodside allowed ACMA a reasonable period for consultation in the preparation of this EP because:

- Consultation for this EP commended 13 months ago in February 2024.
- A consultation period was stated in the initial correspondence to ACMA advising of consultation as well as when consultation closed for the purposes of the preparation of the EP. This enabled Woodside to assess feedback before EP submission.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed ACMA 30 days for consultation.
- In this context, Woodside allowed ACMA a reasonable period for consultation in preparation of the EP ad evidenced by its response on 27 February 2024.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with ACMA is appropriate and adapted to the nature of interests of ACMA:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- In line with NOPSEMA's guideline for engagement with Commonwealth government departments or agencies, Woodside used email for its consultation with ACMA.
- Woodside considers a reasonable opportunity was provided to ACMA as evidenced by its response on 27 February 2024 when it provided feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- ACMA provided feedback but no objections or claims. In line with the intended outcome of consultation as set out in Section 5.2 and regulations 24 and 34(g), Woodside has:
  - Responded to feedback from ACMA.
  - Made no changes or inclusions to the EP as a result of consultation with ACMA because appropriate measures are already included in the EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.

Australian Fisheries Management Authority (AFMA)

Summary of information provided and record of consultation for this EP:

- On 26 February 2024, Woodside emailed AFMA advising of the proposed activity (Record of Consultation, reference 2.3), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- On 4 March 2024, AFMA emailed to thank Woodside and:
  - **(1)** Advised it had no specific comments on the proposal
  - **(2)** Encouraged Woodside to consult directly with potentially impacted stakeholders: North West Slope Trawl Fishery, Western Deepwater Trawl Fishery, Commonwealth Fisheries Association (CFA) and Western Australia Fishing Industry Council (WAFIC) (SI Report, reference 1.1).
- **(1,2)** On 6 March 2024, Woodside responded thanking AFMA for its email and confirmed it had provided information to relevant fishery licence holders and representative organisations (SI Report, reference 1.2).
- On 6 March 2024, AFMA emailed to thank Woodside (SI Report, reference 1.3).
- On 27 March 2024, Woodside provided an activity update to AFMA regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.5).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
(1) AFMA advised it had no specific comment on the proposal.	**(1)** **Woodside assessment:** Woodside noted AFMA had no comments on the proposal. **Woodside response:** Woodside thanked AFMA for its feedback.	**(1)** Not required.
(2) Woodside to consult directly with potentially impacted stakeholders.	**(2)** **Woodside assessment:** Woodside recognises AFMA's recommendation to consult with relevant fishing operators. **Woodside response:** Woodside confirmed it had consulted individual Commonwealth fishing operators in the area, as well as relevant representative bodies. Woodside has consulted AFMA, DAFF - Fisheries, CFA, Tuna Australia, ASBTIA, North West Slope Trawl Fishery and Western Deepwater Trawl Fishery individual licence holders.	**(2)** Woodside has assessed the potential for interaction with Commonwealth managed fisheries in Section 4.10.1 of this EP. Woodside will provide notifications to AFMA, CFA, DAFF – Fisheries, and individual Commonwealth relevant fishery licence holders (see Table 7-6 of this EP) ten days before activity commences, and following completion of activities, as referenced as PS 1.13 of this EP.
While feedback has been received, there were no objections or claims.	Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. Woodside engages in ongoing consultation throughout the life of an EP. Woodside notes that further feedback may be received as part of ongoing consultation. Should further feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.
Summary Report – Consultation Complete		

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with AFMA for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient information

Woodside has given AFMA sufficient information to allow AFMA to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to AFMA on 26 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with regulation 25(4) of the Environment Regulations).
- On 4 March 2024, AFMA consulted and shared its feedback, claims or objections regarding this activity, indicating the information provided was sufficient to enable AFMA to make an informed assessment of the possible consequences of the activity on its functions, interests or activities.
- In addition to the information provided in the Consultation Information Sheet, Woodside provided AFMA with further information in response to AFMA's feedback (email of 6 March 2024).

Reasonable Period

Woodside allowed AFMA a reasonable period for consultation in the preparation of this EP because:

- Consultation for this EP commended 13 months ago in February 2024.
- A consultation period was stated in the initial correspondence to AFMA advising of consultation as well as when consultation closed for the purposes of the preparation of the EP. This enabled Woodside to assess feedback before EP submission.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed AFMA 30 days for consultation.
- In this context, Woodside allowed AFMA a reasonable period for consultation in preparation of the EP as evidenced by its response on 4 March 2024.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with AFMA is appropriate and adapted to the nature of interests of AFMA:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- In line with NOPSEMA's guideline for engagement with Commonwealth government departments or agencies, Woodside used email for its consultation with AFMA.
- Woodside considers a reasonable opportunity was provided to AFMA as evidenced by its response on 27 February 2024 when it provided feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- AFMA provided feedback but no objections or claims. In line with the intended outcome of consultation as set out in Section 5.2 and Regulations 24 and 34(g), Woodside has:
  - Responded to feedback from AFMA.
  - Made no changes or inclusions to the EP as a result of consultation with AFMA because appropriate measures are already included in the EP, but as standard practice will notify AFMA as per PS 1.13.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.

Australian Hydrographic Office (AHO)

Summary of information provided and record of consultation for this EP:

- On 26 February 2024, Woodside emailed AHO advising of the proposed activity (Record of Consultation, reference 2.4), provided a Consultation Information Sheet, shipping lanes map, submarine cables map and a link to NOPSEMA's brochure Consultation on offshore petroleum environment plans: Information for the community.
- On 18 March 2024, as no response had been received, Woodside proactively sent an email reminder to AHO, following up on the proposed activity (Record of Consultation, reference 3.1) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to AHO regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan

No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with AHO for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given AHO sufficient information to allow AHO to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to AHO on 26 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).
- In addition to the Consultation Information Sheet, Woodside provided AHO with information tailored to AHO by including a map of shipping lanes and submarine cables relevant to the activity.

Reasonable Period

Woodside allowed AHO a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to AHO advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed AHO 30 days for consultation. For consultation on EPs, 30 days is the usual period for AHO.

- In this context, Woodside allowed AHO a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with AHO is appropriate and adapted to the nature of interests of AHO:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- In line with NOPSEMA's guideline for engagement with Commonwealth government departments or agencies, Woodside used email for its consultation with AHO.
- Woodside proactively sent a follow-up consultation email on 18 March 2024, reminding AHO of the opportunity to provide feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as AHO did not provide feedback for this EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on AHO's functions, interests or activities.

Australian Maritime Safety Authority (AMSA) – Marine Safety

Summary of information provided and record of consultation for this EP:

- On 26 February 2024, Woodside emailed AMSA – Marine Safety advising of the proposed activity (Record of Consultation, reference 2.4), provided a Consultation Information Sheet, a map of the Submarine Communication Cables, a map of the shipping lanes and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- On 18 March 2024, as no response had been received, Woodside proactively sent an email reminder to AMSA – Marine Safety, following up on the proposed activity (Record of Consultation, reference 3.1) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to AMSA – Marine Safety regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).
- On 22 April 2024, AMSA – Marine Safety emailed Woodside (SI Report, reference 35.1) and:
  - **(1)** provided a map of vessel traffic plot for the area.
  - **(2)** requested Woodside notify AMSA's Response Centre (ARC) 24-48 hours before operations commence.
  - **(3)** reminded Woodside to contact the AHO no less than four working weeks before operations commence.
  - **(4)** reminded Woodside that vessels should exhibit appropriate lights and shapes to reflect the nature of operation.

- **(5)** advised that Woodside should evaluate and implement adequate anti-collision measures, which may include but are not limited to:
  - additional warnings and/or lights to attract attention.
  - installation of Automatic Identification System (AIS) units.
  - offshore guard vessel/s that can monitor traffic and take early action to alert a vessel approaching the area of operations.
- **(1)** provided contact details to obtain shipping data.

- On 22 April 2024, Woodside thanked AMSA- Marine Safety for its feedback (SI Report, reference 35.2) and:
  - **(1)** noted the map provided and the contact details to obtain shipping data.
  - **(2)** confirmed it will notify AMSA's Response Centre (ARC) 24-48 hours before operations commence.
  - **(3)** it will notify the AHO no less than 4 weeks before operations commence.
  - **(4)** confirmed that vessels should exhibit appropriate lights and shapes to reflect the nature of operation.
  - **(5)** confirmed it will evaluate and implement adequate anti-collision measures.

Summary of Feedback, Objection or Claim	**Assessment of Merits of Feedback, Objection or Claim and Woodside's Response**	**Inclusion in Environment Plan**
(1) Provided a map of vessel traffic and contact details for obtaining shipping data.	**(1)** **Woodside assessment:** Woodside noted AMSA's spatial data gateway and the map provided. **Woodside response:** Woodside thanked AMSA for providing the map.	**(1)** Not required.
(2) Requested the ARC be notified 24-48 hours before operations commence.	**(2)** **Woodside assessment:** Woodside will provide notifications to relevant stakeholders as outlined in Table 7-6 of this EP. **Woodside response:** Woodside confirmed it will notify the ARC 24-48 hours before operations commence.	**(2)** Woodside will notify the ARC at least 24–48 hours before operations commence, as referenced as PS 1.10 in this EP.
(3) Requested the AHO be contacted no less than 4 weeks before operations commence.	**(3)** **Woodside assessment:** Woodside will provide notifications to relevant stakeholders as outlined in Table 7-6 of this EP.	**(3)** Woodside will notify the AHO no less than four working weeks before operations commence, as referenced as PS 1.9 in this EP.

	Woodside response: Woodside confirmed it will notify the AHO 4 weeks before operations commence.	
(4) Vessels should exhibit appropriate lights and shapes to reflect nature of operations.	**(4)** **Woodside assessment:** Woodside complies with the International Rules for Preventing Collisions at Sea. **Woodside response:** Woodside confirmed vessels would exhibit appropriate lights and shapes to reflect the nature of operations and the obligation to comply with the International Rules for Preventing Collisions at Sea.	**(4)** Section 6 of the EP contains a number of controls that address AMSA's feedback on lighting and compliance with the international rule for preventing collisions at sea, specifically safety zones are established, vessels are required to comply with marine orders and the facility's collision prevention system will be implemented.
(5) Woodside to evaluate and implement adequate anti-collision measures.	**(5)** **Woodside assessment:** Woodside complies with the International Rules for Preventing Collisions at Sea. **Woodside response:** Woodside confirmed vessels would exhibit appropriate lights and shapes to reflect the nature of operations and the obligation to comply with the International Rules for Preventing Collisions at Sea.	**(5)** Section 6 of the EP contains a number of controls that address AMSA's feedback on lighting and compliance with the international rule for preventing collisions at sea, specifically safety zones are established, vessels are required to comply with marine orders and the facility's collision prevention system will be implemented.
While feedback has been received, there were no objections or claims.	Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. Woodside engages in ongoing consultation throughout the life of an EP. Woodside notes that further feedback may be received as part of ongoing consultation. Should further feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.
Summary Report – Consultation Complete		

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with AMSA for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient information

Woodside has given AMSA sufficient information to allow AMSA to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to AMSA on 26 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with regulation 25(4) of the Environment Regulations).
- In addition to the Consultation Information Sheet, Woodside provided AMSA with information tailored to AMSA by including a map of submarine communication cables and shipping lanes.
- On 22 Avril 2024, AMSA consulted and shared its feedback, claims or objections regarding this activity, indicating the information provided was sufficient to enable AMSA to make an informed assessment of the possible consequences of the activity on its functions, interests or activities.
- In addition to the information provided in the Consultation Information Sheet, Woodside provided AMSA with further information in response to AMSA's feedback (email of 22 April 2024).

Reasonable Period

Woodside allowed AMSA a reasonable period for consultation in the preparation of this EP because:

- Consultation for this EP commended 13 months ago in February 2024.
- A consultation period was stated in the initial correspondence to AMSA advising of consultation as well as when consultation closed for the purposes of the preparation of the EP. This enabled Woodside to assess feedback before EP submission.
- In this context, Woodside allowed AMSA a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with AMSA is appropriate and adapted to the nature of interests of AMSA:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- In line with NOPSEMA's guideline for engagement with Commonwealth government departments or agencies, Woodside used email for its consultation with AMSA.
- Woodside proactively sent a follow-up consultation email on 18 March 2024, reminding AMSA of the opportunity to provide feedback.
- Woodside considers a reasonable opportunity was provided to AMSA as evidenced by its response on 22 April 2024 when it provided feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- AMSA provided feedback but no objections or claims. In line with the intended outcome of consultation as set out in Section 5.2 and regulations 24 and 34(g), Woodside has:
  - Responded to feedback from AMSA.
  - As standard practice (and as requested by AMSA during consultation), Woodside will provide activity notifications to AHO and AMSA's ARC as referenced at PS 1.9 and PS 1.10.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.

Australian Maritime Safety Authority (AMSA) – Marine Pollution

Summary of information provided and record of consultation for this EP:

- On 26 February 2024, Woodside emailed AMSA – Marine Pollution advising of the proposed activity (Record of Consultation, reference 2.1), provided a Consultation Information Sheet and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- On 18 March 2024, as no response had been received, Woodside proactively sent an email reminder to AMSA – Marine Pollution, following up on the proposed activity (Record of Consultation, reference 3.1) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to AMSA – Marine Pollution regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).
- On 3 May 2024, Woodside emailed AMSA – Marine Pollution and provided copies of the two oil Pollution First Strike Plans: the revised Pluto Facility Operations and the new Xena-03 Tie-Back (SI Report, reference 40.1). Woodside received an out of office message and forwarded the correspondence to the contact provided (SI Report, reference 40.2).
- On 5 May 2024, AMSA acknowledged the email and advised it will submit comments should it have any (SI Report, reference 40.3).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
While feedback has been received, there were no objections or claims.	Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. Woodside engages in ongoing consultation throughout the life of an EP. Woodside notes that further feedback may be received as part of ongoing consultation. Should further feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with AMSA for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient information

Woodside has given AMSA sufficient information to allow AMSA to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to AMSA on 26 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with regulation 25(4) of the Environment Regulations).
- In addition to the information in the Consultation Information Sheet, Woodside provided AMSA – Marine Pollution with the Oil Pollution First Strike Plan for the EP and reminded AMSA of the opportunity to provide feedback on the EP (email of 3 May 2024).

Reasonable Period

Woodside allowed AMSA a reasonable period for consultation in the preparation of this EP because:

- Consultation for this EP commended 13 months ago in February 2024.
- A consultation period was stated in the initial correspondence to AMSA advising of consultation as well as when consultation closed for the purposes of the preparation of the EP. This enabled Woodside to assess feedback before EP submission.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed AMSA 30 days for consultation.
- In this context, Woodside allowed AMSA a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with AMSA is appropriate and adapted to the nature of interests of AMSA:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- In line with NOPSEMA's guideline for engagement with Commonwealth government departments or agencies, Woodside used email for its consultation with AMSA.
- Woodside proactively sent a follow-up consultation email on 18 March 2024, reminding AMSA of the opportunity to provide feedback.
- Woodside considers a reasonable opportunity was provided to AMSA as evidenced by its response on 5 May 2024 when it acknowledged the email.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as AMSA did not provide feedback for this EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on AMSA – Marine Pollution's functions, interests or activities.

Department of Agriculture, Fisheries and Forestry (DAFF) – Fisheries

Summary of information provided and record of consultation for this EP:

- On 26 February 2024, Woodside emailed DAFF - Fisheries advising of the proposed activity (Record of Consultation, reference 2.5), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure Consultation on offshore petroleum environment plans: Information for the community.

- On 18 March 2024, as no response had been received, Woodside proactively sent an email reminder to DAFF – Fisheries, following up on the proposed activity (Record of Consultation, reference 3.1) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to DAFF – Fisheries regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	Woodside has assessed the potential for interaction with Commonwealth managed fisheries in Section 4.10.1 of this EP. Woodside will provide notifications to AFMA, CFA, DAFF – Fisheries, and individual Commonwealth relevant fishery licence holders (see Table 7-6 of this EP) ten days before activity commences, and following completion of activities, as referenced as PS 1.13 of this EP. No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with DAFF for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given DAFF sufficient information to allow DAFF to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to DAFF on 26 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed DAFF a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to DAFF advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed DAFF 30 days for consultation. For consultation on EPs, 30 days is the usual period for DAFF.
- In this context, Woodside allowed DAFF a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with DAFF is appropriate and adapted to the nature of interests of DAFF:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- In line with NOPSEMA's guideline for engagement with Commonwealth government departments or agencies, Woodside used email for its consultation with DAFF.
- Woodside proactively sent a follow-up consultation email on 18 March 2024, reminding DAFF of the opportunity to provide feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as DAFF did not provide feedback for these EP. Appropriate measures are already included in the EP, and as standard practice Woodside will notify DAFF as per PS 1.13.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on DAFF's functions, interests or activities.

Department of Defence (DoD)

Summary of information provided and record of consultation for this EP:

- On 26 February 2024, Woodside emailed DoD advising of the proposed activity (Record of Consultation, reference 2.6), provided a Consultation Information Sheet, a map of the defence zones and a link to NOPSEMA's brochure Consultation on offshore petroleum environment plans: Information for the community.

- On 18 March 2024, as no response had been received, Woodside proactively sent an email reminder to DoD, following up on the proposed activity (Record of Consultation, reference 3.1) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to DoD regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with DoD for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given DoD sufficient information to allow DoD to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to DoD on 26 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).
- In addition to the Consultation Information Sheet, Woodside provided DoD with information tailored to DoD by including a map of defence zones relevant to the activity.

Reasonable Period

Woodside allowed DoD a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to DoD advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed DoD 30 days for consultation. For consultation on EPs, 30 days is the usual period for DoD.
- In this context, Woodside allowed DoD a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with DoD is appropriate and adapted to the nature of interests of DoD:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- In line with NOPSEMA's guideline for engagement with Commonwealth government departments or agencies, Woodside used email for its consultation with DoD.
- Woodside proactively sent a follow-up consultation email on 18 March 2024, reminding DoD of the opportunity to provide feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as DoD did not provide feedback for this EP. Appropriate measures are already included in the EP, but as standard practice Woodside will notify DoD as per PS 1.12.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on DoD's functions, interests or activities.

Department of Primary Industries and Regional Development (DPIRD)

Summary of information provided and record of consultation for this EP:

- On 26 February 2024, Woodside emailed DPIRD advising of the proposed activity (Record of Consultation, reference 2.3), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- On 18 March 2024, as no response had been received, Woodside proactively sent an email reminder to DPIRD, following up on the proposed activity (Record of Consultation, reference 3.1) and included a link to the Consultation Information Sheet on Woodside's website.

- On 27 March 2024, Woodside provided an activity update to DPIRD regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).
- On 28 March 2024, DPIRD thanked Woodside for the update (SI Report, reference 28.1).
- On 2 April 2024, Woodside emailed DPIRD acknowledging its response (SI Report, reference 28.2).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
While feedback has been received, there were no objections or claims.	Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. Woodside engages in ongoing consultation throughout the life of an EP. Woodside notes that further feedback may be received as part of ongoing consultation. Should further feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	Woodside has assessed the potential for interaction with State-managed fisheries in Section 4.10.1 of this EP. Woodside will provide notifications to DPIRD and WAFIC (see Table 7-6 of this EP) prior to the commencement and at the completion of the activity, as referenced at PS 1.13 in this EP. No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with DPIRD for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient information

Woodside has given DPIRD sufficient information to allow DPIRD to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to DPIRD on 26 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.

  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with regulation 25(4) of the Environment Regulations).
- On 28 March 2024, DPIRD consulted and shared its feedback, claims or objections regarding this activity, indicating the information provided was sufficient to enable DPIRD to make an informed assessment of the possible consequences of the activity on its functions, interests or activities.

Reasonable Period

Woodside allowed DPIRD a reasonable period for consultation in the preparation of this EP because:

- Consultation for this EP commended 13 months ago in February 2024.
- A consultation period was stated in the initial correspondence to DPIRD advising of consultation as well as when consultation closed for the purposes of the preparation of the EP. This enabled Woodside to assess feedback before EP submission.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed DPIRD 30 days for consultation.
- As DPIRD responded to Woodside within the timeframe provided, in this context, Woodside allowed DPIRD a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with DPIRD is appropriate and adapted to the nature of interests of DPIRD:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside proactively sent a follow-up consultation email on 18 March 2024, reminding DPIRD of the opportunity to provide feedback.
- Woodside considers a reasonable opportunity was provided to DPIRD as evidenced by its response on 28 March 2024..

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- DPIRD provided feedback but no objections or claims. In line with the intended outcome of consultation as set out in Section 5.2 and Regulations 24 and 34(g), Woodside has:
  - Responded to feedback from DPIRD.
  - Made no changes or inclusions to the EP as a result of consultation with DPIRD because appropriate measures are already included in the EP but as standard practice will notify DPIRD as per PS 1.13.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.

Department of Transport (DoT)

Summary of information provided and record of consultation for this EP:

- On 26 February 2024, Woodside emailed DoT advising of the proposed activity (Record of Consultation, reference 2.7), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- **(1)** On 6 March 2024, DoT responded thanking Woodside for the update (SI Report, reference 7.1).
- (1) On 6 March 2024, Woodside thanked DoT for their response (SI Report, reference 7.2).
- On 27 March 2024, Woodside provided an activity update to DoT regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.5).
- **(1)** On 15 April 2024, DoT responded, thanking Woodside for the update (SI Report, reference 7.3).
- On 3 May 2024, Woodside emailed DoT and provided copies of the two oil Pollution First Strike Plans: the revised Pluto Facility Operations and the new Xena-03 Tie-Back (SI Report, reference 7.4).
- **(2)** On 14 June 2024, DoT emailed Woodside regarding the First Strike Plans (FSP) and requested clarification regarding a mention of Pilbara Ports Authority (PPA) being the control agency in Dampier Port Limits (SI Report, reference 7.5).
- On 26 June 2024, Woodside responded thanking DoT for its review of the FSPs (SI Report, reference 7.6). Woodside:
  - (2) Advised that as the Pluto Operations trunkline hydrocarbon spill scenario arose at the State/Commonwealth boundary and therefore had the potential to contact port waters, Woodside would add PPA into the notifications table of the FSP and retain a mention of PPA being the control agency in Dampier Port Limits. However, the spill scenario was not applicable to the Xena-03 Tie-Back FSP, therefore Woodside would remove the mention for that FSP.
- **(2)** On 27 June 2024, DoT emailed to thank Woodside for the clarification and confirmed it had no further queries (SI Report, reference 7.7).
- (2) On 27 June 2024, Woodside emailed to thank DoT for confirming it was comfortable with the amendments (SI Report, reference 7.8).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
(1) DoT thanked Woodside for the update.	**(1)** **Woodside assessment:** Woodside noted DoT's response. **Woodside response:** Woodside thanked DoT for its feedback.	**(1)** Not required.
(2)	**(2)**	**(2)**

DoT asked for clarification regarding the control agency for Dampier Port Limits in the FSPs.	**Woodside assessment:** Woodside acknowledged DoT's clarification request and amended the mention of PPA in relation to the Xena-03 Tie-Back FSP. **Woodside response:** Woodside advised it had removed mention of PPA as the control agency in Dampier Port Limits from the Xena-03 Tie-Back FSP and confirmed that DoT was comfortable with the amendment.	Woodside has updated the Xena-03 Tie-Back Oil Pollution First Strike Plan (Appendix J).
While feedback has been received, there were no objections or claims.	Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. Woodside engages in ongoing consultation throughout the life of an EP. Woodside notes that further feedback may be received as part of ongoing consultation. Should further feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	Woodside will consult DoT if there is a spill impacting State water from the proposed activity, as referenced in the OSPRMA (Appendix H). Woodside will provide DoT with a copy of the accepted Oil Pollution First Strike Plan, as referenced in the OSPRMA (Appendix H). No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with DoT for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient information

Woodside has given DoT sufficient information to allow DoT to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to DoT on 26 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.

  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with regulation 25(4) of the Environment Regulations).
- On 6 March 2024, DoT consulted and shared its feedback, claims or objections regarding this activity, indicating the information provided was sufficient to enable DoT to make an informed assessment of the possible consequences of the activity on its functions, interests or activities.
- In addition to the information provided in the Consultation Information Sheet, Woodside provided DoT with further information in response to DoT's feedback (email of 26 June 2024).

Reasonable Period

Woodside allowed DoT a reasonable period for consultation in the preparation of this EP because:

- Consultation for this EP commended 13 months ago in February 2024.
- A consultation period was stated in the initial correspondence to DoT advising of consultation as well as when consultation closed for the purposes of the preparation of the EP. This enabled Woodside to assess feedback before EP submission.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed DoT 30 days for consultation.
- In this context, Woodside allowed DoT a reasonable period for consultation in preparation of the EP as evidenced by DoT's response on 26 June 2024.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with DoT is appropriate and adapted to the nature of interests of DoT:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside considers a reasonable opportunity was provided to DoT as evidenced by its response on 6 March 2024 when it provided feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- DoT provided feedback but no objections or claims. In line with the intended outcome of consultation as set out in Section 5.2 and Regulations 24 and 34(g), Woodside has:
  - Responded to feedback from DoT.
  - As a result of DoT's feedback, updated the Xena-03 Tie-Back Oil Pollution First Strike Plan as referenced at Appendix J.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.

Department of Planning, Lands and Heritage (DPLH)

Summary of information provided and record of consultation for this EP:

- On 26 February 2024, Woodside emailed DPLH advising of the proposed activity (Record of Consultation, reference 2.8), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- On 29 February 2024, Woodside emailed DLPH a list of the State Shipwrecks relevant to this activity (Record of Consultation, reference 2.8.1).
- **(1)** On 6 March 2024, DPLH emailed Woodside and confirmed the Land Use Management Division had no comments or feedback on the activities under this EP (SI Report, reference 6.1).
- (1) On 6 March 2024, Woodside thanked DPLH for its feedback and noted the Land Use Management Division had no comment on the activities under this EP (SI Report, reference 6.2).
- On 27 March 2024, Woodside provided an activity update to DPLH regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.5).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
(1) The Land Use Management Division had no comments or feedback on the activities.	**(1)** **Woodside assessment:** Woodside noted DPLH Land Use Management Division had no comment or feedback. **Woodside response:** Woodside thanked DPLH for its feedback and noted the Land Use Management Division had no comment.	**(1)** Not required.
While feedback has been received, there were no objections or claims.	Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. Woodside engages in ongoing consultation throughout the life of an EP. Woodside notes that further feedback may be received as part of ongoing consultation. Should further feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	The EP demonstrates that there are no known underwater heritage sites or shipwrecks within the PAP and identifies that there are no credible impacts to the values of any underwater heritage or shipwrecks as a result of planned activities (Section 4.9.8 of this EP). While impacts to underwater heritage sites or shipwrecks are possible in the event of an unplanned hydrocarbon spill, Woodside considers it adopts appropriate controls to prevent a hydrocarbon spill and controls to respond in the highly unlikely event of a hydrocarbon spill, as

		demonstrated in Section 6.8.2 and Section 6.8.3 of this EP. No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with DPLH for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient information

Woodside has given DPLH sufficient information to allow DPLH to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to DPLH on 26 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with regulation 25(4) of the Environment Regulations).
- In addition to the Consultation Information Sheet, Woodside provided DPLH with information tailored to DPLH by including a list of shipwrecks relevant to the EP in State waters.
- On 6 March 2024, DPLH consulted and shared its feedback, claims or objections regarding this activity, indicating the information provided was sufficient to enable DoT to make an informed assessment of the possible consequences of the activity on its functions, interests or activities.

Reasonable Period

Woodside allowed DPLH a reasonable period for consultation in the preparation of this EP because:

- Consultation for this EP commended 13 months ago in February 2024.
- A consultation period was stated in the initial correspondence to DPLH advising of consultation as well as when consultation closed for the purposes of the preparation of the EP. This enabled Woodside to assess feedback before EP submission.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed DPLH 30 days for consultation.

- In this context, Woodside allowed DPLH a reasonable period for consultation in preparation of the EP as evidenced by DPLH's response on 6 March 2024.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with DPLH is appropriate and adapted to the nature of interests of DPLH:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside considers a reasonable opportunity was provided to DPLH as evidenced by its response on 6 March 2024.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- DPLH provided feedback but no objections or claims. In line with the intended outcome of consultation as set out in Section 5.2 and regulations 24 and 34(g), Woodside has:
  - Responded to feedback from DPLH.
  - Made no changes or inclusions to the EP as a result of consultation with DPLH because appropriate measures are already included in the EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.

Western Australian Museum (WAM)

Summary of information provided and record of consultation for this EP:

- On 26 February 2024, Woodside emailed Western Australian Museum advising of the proposed activity (Record of Consultation, reference 2.9), provided a Consultation Information Sheet, a list of State Shipwrecks and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 18 March 2024, as no response had been received, Woodside proactively sent an email reminder to WAM, following up on the proposed activity (Record of Consultation, reference 3.1) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to WAM regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan

No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with WAM for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given WAM sufficient information to allow WAM to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to WAM on 26 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).
- In addition to the Consultation Information Sheet, Woodside provided WAM with information tailored to WAM by including a list of shipwrecks relevant to the EP in State waters.

Reasonable Period

Woodside allowed WAM a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to WAM advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed WAM 30 days for consultation. For consultation on EPs, 30 days is the usual period for WAM.

- In this context, Woodside allowed WAM a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with WAM is appropriate and adapted to the nature of interests of WAM:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside proactively sent a follow-up consultation email on 18 March 2024, reminding WAM of the opportunity to provide feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as WAM did not provide feedback for this EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on WAM's functions, interests or activities.

Pilbara Ports Authority

Summary of information provided and record of consultation for this EP:

- On 26 February 2024, Woodside emailed Pilbara Ports Authority advising of the proposed activity (Record of Consultation, reference 2.1), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- On 18 March 2024, as no response had been received, Woodside proactively sent an email reminder to Pilbara Ports Authority, following up on the proposed activity (Record of Consultation, reference 3.1) and included a link to the Consultation Information Sheet on Woodside's website.
- On 20 March 2024, Pilbara Ports Authority emailed Woodside (SI Report, reference 24.1) and:
  - **(1)** confirmed it has no comment on this EP.
  - **(2)** noted the EMBA encroaches on port waters at the Port of Dampier and is adjacent to port waters of Port of Ashburton, Port of Varanus Island, Port of Cape Preston East and Port of Cape Preston West.
- On 22 March 2024, Woodside thanked Pilbara Ports Authority for its response (SI Report, reference 24.2). and:
  - **(1)** noted that Pilbara Ports Authority has no comment on this EP
  - **(2)** confirmed the EMBA overlaps Port of Dampier and notes the advice from Pilbara Ports Authority regarding ports in waters adjacent to the EMBA.
- On 27 March 2024, Woodside provided an activity update to Pilbara Ports Authority regarding wells location coordinates and included an updated Consultation

Information Sheet (Record of Consultation, reference 3.5).		
Summary of Feedback, Objection or Claim	**Assessment of Merits of Feedback, Objection or Claim and Woodside's Response**	**Inclusion in Environment Plan**
(1) Pilbara Ports Authority advised it had no comment on the activities.	**(1)** **Woodside assessment:** Woodside noted Pilbara Ports Authority had no comment. **Woodside response:** Woodside thanked Pilbara Ports Authority for its feedback and noted it had no comment.	**(1)** Not required.
(2) The EMBA overlaps Port Dampier port waters and is adjacent to other port waters.	**(2)** **Woodside assessment:** Woodside noted Pilbara Ports Authority's advice regarding port waters adjacent to the EMBA. **Woodside response:** Woodside confirmed the EMBA overlaps Port of Dampier and noted the advice from Pilbara Ports Authority regarding ports in waters adjacent to the EMBA.	**(2)** Not required.
While feedback has been received, there were no objections or claims.	Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. Woodside engages in ongoing consultation throughout the life of an EP. Woodside notes that further feedback may be received as part of ongoing consultation. Should further feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.
Summary Report – Consultation Complete		
Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with Pilbara Ports Authority for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:		

Sufficient information

Woodside has given Pilbara Ports Authority sufficient information to allow Pilbara Ports Authority to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to Pilbara Ports Authority on 26 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with regulation 25(4) of the Environment Regulations).
- On 20 March 2024, Pilbara Ports Authority consulted and shared its feedback, claims or objections regarding this activity, indicating the information provided was sufficient to enable Pilbara Ports Authority to make an informed assessment of the possible consequences of the activity on its functions, interests or activities.

Reasonable Period

Woodside allowed Pilbara Ports Authority a reasonable period for consultation in the preparation of this EP because:

- Consultation for this EP commended 13 months ago in February 2024.
- A consultation period was stated in the initial correspondence to Pilbara Ports Authority advising of consultation as well as when consultation closed for the purposes of the preparation of the EP. This enabled Woodside to assess feedback before EP submission.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed Pilbara Ports Authority 30 days for consultation.
- **In this context, Woodside allowed Pilbara Ports Authority a reasonable period for consultation in preparation of the EP as evidenced by Pilbara Ports Authority's response on 20 March 2024. Reasonable Opportunity**

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with Pilbara Ports Authority is appropriate and adapted to the nature of interests of Pilbara Ports Authority:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside considers a reasonable opportunity was provided to Pilbara Ports Authority as evidenced by its response on 20 March 2024.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- AFMA provided feedback but no objections or claims. In line with the intended outcome of consultation as set out in Section 5.2 and regulations 24 and 34(g), Woodside has:
  - Responded to feedback from Pilbara Ports Authority.
  - Made no changes or inclusions to the EP as a result of consultation with Pilbara Ports Authority because appropriate measures are already included in the EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.

Commonwealth and WA State Government Departments or Agencies – Environment

Department of Agriculture, Fisheries and Forestry (DAFF) – Biosecurity

Summary of information provided and record of consultation for this EP:

- On 26 February 2024, Woodside emailed DAFF advising of the proposed activity (Record of Consultation, reference 2.5), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure Consultation on offshore petroleum environment plans: Information for the community.
- On 18 March 2024, as no response had been received, Woodside proactively sent an email reminder to DAFF, following up on the proposed activity (Record of Consultation, reference 3.1) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to DAFF regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with DAFF for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given DAFF sufficient information to allow DAFF to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to DAFF on 26 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed DAFF a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to DAFF advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed DAFF 30 days for consultation. For consultation on EPs, 30 days is the usual period for DAFF.
- In this context, Woodside allowed DAFF a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with DAFF is appropriate and adapted to the nature of interests of DAFF:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- In line with NOPSEMA's guideline for engagement with Commonwealth government departments or agencies, Woodside used email for its consultation with DAFF.
- In absence of feedback, Woodside proactively sent a follow-up consultation email on 18 March 2024, reminding DAFF of the opportunity to provide feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as DAFF did not provide feedback for this EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on DAFF's functions, interests or activities.

Department of Climate Change, Energy, the Environment (DCCEEW)

Summary of information provided and record of consultation for this EP:

- On 26 February 2024, Woodside emailed DECCEW advising of the proposed activity (Record of Consultation, reference 2.10), provided a Consultation Information Sheet, a list of Commonwealth Shipwrecks and a link to NOPSEMA's brochure Consultation on offshore petroleum environment plans: Information for the community.
- On 18 March 2024, as no response had been received, Woodside proactively sent an email reminder to DCCEEW, following up on the proposed activity (Record of Consultation, reference 3.1) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to DCCEEW regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with DCCEEW for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given DCCEEW sufficient information to allow DCCEEW to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to DCCEEW on 26 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).
- In addition to the Consultation Information Sheet, Woodside provided DCCEEW with information tailored to DCCEEW by including a list of shipwrecks relevant to the EP in Commonwealth waters.

Reasonable Period

Woodside allowed DCCEEW a reasonable period for consultation in the preparation of this EP because:

- A consultation period was notified in the initial correspondence to DCCEEW advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed DCCEEW 30 days for consultation. For consultation on EPs, 30 days is the usual period for DCCEEW.
- In this context, Woodside allowed DCCEEW a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with DCCEEW is appropriate and adapted to the nature of interests of DCCEEW:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- In line with NOPSEMA's guideline for engagement with Commonwealth government departments or agencies, Woodside used email for its consultation with DCCEEW.
- In the absence of feedback, Woodside proactively sent a follow-up consultation email on 18 March 2024, reminding DCCEEW of the opportunity to provide feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as DCCEEW did not provide feedback for this EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on DCCEEW's functions, interests or activities.

Director of National Parks (DNP)

Historical Engagement:

- On 17 March 2022, Woodside emailed DNP a copy of the Pluto Baseline Offshore Water Quality and Sediment Sampling Report, as per previous correspondence request (SI Report, reference 33.1).
- On 13 September 2022, Woodside emailed DNP requesting feedback on the report provided (SI Report, reference 33.2).
- On 9 November 2022, Woodside emailed DNP to follow up (SI Report, reference 33.3).
- On 30 November 2022, DNP emailed Woodside to organise a meeting to discuss the Offshore Water Quality and Sediment Sampling Report (SI Report, reference 33.4).
- On 13 December 2022, Woodside met virtually with Parks Australia Authorisation and Assessments team under the DNP and talked through the results of the Pluto Baseline Offshore Water Quality and Sediment Sampling Report (SI Report, reference 33.5)
- On 19 December 2022, Woodside emailed DNP following the meeting regarding the Pluto Baseline Offshore Water Quality and Sediment Sampling Report with a summary of the discussion. It also provided information about the 5 year revision of this EP and submission timeframes. Woodside acknowledged the revised guidance for consultation on activities within Marine Parks (SI Report, reference 33.6).

Summary of information provided and record of consultation for this EP:

- On 26 February 2024, Woodside emailed DNP advising of the proposed activity (Record of Consultation, reference 2.11), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 18 March 2024, as no response had been received, Woodside proactively sent an email reminder to DNP, following up on the proposed activity (Record of Consultation, reference 3.1) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to DNP regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).
- **(1)** On 13 July 2024, DNP emailed Woodside and confirmed the operational area overlaps the Montebello Marine Park (MP) but the well locations are outside of the MP (SI report, reference 33.7). DNP noted:
  - **(2)** To assist in the preparation of an EP for petroleum activities, NOPSEMA has worked closely with Parks Australia to develop and publish a guidance note that outlines what titleholders need to consider and evaluate. Titleholders should ensure the EP:

- Identifies and manages all impacts and risks on Australian marine park values (including ecosystem values) and had considered all options to avoid or reduce them to as low as reasonably practicable.
- Clearly demonstrates the activity would not be inconsistent with the North-west Marine Parks Network Management Plan 2018.

- **(3)** Class approval for the Multiple Use Zone of the Montebello MP required an accepted EP.
- **(2)** The specific values for the Montebello MP.
- **(4)** The requirements for emergency responses .

- On 17 July 2024, Woodside responded thanking DNP for its email (SI Report, reference 33.8) and:
  - **(2)** Confirmed Woodside had taken into consideration the Petroleum Activities and Australian Marine Parks guidance note to ensure the EP:
    - Identified and managed all impacts and risks on AMP values (including ecosystem values) to an acceptable level.
    - Clearly demonstrated that the activities would not be inconsistent with the North-west Marine Parks Network Management Plan 2018.
  - **(1)** Confirmed a small portion of the Pluto facility operational area overlaps the Montebello MP and the wells are located outside of the MP.
  - **(3)** Noted the class approval for the Multiple Use Zone of the Montebello MP requires an accepted EP.
  - **(2)** Noted the specific values for the Montebello MP.
- **(4)** Noted the emergency response requirements and confirmed it will notify DNP if details regarding the activities change.

Summary of Feedback, Objection or Claim	**Assessment of Merits of Feedback, Objection or Claim and Woodside's Response**	**Inclusion in Environment Plan**
(1) The operational area overlaps the Montebello MP.	**(1)** **Woodside assessment:** A small portion of the Pluto facility Operational Area overlaps the Montebello MP, and the export pipeline Operational Area is 13 km east of the Dampier MP. **Woodside response:** Woodside confirmed the overlap and the wells are located outside the Montebello MP.	**(1)** Not required.
(2) Ensure the EP identify and manage all impacts and risks on AMP values, and clearly demonstrate that activities will not be inconsistent with the management plan.	**(2)** **Woodside assessment:** The EP demonstrates how Woodside will identify and manage all impacts and risks on Australian marine park values. **Woodside response:** Woodside confirmed it had taken into consideration the Petroleum Activities and Marine Parks guidance note to ensure the EP identified and	**(2)** The EP demonstrates how Woodside will identify and manage all impacts and risks on Australian marine park values (including ecosystem values) to an ALARP and acceptable level and that the activity is not inconsistent with the management plan (see Section 6.8 of the EP).

	managed all risks on AMP values, and clearly demonstrated that activities will not be inconsistent with the management plan.	
(3) The class approval requires an accepted EP.	**(3)** **Woodside assessment:** Woodside is aware of its obligations under the class approval for the Multiple Use Zone of the Montebello MP. **Woodside response:** Woodside noted the class approval requires an accepted EP.	**(3)** Not required.
(4) Emergency response requirements.	**(4)** **Woodside assessment:** Woodside noted the requirements. **Woodside response:** Woodside will notify DNP if details regarding the activities change and noted the emergency response requirements.	**(4)** Woodside will provide notification of significant change, as appropriate, to relevant persons as referenced in Table 7-6 in the EP. Woodside will ensure DNP is made aware of any incidences within a marine park for the activity, as per the commitment in the Oil Pollution First Strike Plan (Appendix I).
While feedback has been received, there were no objections or claims.	Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. Woodside engages in ongoing consultation throughout the life of an EP. Woodside notes that further feedback may be received as part of ongoing consultation. Should further feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.
Summary Report – Consultation Complete		
Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with DNP for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:		

Sufficient information

Woodside has given DNP sufficient information to allow DNP to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to DNP on 26 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with regulation 25(4) of the Environment Regulations).
- On 13 July 2024, DNP consulted and shared its feedback, claims or objections regarding this activity, indicating the information provided was sufficient to enable DNP to make an informed assessment of the possible consequences of the activity on its functions, interests or activities.
- In addition to the information provided in the Consultation Information Sheet, Woodside provided DNP with further information in response to DNP's feedback (email of 17 July 2024).

Reasonable Period

Woodside allowed DNP a reasonable period for consultation in the preparation of this EP because:

- Consultation for this EP commended 13 months ago in February 2024.
- A consultation period was stated in the initial correspondence to DNP advising of consultation as well as when consultation closed for the purposes of the preparation of the EP. This enabled Woodside to assess feedback before EP submission.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed DNP 30 days for consultation.
- In this context, Woodside allowed DNP a reasonable period for consultation in preparation of the EP as evidenced by DNP's response on 13 July 2024.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with DNP is appropriate and adapted to the nature of interests of DNP:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- In line with NOPSEMA's guideline for engagement with Commonwealth government departments or agencies, Woodside used email for its consultation with DNP.

- Woodside considers a reasonable opportunity was provided to DNP as evidenced by its response on 13 July 2024 when it provided feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- DNP provided feedback but no objections or claims. In line with the intended outcome of consultation as set out in Section 5.2 and regulations 24 and 34(g), Woodside has:
  - Responded to feedback from DNP.
  - Made no changes or inclusions to the EP as a result of consultation with DNP because appropriate measures are already included in the EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.

Ningaloo Coast World Heritage Advisory Committee (NCWHAC)

Summary of information provided and record of consultation for this EP:

- On 26 February 2024, Woodside emailed NCWHAC advising of the proposed activity (Record of Consultation, reference 2.12), provided a Consultation Information Sheet, a list of Commonwealth Shipwrecks and a link to NOPSEMA's brochure Consultation on offshore petroleum environment plans: Information for the community.
- On 18 March 2024, as no response had been received, Woodside proactively sent an email reminder to NCWHAC, following up on the proposed activity (Record of Consultation, reference 3.1) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to NCWHAC regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with NCWHAC for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given NCWHAC sufficient information to allow NCWHAC to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to NCWHAC on 26 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed NCWHAC a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to NCWHAC advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed NCWHAC 30 days for consultation. For consultation on EPs, 30 days is the usual period for NCWHAC.
- In this context, Woodside allowed NCWHAC a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with NCWHAC is appropriate and adapted to the nature of interests of NCWHAC:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside proactively sent a follow-up consultation email on 18 March 2024, reminding NCWHAC of the opportunity to provide feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as NCWHAC did not provide feedback for this EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on NCWHAC's functions, interests or activities.

Department of Biodiversity, Conservation and Attractions (DBCA)

Summary of information provided and record of consultation for this EP:

- On 26 February 2024, Woodside emailed DBCA advising of the proposed activity (Record of Consultation, reference 2.12), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 1 March 2024, DBCA responded thanking Woodside for providing information on this EP (SI Report, reference 5.1). DBCA noted:
  - **(1)** the operations were in the vicinity of reserves managed by DBCA and given the ecological importance of areas potentially affected by a hydrocarbon release from the proposed activities, it was considered important that the baseline values and state of the potentially affected environment are appropriately understood and documented prior to operations commencing.
  - **(2)** it would like to have confidence that Woodside has established appropriate baseline survey data on the current state of areas supporting important ecological values and any current contamination if present within the area of potential impact of hydrocarbon releases.
  - **(3)** it undertakes monitoring in marine parks and reserves and published monitoring reports which are available on its website, however Woodside should be aware this monitoring is targeted to inform DBCA's values and objectives and is not necessarily suitable to provide baseline information for oil spill risk assessment and management planning.
  - **(4)** it recommends Woodside refer to the Department of Climate Change, Energy, the Environment and Water's *National Light Pollution Guidelines for Wildlife* as a best-practice industry standard for managing potential impacts of light pollution on marine fauna.
  - **(5)** in the event of a hydrocarbon release, it is requested that Woodside notify DBCA's Pilbara regional office as soon as practicable on (08) 9182 2000.
  - **(6)** it will not implement an oiled wildlife management response on behalf of a petroleum operator except as part of a whole of government response mandated by regulatory decision makers.
  - **(7)** Woodside should refer to the Department of Transport's web content regarding marine pollution and the Offshore Petroleum Industry Guidance Note of 2020 titled *Marine Oil Pollution: Response and Consultation Arrangements*. **(7)** Not required. Woodside noted and referred to DoT's web content.
- On 14 March 2024, Woodside responded thanking DBCA for its feedback (SI Report, reference 5.2). Woodside:
  - **(1)** Confirmed it maintained knowledge and an understanding of areas of ecological importance within and adjacent to operational areas.
  - **(2,3)** Advised its oil spill scientific monitoring program would provide for a quantitative assessment of the overall environmental impacts in the event of an unplanned hydrocarbon release.
  - **(4)** Confirmed it had considered DCCEEW's National Light Pollution Guidelines with respect to vessel activities. The impact assessment determined that the impacts of lighting were as low as reasonably practicable.
  - **(5)** Advised it had incorporated the DBCA Pilbara regional office telephone number as part of the notifications listed in the Oil Pollution First Strike Plan.
  - **(6)** Noted that DBCA would not implement an oiled wildlife management response on behalf of a petroleum operator.

• On 27 March 2024, Woodside provided an activity update to DBCA regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.5).		
Summary of Feedback, Objection or Claim	**Assessment of Merits of Feedback, Objection or Claim and Woodside's Response**	**Inclusion in Environment Plan**
(1) Baseline values are understood and documented prior to commencement of activities.	**(1)** **Woodside assessment:** Woodside determined that areas of ecological importance, including marine parks and island conservation reserves, would not be impacted by planned activities. **Woodside response:** Woodside reaffirmed that areas of ecological importance in the proximity of the EP Operational Areas would be not impacted by planned activities.	**(1)** The EP demonstrates that the proposed activities are outside the boundaries of a proclaimed State Marine Park and identifies that there are no credible impacts to the values of any State Marine Parks as a result of planned activities (Section 4.8 and Section 6.7 of the EP). While impacts to Commonwealth Marine Parks are possible in the event of an unplanned hydrocarbon spill, Woodside considers it adopts appropriate controls to prevent a hydrocarbon spill and controls to respond in the highly unlikely event of a hydrocarbon spill, as demonstrated in Sections 6.9 of the EP.
(2) Establish the appropriate baseline survey data on the current state of the areas.	**(2)** **Woodside assessment:** Woodside confirmed it maintained knowledge and an understanding of areas of ecological importance adjacent to Operational Areas and its oil spill scientific monitoring program provides for a quantitative assessment of overall impacts in the event of an unplanned hydrocarbon release. **Woodside response:** Woodside responded that it utilises an information system to track current existing environment knowledge that is regularly updated. Woodside advised its oil spill scientific monitoring program provides for a quantitative assessment of overall impacts in the event of an unplanned hydrocarbon release.	**(2)** Under the Oil Spill Scientific Monitoring Program preparedness, an annual review and update to environmental baseline studies database is completed and documented as described in this EP.
(3)	**(3)**	**(3)**

Acquire the necessary information to implement a Before-After Control Impact (BACI) framework.	**Woodside assessment:** Woodside reviewed the request about implementing a BACI framework and noted its oil spill scientific monitoring program (SMP) would provide for a quantitative assessment of the overall environmental impacts in the event of an unplanned hydrocarbon release. **Woodside response:** Woodside advised its oil spill scientific monitoring program (SMP) would provide for a quantitative assessment of the overall environmental impacts in the event of an unplanned hydrocarbon release, or any release event with the potential to contact sensitive environmental receptors.	Under the Oil Spill Scientific Monitoring Program preparedness, an annual review and update to environmental baseline studies database is completed and documented as described in this EP.
(4) Refer to DCCEEW's National Light Pollution Guidelines for Wildlife.	**(4)** **Woodside assessment:** Woodside noted DCCEEW's National Light Pollution Guidelines for Wildlife and that its impact assessment for light emissions is based on these recommendations. **Woodside response:** Woodside confirmed it had considered DCCEEW's National Light Pollution Guidelines for Wildlife and that lighting associated with this EP is required as a priority for safe operation.	**(4)** Woodside's impact assessment for light emissions is based on recommendations of the National Light Pollution Guidelines for Wildlife (see Section 6.7.12).
(5) Notify DBCA's Pilbara office as soon as practicable in the event of a hydrocarbon release.	**(5)** **Woodside assessment:** Woodside noted DBCA's 'Incidents and Emergency Response' process and need to include DBCA's Pilbara's contact information in Oil Pollution First Strike Plan. **Woodside response:** Woodside confirmed the DBCA Pilbara number had been incorporated as part of the Oil Pollution First Strike Plan.	**(5)** DBCA's Pilbara phone number has been incorporated into the Oil Pollution First Strike Plan for this EP (see Appendix I).
(6)	**(6)** **Woodside assessment:** Woodside accepts that DBCA would not implement an oiled wildlife management response and notes its own Oiled Wildlife Response is	**(6)**

No oiled wildlife management response will be implemented except as part of a mandated government response.	included in the Oil Spill Preparedness and Response Mitigation Assessment for this EP. **Woodside response:** Woodside confirmed that DBCA would not implement an oiled wildlife management response on behalf of a petroleum operator.	Woodside's Oiled Wildlife Response is included in the Oil Spill Preparedness and Response Mitigation Assessment for this EP (see Appendix H).
(7) Refer to the Department of Transport's guidance note: Marine Oil Pollution: Response and Consultation Arrangements.	**(7)** **Woodside assessment:** Woodside appreciated the recommendation to refer to DoT's web content regarding marine pollution and the Offshore Petroleum Industry Guidance Note of 2020 titled Marine Oil Pollution: Response and Consultation Arrangements. **Woodside response:** Woodside noted the DoT's web content regarding marine pollution and the Offshore Petroleum Industry Guidance Note of 2020 titled Marine Oil Pollution: Response and Consultation Arrangements.	**(7)** Not required
While feedback has been received, there were no objections or claims.	Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. Woodside engages in ongoing consultation throughout the life of an EP. Woodside notes that further feedback may be received as part of ongoing consultation. Should further feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with DBCA for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient information

Woodside has given DBCA sufficient information to allow DBCA to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to DBCA on 26 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with regulation 25(4) of the Environment Regulations).
- On 1 March 2024, DBCA consulted and shared its feedback, claims or objections regarding this activity, indicating the information provided was sufficient to enable DBCA to make an informed assessment of the possible consequences of the activity on its functions, interests or activities.
- In addition to the information provided in the Consultation Information Sheet, Woodside provided DBCA with further information in response to DBCA's feedback (email of 14 March 2024).

Reasonable Period

Woodside allowed DBCA a reasonable period for consultation in the preparation of this EP because:

- Consultation for this EP commended 13 months ago in February 2024.
- A consultation period was stated in the initial correspondence to DBCA advising of consultation as well as when consultation closed for the purposes of the preparation of the EP. This enabled Woodside to assess feedback before EP submission.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed DBCA 30 days for consultation.
- Woodside considers a reasonable opportunity was provided to DBCA as evidenced by its response on 1 March 2024.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with DDBCA is appropriate and adapted to the nature of interests of DBCA:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside considers a reasonable opportunity was provided to DBCA as evidenced by its response on 1 March 2024.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- DBCA provided feedback but no objections or claims. In line with the intended outcome of consultation as set out in Section 5.2 and regulations 24 and 34(g), Woodside has:
  - Responded to feedback from DBCA.
  - Made no changes or inclusions to the EP as a result of consultation with DBCA because appropriate measures are already included in the EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.

Clean Energy Regulator (CER)

Summary of information provided and record of consultation for this EP:

- On 9 December 2024, Woodside emailed CER advising of the proposed activity (SI Report, reference 43.1), and offered to meet to go through the information.
- On 16 December 2024, CER responded (SI Report, reference 43.2) and:
  - **(1)** Advised it cannot provide general comments on EPs.
  - **(2)** Offered to meet to discuss specific issues relating to the Safeguard and NGER frameworks.
- On 16 December 2024, Woodside thanked CER for its response (SI Report, reference 43.3) and:
  - **(1)** Noted CER had no comments on this EP and sought clarification on CER's position regarding consultation on operations EPs.
  - **(2)** Confirmed it will continue meeting all Safeguard and NGER frameworks for the Pluto LNG facility at the appropriate time and do not require a meeting at this time.
- On 16 December 2024, CER responded (SI Report, reference 43.4) and:
  - **(1)** Confirmed it provides comments on matters that fall within its remit.

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
(1) No comments on this EP.	**(1)** **Woodside assessment:** Woodside accepts that CER has no comments on the EP at this time and it provides feedback on matters that falls within its remit. **Woodside response:** Woodside noted CER's advice and confirmed it will continue sending consultation information when CER is identified as a relevant person.	**(1)** Not required.

(2) Discuss issues specific to Safeguard and NGER frameworks.	**(2)** **Woodside assessment:** Woodside acknowledges CER's interest is primarily in compliance and reporting. **Woodside response:** Woodside confirmed it will continue meeting all Safeguard and NGER frameworks for the Pluto LNG facility at the appropriate time and do not require a meeting at this time.	**(2)** Not required
While feedback has been received, there were no objections or claims.	Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. Woodside engages in ongoing consultation throughout the life of an EP. Woodside notes that further feedback may be received as part of ongoing consultation. Should further feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with CER for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given CER sufficient information to allow CER to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided a link to the Consultation Information Sheet to CER on 9 December 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.

- Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed CER a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to CER advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed CER 30 days for consultation.
- In this context, Woodside allowed CER a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with CER is appropriate and adapted to the nature of interests of CER:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- CER provided feedback but no objections or claims. In line with the intended outcome of consultation as set out in Section 5.2 and regulations 24 and 34(g), Woodside has:
  - Responded to feedback from CER.
  - Made no changes or inclusions to the EP as a result of consultation with CER because appropriate measures are already included in the EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.

Commonwealth and State Government Departments or Agencies – Industry

Department of Industry, Science and Resources (DISR)

Summary of information provided and record of consultation for this EP:

- On 26 February 2024, Woodside emailed DISR advising of the proposed activity (Record of Consultation, reference 2.13), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure Consultation on offshore petroleum environment plans: Information for the community.
- On 18 March 2024, as no response had been received, Woodside proactively sent an email reminder to DISR, following up on the proposed activity (Record of Consultation, reference 3.1) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to DISR regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	**Assessment of Merits of Feedback, Objection or Claim and Woodside's Response**	**Inclusion in Environment Plan**
No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with DISR for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given DISR sufficient information to allow DISR to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to DISR on 26 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed DISR a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to DISR advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed DISR 30 days for consultation. For consultation on EPs, 30 days is the usual period for DISR.
- In this context, Woodside allowed DISR a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with DISR is appropriate and adapted to the nature of interests of DISR:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside proactively sent a follow-up consultation email on 18 March 2024, reminding DISR of the opportunity to provide feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as DISR did not provide feedback for this EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on DISR's functions, interests or activities.

Department of Energy, Mines, Industry Regulation and Safety (DEMIRS)

Summary of information provided and record of consultation for this EP:

- On 26 February 2024, Woodside emailed DEMIRS advising of the proposed activity (Record of Consultation, reference 2.13), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure Consultation on offshore petroleum environment plans: Information for the community.
- On 18 March 2024, as no response had been received, Woodside proactively sent an email reminder to DEMIRS, following up on the proposed activity (Record of Consultation, reference 3.1) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to DEMIRS regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with DEMIRS for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given DEMIRS sufficient information to allow DEMIRS to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to DEMIRS on 26 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed DEMIRS a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to DISR advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed DEMIRS 30 days for consultation. For consultation on EPs, 30 days is the usual period for DEMIRS.

- In this context, Woodside allowed DEMIRS a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with DEMIRS is appropriate and adapted to the nature of interests of DEMIRS:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- In absence of feedback, Woodside proactively sent a follow-up consultation email on 18 March 2024, reminding DEMIRS of the opportunity to provide feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as DEMIRS did not provide feedback for this EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on DEMIRS's functions, interests or activities.

Commonwealth commercial fisheries and representative bodies

North West Slope and Trawl Fishery

Summary of information provided and record of consultation for this EP:

- On 26 February 2024, Woodside emailed North West Slope and Trawl Fishery individual licence holders advising of the proposed activity (Record of Consultation, reference 2.14), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure Consultation on offshore petroleum environment plans: Information for the community.
- On 18 March 2024, as no response had been received, Woodside proactively sent an email reminder to North West Slope and Trawl Fishery individual licence holders, following up on the proposed activity (Record of Consultation, reference 3.2) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to North West Slope and Trawl Fishery individual licence holders regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan

No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside has consulted AFMA, DAFF - Fisheries, CFA, Tuna Australia, ASBTIA, North West Slope Trawl Fishery and Western Deepwater Trawl Fishery individual licence holders. Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	Woodside has assessed the potential for interaction with Commonwealth managed fisheries in Section 4.10.1 of this EP. Woodside will provide notifications to AFMA, CFA, DAFF – Fisheries, and individual Commonwealth relevant fishery licence holders (see Table 7-6 of this EP) ten days before activity commences, and following completion of activities, as referenced as PS 1.13 of this EP. No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with North West Slope and Trawl Fishery for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given North West Slope and Trawl Fishery sufficient information to allow North West Slope and Trawl Fishery to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to North West Slope and Trawl Fishery on 26 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed North West Slope and Trawl Fishery a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to North West Slope and Trawl Fishery advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.

- Woodside's methodology allows a 30-day consultation period and Woodside allowed North West Slope and Trawl Fishery 30 days for consultation. For consultation on EPs, 30 days is the usual period for North West Slope and Trawl Fishery.
- In this context, Woodside allowed North West Slope and Trawl Fishery a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with North West Slope and Trawl Fishery is appropriate and adapted to the nature of interests of North West Slope and Trawl Fishery:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- In the absence of feedback, Woodside proactively sent a follow-up consultation email on 18 March 2024, reminding North West Slope and Trawl Fishery of the opportunity to provide feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as North West Slope and Trawl Fishery did not provide feedback for this EP, but as standard practice will notify North West Slope and Trawl Fishery as per PS 1.13.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on North West Slope and Trawl Fishery's functions, interests or activities.

Western Deepwater Trawl Fishery

Summary of information provided and record of consultation for this EP:

- On 26 February 2024, Woodside emailed Western Deepwater Trawl Fishery individual licence holders advising of the proposed activity (Record of Consultation, reference 2.14), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure Consultation on offshore petroleum environment plans: Information for the community.
- On 18 March 2024, as no response had been received, Woodside proactively sent an email reminder to Western Deepwater Trawl Fishery individual licence holders, following up on the proposed activity (Record of Consultation, reference 3.2) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to Western Deepwater Trawl Fishery individual licence holders regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside has consulted AFMA, DAFF - Fisheries, CFA, Tuna Australia, ASBTIA, North West Slope Trawl Fishery and Western Deepwater Trawl Fishery individual licence holders. Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	Woodside has assessed the potential for interaction with Commonwealth managed fisheries in Section 4.10.1 of this EP. Woodside will provide notifications to AFMA, CFA, DAFF – Fisheries, and individual Commonwealth relevant fishery licence holders (see Table 7-6 of this EP) ten days before activity commences, and following completion of activities, as referenced as PS 1.13 of this EP. No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Western Deepwater Trawl Fishery for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given Western Deepwater Trawl Fishery sufficient information to allow Western Deepwater Trawl Fishery to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to Western Deepwater and Trawl Fishery on 26 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed Western Deepwater Trawl Fishery a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to Western Deepwater Trawl Fishery advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed Western Deepwater Trawl Fishery 30 days for consultation. For consultation on EPs, 30 days is the usual period for Western Deepwater Trawl Fishery.
- In this context, Woodside allowed Western Deepwater Trawl Fishery a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with Western Deepwater Trawl Fishery is appropriate and adapted to the nature of interests of Western Deepwater Trawl Fishery:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside proactively sent a follow-up consultation email on 18 March 2024, reminding Western Deepwater Trawl Fishery of the opportunity to provide feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as Western Deepwater Trawl Fishery did not provide feedback for this EP, but as standard practice will notify Western Deepwater Trawl Fishery as per PS 1.13.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on Western Deepwater Trawl Fishery's functions, interests or activities.

Commonwealth Fisheries Association (CFA)

Summary of information provided and record of consultation for this EP:

- On 26 February 2024, Woodside emailed CFA advising of the proposed activity (Record of Consultation, reference 2.14), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure Consultation on offshore petroleum environment plans: Information for the community.
- On 18 March 2024, as no response had been received, Woodside proactively sent an email reminder to CFA, following up on the proposed activity (Record of Consultation, reference 3.2) and included a link to the Consultation Information Sheet on Woodside's website.

- On 27 March 2024, Woodside provided an activity update to CFA regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside has consulted AFMA, DAFF - Fisheries, CFA, Tuna Australia, ASBTIA, North West Slope Trawl Fishery and Western Deepwater Trawl Fishery individual licence holders. Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	Woodside has assessed the potential for interaction with Commonwealth managed fisheries in Section 4.10.1 of this EP. Woodside will provide notifications to AFMA, CFA, DAFF – Fisheries, and individual Commonwealth relevant fishery licence holders (see Table 7-6 of this EP) ten days before activity commences, and following completion of activities, as referenced as PS 1.13 of this EP. No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with CFA for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given CFA sufficient information to allow CFA to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to CFA on 26 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed CFA a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to CFA advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed CFA 30 days for consultation. For consultation on EPs, 30 days is the usual period for CFA.
- In this context, Woodside allowed CFA a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with CFA is appropriate and adapted to the nature of interests of CFA:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- In absence of feedback, Woodside proactively sent a follow-up consultation email on 18 March 2024, reminding CFA of the opportunity to provide feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as CFA did not provide feedback for this EP, but as standard practice will notify CFA as per PS 1.13.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on CFA's functions, interests or activities.

State commercial fisheries and representative bodies

Mackerel Managed Fishery (Area 2)

Summary of information provided and record of consultation for this EP:

- On 29 February 2024, WAFIC, on behalf of Woodside, emailed Mackerel Managed Fishery (Area 2) individual licence holders advising of the proposed activity (SI Report, reference 12.3), and provided a Consultation Information Sheet.
- On 19 March 2024, Woodside emailed WAFIC following up on the proposed activities and noted WAFIC does not usually send consultation reminders to individual

licence holders (SI Report, reference 12.5).

- On 28 March 2024, Woodside provided an activity update to WAFIC regarding wells location coordinates and included an updated Consultation Information Sheet (SI report, reference 12.6). Woodside enquired whether the update should be sent to relevant fisheries.
- On 2 April 2024, WAFIC emailed Woodside reporting that no feedback had been received for this activity and did not consider necessary to distribute the update (SI Report, reference 12.7).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside has consulted DPIRD, WAFIC and individual relevant licence holders via WAFIC. Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	Woodside has assessed the potential for interaction with State-managed fisheries in Section 4.10.1 of this EP. Woodside will provide notifications to DPIRD and WAFIC (see Table 7-6 of this EP) prior to the commencement and at the completion of the activity, as referenced at PS 1.13 in this EP. No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Mackerel Managed Fishery (Area 2) for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given Mackerel Managed Fishery (Area 2) sufficient information to allow Mackerel Managed Fishery (Area 2) to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information, via WAFIC, to Mackerel Managed Fishery (Area 2) on 29 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.

- Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed Mackerel Managed Fishery (Area 2) a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to Mackerel Managed Fishery (Area 2) advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed Mackerel Managed Fishery (Area 2) 30 days for consultation. For consultation on EPs, 30 days is the usual period for Mackerel Managed Fishery (Area 2).
- In this context, Woodside allowed Mackerel Managed Fishery (Area 2) a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with Mackerel Managed Fishery (Area 2) is appropriate and adapted to the nature of interests of Mackerel Managed Fishery (Area 2):

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as Mackerel Managed Fishery (Area 2) did not provide feedback for this EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on Mackerel Managed Fishery (Area 2)'s functions, interests or activities.

Pilbara Crab Managed Fishery

Summary of information provided and record of consultation for this EP:

- On 29 February 2024, WAFIC, on behalf of Woodside, emailed Pilbara Crab Managed Fishery individual licence holders advising of the proposed activity (SI Report, reference 12.3), and provided a Consultation Information Sheet.
- On 19 March 2024, Woodside emailed WAFIC following up on the proposed activities and noted WAFIC does not usually send consultation reminders to individual

licence holders (SI Report, reference 12.5).

- On 28 March 2024, Woodside provided an activity update to WAFIC regarding wells location coordinates and included an updated Consultation Information Sheet (SI report, reference 12.6). Woodside enquired whether the update should be sent to relevant fisheries.
- On 2 April 2024, WAFIC emailed Woodside reporting that no feedback had been received for this activity and did not consider necessary to distribute the update (SI Report, reference 12.7).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside has consulted DPIRD, WAFIC and individual relevant licence holders via WAFIC. Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	Woodside has assessed the potential for interaction with State-managed fisheries in Section 4.10.1 of this EP. Woodside will provide notifications to DPIRD and WAFIC (see Table 7-6 of this EP) prior to the commencement and at the completion of the activity, as referenced at PS 1.13 in this EP. No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Pilbara Crab Managed Fishery for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given Pilbara Crab Managed Fishery sufficient information to allow Pilbara Crab Managed Fishery to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information, via WAFIC, to Pilbara Crab Managed Fishery on 29 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.

- Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed Pilbara Crab Managed Fishery a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to Pilbara Crab Managed Fishery advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed Pilbara Crab Managed Fishery 30 days for consultation. For consultation on EPs, 30 days is the usual period for Pilbara Crab Managed Fishery.
- In this context, Woodside allowed Pilbara Crab Managed Fishery a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with Pilbara Crab Managed Fishery is appropriate and adapted to the nature of interests of Pilbara Crab Managed Fishery:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as Pilbara Crab Managed Fishery did not provide feedback for this EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on Pilbara Crab Managed Fishery's functions, interests or activities.

Onslow Prawn Managed Fishery

Summary of information provided and record of consultation for this EP:

- On 29 February 2024, WAFIC, on behalf of Woodside, emailed Onslow Prawn Managed Fishery individual licence holders advising of the proposed activity (SI Report, reference 12.3), and provided a Consultation Information Sheet.
- On 19 March 2024, Woodside emailed WAFIC following up on the proposed activities and noted WAFIC does not usually send consultation reminders to individual

licence holders (SI Report, reference 12.5).

- On 28 March 2024, Woodside provided an activity update to WAFIC regarding wells location coordinates and included an updated Consultation Information Sheet (SI report, reference 12.6). Woodside enquired whether the update should be sent to relevant fisheries.
- On 2 April 2024, WAFIC emailed Woodside reporting that no feedback had been received for this activity and did not consider necessary to distribute the update (SI Report, reference 12.7).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside has consulted DPIRD, WAFIC and individual relevant licence holders via WAFIC. Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	Woodside has assessed the potential for interaction with State-managed fisheries in Section 4.10.1 of this EP. Woodside will provide notifications to DPIRD and WAFIC (see Table 7-6 of this EP) prior to the commencement and at the completion of the activity, as referenced at PS 1.13 in this EP. No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Onslow Prawn Managed Fishery for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given Onslow Prawn Managed Fishery sufficient information to allow Onslow Prawn Managed Fishery to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information, via WAFIC, to Onslow Prawn Managed Fishery on 29 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.

- Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed Onslow Prawn Managed Fishery a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to Onslow Prawn Managed Fishery advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed Onslow Prawn Managed Fishery 30 days for consultation. For consultation on EPs, 30 days is the usual period for Onslow Prawn Managed Fishery.
- In this context, Woodside allowed Onslow Prawn Managed Fishery a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with Onslow Prawn Managed Fishery is appropriate and adapted to the nature of interests of Onslow Prawn Managed Fishery:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as Onslow Prawn Managed Fishery did not provide feedback for this EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on Onslow Prawn Managed Fishery's functions, interests or activities.

Pilbara Trawl Fishery

Summary of information provided and record of consultation for this EP:

- On 29 February 2024, WAFIC, on behalf of Woodside, emailed Pilbara Trawl Fishery individual licence holders advising of the proposed activity (SI Report, reference 12.3), and provided a Consultation Information Sheet.
- On 19 March 2024, Woodside emailed WAFIC following up on the proposed activities and noted WAFIC does not usually send consultation reminders to individual

licence holders (SI Report, reference 12.5).

- On 28 March 2024, Woodside provided an activity update to WAFIC regarding wells location coordinates and included an updated Consultation Information Sheet (SI report, reference 12.6). Woodside enquired whether the update should be sent to relevant fisheries.
- On 2 April 2024, WAFIC emailed Woodside reporting that no feedback had been received for this activity and did not consider necessary to distribute the update (SI Report, reference 12.7).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside has consulted DPIRD, WAFIC and individual relevant licence holders via WAFIC. Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	Woodside has assessed the potential for interaction with State-managed fisheries in Section 4.10.1 of this EP. Woodside will provide notifications to DPIRD and WAFIC (see Table 7-6 of this EP) prior to the commencement and at the completion of the activity, as referenced at PS 1.13 in this EP. No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Pilbara Trawl Fishery for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given Pilbara Trawl Fishery sufficient information to allow Pilbara Trawl Fishery to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information, via WAFIC, to Pilbara Trawl Fishery on 29 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.

- Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed Pilbara Trawl Fishery a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to Pilbara Trawl Fishery advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed Pilbara Trawl Fishery 30 days for consultation. For consultation on EPs, 30 days is the usual period for Pilbara Trawl Fishery.
- In this context, Woodside allowed Pilbara Trawl Fishery a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with Pilbara Trawl Fishery is appropriate and adapted to the nature of interests of Pilbara Trawl Fishery:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as Pilbara Trawl Fishery did not provide feedback for this EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on Pilbara Trawl Fishery's functions, interests or activities.

Pilbara Line Fishery

Summary of information provided and record of consultation for this EP:

- On 29 February 2024, WAFIC, on behalf of Woodside, emailed Pilbara Line Fishery individual licence holders advising of the proposed activity (SI Report, reference 12.3), and provided a Consultation Information Sheet.
- On 19 March 2024, Woodside emailed WAFIC following up on the proposed activities and noted WAFIC does not usually send consultation reminders to individual licence holders (SI Report, reference 12.5).

- On 28 March 2024, Woodside provided an activity update to WAFIC regarding wells location coordinates and included an updated Consultation Information Sheet (SI report, reference 12.6). Woodside enquired whether the update should be sent to relevant fisheries.
- On 2 April 2024, WAFIC emailed Woodside reporting that no feedback had been received for this activity and did not consider necessary to distribute the update (SI Report, reference 12.7).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside has consulted DPIRD, WAFIC and individual relevant licence holders via WAFIC. Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	Woodside has assessed the potential for interaction with State-managed fisheries in Section 4.10.1 of this EP. Woodside will provide notifications to DPIRD and WAFIC (see Table 7-6 of this EP) prior to the commencement and at the completion of the activity, as referenced at PS 1.13 in this EP. No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Pilbara Line Fishery for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given Pilbara Line Fishery sufficient information to allow Pilbara Line Fishery to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information, via WAFIC, to Pilbara Line Fishery on 29 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.

- Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed Pilbara Line Fishery a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to Pilbara Line Fishery advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed Pilbara Line Fishery 30 days for consultation. For consultation on EPs, 30 days is the usual period for Pilbara Line Fishery.
- In this context, Woodside allowed Pilbara Line Fishery a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with Pilbara Line Fishery is appropriate and adapted to the nature of interests of Pilbara Line Fishery:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as Pilbara Line Fishery did not provide feedback for this EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on Pilbara Line Fishery's functions, interests or activities.

Western Australian Fishing Industry Council (WAFIC)

Summary of information provided and record of consultation for this EP:

- On 28 February 2024, Woodside emailed WAFIC advising of the proposed activity (Record of Consultation, reference 2.15), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- On 28 February 2024, Woodside emailed WAFIC to initiate consultation with relevant individual licence holders for this activity (SI Report, reference 12.1).
- **(1)** On 28 February 2024, Woodside telephoned WAFIC to review the list of relevant fisheries identified by Woodside.

- **(1)** On 28 February 2024, Woodside emailed WAFIC with the agreed list of relevant fisheries for this activity and an updated consultation email for individual licence holders (SI Report, reference 12.2).
- **(1)** On 29 February 2024, WAFIC emailed Woodside advising the consultation information had been sent to five relevant fisheries and confirmed it will provide feedback after the consultation period closes (SI Report, reference 12.3).
- **(1)** On 29 February 2024, Woodside emailed WAFIC to acknowledge the distribution of information (SI Report, reference 12.4).
- On 19 March 2024, Woodside emailed WAFIC following up on the proposed activities and noted WAFIC does not usually send consultation reminders to individual licence holders (SI Report, reference 12.5).
- On 28 March 2024, Woodside provided an activity update to WAFIC regarding wells location coordinates and included an updated Consultation Information Sheet (SI report, reference 12.6). Woodside enquired whether the update should be sent to relevant fisheries.
- **(2)** On 2 April 2024, WAFIC emailed Woodside reporting that no feedback had been received for this activity and did not consider necessary to distribute the update (SI Report, reference 12.7).
- **(2)** On 3 April 2024, Woodside thanked WAFIC for the feedback and noted the advice regarding the update to relevant fisheries (SI Report, reference 12.8).

Summary of Feedback, Objection or Claim	**Assessment of Merits of Feedback, Objection or Claim and Woodside's Response**	**Inclusion in Environment Plan**
(1) Consultation material delivered to relevant fisheries.	**(1)** **Woodside assessment:** Woodside reviewed WAFIC's update on outreach to relevant fisheries which gave them sufficient information to make an informed assessment of possible consequences of the activity on their functions, interests or activities per regulation 25 of the Environment Regulations. **Woodside response:** Woodside noted consultation information had been distributed to relevant fisheries via WAFIC.	**(1)** Not required.
(2) No feedback received from licence holders for this activity.	**(2)** **Woodside assessment:** Woodside accepted WAFIC's advice that there was no feedback on the activity and that it was not necessary to distribute the update to licence holders.	**(2)** Not required.

	Woodside response: Woodside noted WAFIC had no further comments and its advice regarding the update distribution.	
While feedback has been received, there were no objections or claims.	Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. Woodside engages in ongoing consultation throughout the life of an EP. Woodside notes that further feedback may be received as part of ongoing consultation. Should further feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	Woodside has assessed the potential for interaction with State-managed fisheries in Section 4.10.1 of this EP. Woodside will provide notifications to DPIRD and WAFIC (see Table 7-6 of this EP) prior to the commencement and at the completion of the activity, as referenced at PS 1.13 in this EP. No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with WAFIC for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient information

Woodside has given WAFIC sufficient information to allow WAFIC to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to WAFIC on 28 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with regulation 25(4) of the Environment Regulations).
- On 2 April 2024, WAFIC consulted and shared its feedback, claims or objections regarding this activity, indicating the information provided was sufficient to enable WAFIC to make an informed assessment of the possible consequences of the activity on its functions, interests or activities.

Reasonable Period

Woodside allowed WAFIC a reasonable period for consultation in the preparation of this EP because:

- Consultation for this EP commended 13 months ago in February 2024.
- A consultation period was stated in the initial correspondence to WAFIC advising of consultation as well as when consultation closed for the purposes of the preparation of the EP. This enabled Woodside to assess feedback before EP submission.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed WAFIC 30 days for consultation.
- In this context, Woodside allowed WAFIC a reasonable period for consultation in preparation of the EP as evidenced by WAFIC's response on 2 April 2024

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with WAFIC is appropriate and adapted to the nature of interests of WAFIC:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside considers a reasonable opportunity was provided to WAFIC as evidenced by its response on 2 April 2024.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- WAFIC provided feedback but no objections or claims. In line with the intended outcome of consultation as set out in Section 5.2 and regulations 24 and 34(g), Woodside has:
  - Responded to feedback from WAFIC.
  - Made no changes or inclusions to the EP as a result of consultation with WAFIC because appropriate measures are already included in the EP, but as standard practice will notify WAFIC as per PS 1.13.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.

Recreational marine users and representative bodies

Gascoyne Recreational Marine Users

Summary of information provided and record of consultation for this EP:

- On 26 February 2024, Woodside sent a letter to individual Gascoyne Recreational Marine Users advising of the proposed activity (Record of Consultation, reference

2.16), provided a Consultation Information Sheet, and a QR code to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*

- On 28 February 2024, Woodside emailed individual Gascoyne Recreational Marine Users advising of the proposed activity (Record of Consultation, reference 2.17), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- **(1)** On 28 February 2024, an individual Recreational Marine User emailed Woodside (SI Report, reference 13.1) and confirmed they would maintain safe distances as per their operations and AMSA regulations.
- On 18 March 2024, as no response had been received, Woodside proactively sent a letter reminder to individual Gascoyne Recreational Marine Users, following up on the proposed activity (Record of Consultation, reference 3.3) and included a QR code to the Consultation Information Sheet on Woodside's website.
- On 19 March 2024, as no response had been received, Woodside proactively sent an email reminder to individual Gascoyne Recreational Marine Users, following up on the proposed activity (Record of Consultation, reference 3.3) and included a link to the Consultation Information Sheet on Woodside's website.
- **(1)** On 25 March 2024, Woodside emailed the individual Recreational Marine User confirming that exclusion zones would be communicated by AMSA and marine notices prior to activities commencing.
- On 27 March 2024, Woodside emailed an activity update to individual Gascoyne Recreational Marine Users regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).
- On 28 March 2024, Woodside mailed an activity update to individual Gascoyne Recreational Marine Users regarding wells location coordinates and included a QR code to the updated Consultation Information Sheet (Record of Consultation, reference 3.7).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
(1) An individual Recreational Marine User advised they would maintain safe navigation as per AMSA regulations	**(1)** **Woodside assessment:** Woodside acknowledges that the individual Recreational Marine User has the information it needs to maintain safe navigation. **Woodside response:** Woodside confirmed exclusion zones will be communicated by AMSA and marine notices prior to activities commencing.	**(1)** Woodside will notify AHO prior to activities commencing, as referenced as PS 1.9 in this EP.
While feedback has been received, there were no objections or claims.	Woodside has consulted Recfishwest, Marine Tourism WA, WA Game Fishing Association and individual recreational marine users. Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24.	No additional measures or controls are required.

	Woodside engages in ongoing consultation throughout the life of an EP. Woodside notes that further feedback may be received as part of ongoing consultation. Should further feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Gascoyne Recreational Marine Users for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given Gascoyne Recreational Marine Users sufficient information to allow Gascoyne Recreational Marine Users to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to Gascoyne Recreational Marine Users on 26 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed Gascoyne Recreational Marine Users a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to Gascoyne Recreational Marine Users advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed Gascoyne Recreational Marine Users 30 days for consultation. For consultation on EPs, 30 days is the usual period for Gascoyne Recreational Marine Users.

- In this context, Woodside allowed Gascoyne Recreational Marine Users a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with Gascoyne Recreational Marine Users is appropriate and adapted to the nature of interests of Gascoyne Recreational Marine Users:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside proactively sent a follow-up consultation email on 18 March 2024, reminding Gascoyne Recreational Marine Users of the opportunity to provide feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as Gascoyne Recreational Marine Users did not provide feedback for this EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on Gascoyne Recreational Marine Users' functions, interests or activities.

Pilbara/Kimberley Recreational Marine Users

Summary of information provided and record of consultation for this EP:

- On 26 February 2024, Woodside sent a letter to individual Pilbara/Kimberley Recreational Marine Users advising of the proposed activity (Record of Consultation, reference 2.16), provided a Consultation Information Sheet, and a QR code to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 18 March 2024, as no response had been received, Woodside proactively sent a letter reminder to individual Pilbara/Kimberley Recreational Marine Users, following up on the proposed activity (Record of Consultation, reference 3.3) and included a QR code to the Consultation Information Sheet on Woodside's website.
- On 28 March 2024, Woodside provided an activity update to individual Pilbara/Kimberley Recreational Marine Users regarding wells location coordinates and included a QR code to the updated Consultation Information Sheet (Record of Consultation, reference 3.7).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan

No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside has consulted Recfishwest, Marine Tourism WA, WA Game Fishing Association and individual recreational marine users. Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. Woodside engages in ongoing consultation throughout the life of an EP. Woodside notes that further feedback may be received as part of ongoing consultation. Should further feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Pilbara/Kimberley Recreational Marine Users for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given Pilbara/Kimberley Recreational Marine Users sufficient information to allow Pilbara/Kimberley Recreational Marine Users to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to Pilbara/Kimberley Recreational Marine Users on 26 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed Pilbara/Kimberley Recreational Marine Users a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to Pilbara/Kimberley Recreational Marine Users advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed Pilbara/Kimberley Recreational Marine Users 30 days for consultation. For consultation on EPs, 30 days is the usual period for Pilbara/Kimberley Recreational Marine Users.
- In this context, Woodside allowed Pilbara/Kimberley Recreational Marine Users a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with Pilbara/Kimberley Recreational Marine Users is appropriate and adapted to the nature of interests of Pilbara/Kimberley Recreational Marine Users:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- In the absence of feedback, Woodside proactively sent a follow-up consultation letter on 18 March 2024, reminding Pilbara/Kimberley Recreational Marine Users of the opportunity to provide feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as Pilbara/Kimberley Recreational Marine Users did not provide feedback for this EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on Pilbara/Kimberley Recreational Marine Users' functions, interests or activities.

Recfishwest

Summary of information provided and record of consultation for this EP:

- On 28 February 2024, Woodside emailed Recfishwest advising of the proposed activity (Record of Consultation, reference 2.17), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 19 March 2024, as no response had been received, Woodside proactively sent an email reminder to Recfishwest, following up on the proposed activity (Record of Consultation, reference 3.3) and included a link to the Consultation Information Sheet on Woodside's website.
- **(1)** On 26 March 2024, Recfishwest emailed to thank Woodside for the consultation information (SI Report, reference 27.1) and requested to be kept informed as activities progress, given the proximity to areas accessed by the charter industry and recreational fishers.

- **(1)** On 27 March 2024, Woodside thanked Recfishwest for its response (SI Report, reference 27.2) and confirmed it will keep Recfishwest informed prior to and on completion of activities.
- On 27 March 2024, Woodside provided an activity update to Recfishwest regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.5).
- **(2)** On 28 March 2024, Recfishwest emailed Woodside and confirmed having no further comments following the update received (SI Report, reference 27.3).
- **(2)** On 2 April 2024, Woodside thanked Recfishwest for its feedback (SI Report, reference 27.4).
- On 15 April 2024, Woodside met with Recfishwest to provide an update on its activities. While the presentation was centred on decommissioning, it included information about this EP and Woodside's consultation approach (SI Report, reference 27.5). No feedback was provided on this EP.

Summary of Feedback, Objection or Claim	**Assessment of Merits of Feedback, Objection or Claim and Woodside's Response**	**Inclusion in Environment Plan**
(1) Recfishwest requested to be kept informed as activities progress.	**(1)** **Woodside assessment:** Woodside acknowledges Recfishwest's request to be informed as activities progress and agrees to keep Recfishwest informed prior to and on completion of activities. **Woodside response:** Woodside confirmed it would keep Recfishwest informed prior to and on completion of activities, given that the areas surrounding the operation is accessed by recreational fishers and the charter industry.	**(1)** Woodside will provide notifications to Recfishwest (see Table 7-6 of this EP) ten days before activity commences, and following completion of activities, as referenced as PS 1.13 of this EP.
(2) Recfishwest confirmed having no further comments for this activity.	**(2)** **Woodside assessment:** Woodside noted Recfishwest had no further comments. **Woodside response:** Woodside thanked Recfishwest for its feedback.	**(2)** Not required.
While feedback has been received, there were no objections or claims.	Woodside has consulted Recfishwest, Marine Tourism WA, WA Game Fishing Association and individual recreational marine users. Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24.	No additional measures or controls are required.

	Woodside engages in ongoing consultation throughout the life of an EP. Woodside notes that further feedback may be received as part of ongoing consultation. Should further feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with Recfishwest for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient information

Woodside has given Recfishwest sufficient information to allow Recfishwest to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to Recfishwest on 28 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with regulation 25(4) of the Environment Regulations).
- On 28 March 2024, Recfishwest consulted and shared its feedback, claims or objections regarding this activity, indicating the information provided was sufficient to enable Recfishwest to make an informed assessment of the possible consequences of the activity on its functions, interests or activities.

Reasonable Period

Woodside allowed Recfishwest a reasonable period for consultation in the preparation of this EP because:

- Consultation for this EP commended 13 months ago in February 2024.
- A consultation period was stated in the initial correspondence to Recfishwest advising of consultation as well as when consultation closed for the purposes of the preparation of the EP. This enabled Woodside to assess feedback before EP submission.

- Woodside's methodology allows a 30-day consultation period and Woodside allowed Recfishwest 30 days for consultation.
- In this context, Woodside allowed Recfishwest a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with Recfishwest is appropriate and adapted to the nature of interests of Recfishwest:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside considers a reasonable opportunity was provided to Recfishwest as evidenced by its response on 26 March 2024.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- Recfishwest provided feedback but no objections or claims. In line with the intended outcome of consultation as set out in Section 5.2 and regulations 24 and 34(g), Woodside has:
  - Responded to feedback from Recfishwest.
  - As requested by Recfishwest during consultation, Woodside will provide activity notifications as referenced at PS 1.13.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.

Marine Tourism WA

Summary of information provided and record of consultation for this EP:

- On 28 February 2024, Woodside emailed Marine Tourism WA advising of the proposed activity (Record of Consultation, reference 2.17), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- On 19 March 2024, as no response had been received, Woodside proactively sent an email reminder to Marine Tourism WA, following up on the proposed activity (Record of Consultation, reference 3.3) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to Marine Tourism WA regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan

No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside has consulted Recfishwest, Marine Tourism WA, WA Game Fishing Association and individual recreational marine users. Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. Woodside engages in ongoing consultation throughout the life of an EP. Woodside notes that further feedback may be received as part of ongoing consultation. Should further feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Marine Tourism WA for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given Marine Tourism WA sufficient information to allow Marine Tourism WA to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to Marine Tourism WA on 28 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed Marine Tourism WA a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to Marine Tourism WA advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed Marine Tourism WA 30 days for consultation. For consultation on EPs, 30 days is the usual period for Marine Tourism WA.
- In this context, Woodside allowed Marine Tourism WA a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with Marine Tourism WA is appropriate and adapted to the nature of interests of Marine Tourism WA:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- In absence of feedback. Woodside proactively sent a follow-up consultation email on 19 March 2024, reminding Marine Tourism WA of the opportunity to provide feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as Marine Tourism WA did not provide feedback for this EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on Marine Tourism WA's functions, interests or activities.

WA Game Fishing Association

Summary of information provided and record of consultation for this EP:

- On 28 February 2024, Woodside sent an email to individual WA Game Fishing Association advising of the proposed activity (Record of Consultation, reference 2.17), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 19 March 2024, as no response had been received, Woodside proactively sent an email reminder to WA Game Fishing Association, following up on the proposed activity (Record of Consultation, reference 3.3) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to WA Game Fishing Association regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside has consulted Recfishwest, Marine Tourism WA, WA Game Fishing Association and individual recreational marine users. Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. Woodside engages in ongoing consultation throughout the life of an EP. Woodside notes that further feedback may be received as part of ongoing consultation. Should further feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with WA Game Fishing Association for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given WA Game Fishing Association sufficient information to allow WA Game Fishing Association to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to WA Game Fishing Association on 28 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.

- Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed WA Game Fishing Association a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to WA Game Fishing Association advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed WA Game Fishing Association 30 days for consultation. For consultation on EPs, 30 days is the usual period for WA Game Fishing Association.
- In this context, Woodside allowed WA Game Fishing Association a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with WA Game Fishing Association is appropriate and adapted to the nature of interests of WA Game Fishing Association:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- In absence of feedback, Woodside proactively sent a follow-up consultation email on 19 March 2024, reminding WA Game Fishing Association of the opportunity to provide feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as WA Game Fishing Association did not provide feedback for this EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on WA Game Fishing Association's functions, interests or activities.

Titleholders and operators

Chevron Australia / Osaka Gas Gorgon / Tokyo Gas Gorgon / JERA Gorgon

Summary of information provided and record of consultation for this EP:

- On 28 February 2024, Woodside emailed Chevron Australia advising of the proposed activity (Record of Consultation, reference 2.18), provided a Consultation Information Sheet, GIS shape files and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*. Woodside asked that the consultation information be forwarded to Chevron's Joint Venture participants Osaka Gas Gorgon, Tokyo Gas Gorgon and Jera Gorgon for feedback.
- On 18 March 2024, as no response had been received, Woodside proactively sent an email reminder to Chevron Australia, following up on the proposed activity (Record of Consultation, reference 3.1) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to Chevron regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).
- On 9 April 2024, Chevron emailed Woodside (SI Report, reference 36.1) and:
  - **(1)** confirmed it has no issues with the planned activities.
  - **(2)** requested Woodside to provide additional information should the activities be undertaken during cyclone season, including cyclone anchor configuration, mooring design, anchor analysis and risk mitigation.
- On 2 May 2024, Woodside emailed Chevron (SI Report, reference 36.2) and:
  - **(1)** thanked Chevron for its feedback.
  - **(2)** advised drilling is not currently planned to occur in cyclone season.
- On 21 October 2024, Woodside proposed an ingress agreement with Chevron regarding mooring line activities within Production Lease WA-48-L during the drilling of the Xena-03 well. The agreement was accepted by Chevron on 14 November 2024.
- On 26 November 2024, in addition to the ingress agreement, Woodside emailed Chevron Australia advising that it was providing further clarity to adjacent titleholders on the Operational Area for the EP (SI Report, reference 36.3). Woodside attached a map of adjacent titleholders. Woodside noted that:
  - The Operational Area included a radius of 4000m from the Xena-03 well to allow for movement and positioning of vessels. This meant that vessel surface activities covered under the EP may temporarily extend into Chevron's permit area WA-48-L adjacent to Woodside permits WA-34-L and WA-536-P.
  - Woodside confirmed it would notify AHO at least four weeks prior to activities where vessels would be in the Operational Area for more than three weeks at a time to enable AHO to issue maritime notices.
  - To reduce impact on adjacent titleholders, Woodside was proposing to include Chevron in additional activity notifications related to vessel activities and was seeking feedback on any other control measures Chevron may have related to vessel movements on the periphery of its titles. Chevron did not provide further feedback or request additional activity notifications.

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
(1) Chevron confirmed it has no issues regarding the activities.	**(1)** **Woodside assessment:** Woodside noted Chevron had no issues with the activities. **Woodside response:** Woodside thanked Chevron for its feedback and confirming it has no issues with the activities.	**(1)** Not required.
(2) Requested further information should activities be undertaken during cyclone season	**(2)** **Woodside assessment:** Woodside noted that drilling is not currently planned to occur in cyclone season and will notify Chevron with mooring design information in the form of the mooring analysis if required. **Woodside response:** Woodside advised that should drilling occur with a moored MODU during cyclone season, it will provide Chevron with mooring design information.	**(2)** Not required.
While feedback has been received, there were no objections or claims.	Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. Woodside engages in ongoing consultation throughout the life of an EP. Woodside notes that further feedback may be received as part of ongoing consultation. Should further feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.
Summary Report – Consultation Complete		
Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with Chevron for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:		

Sufficient information

Woodside has given Chevron sufficient information to allow Chevron to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to Chevron on 28 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with regulation 25(4) of the Environment Regulations).
- In addition to the Consultation Information Sheet, Woodside provided Chevron with information tailored to Chevron by GIS shape files relevant to the activity.
- On 9 April 2024, Chevron consulted and shared its feedback, claims or objections regarding this activity, indicating the information provided was sufficient to enable Chevron to make an informed assessment of the possible consequences of the activity on its functions, interests or activities.
- In addition to the Consultation Information Sheet, Woodside provided Chevron with additional tailored information regarding the potential impacts of the project on its functions, interests and activities (email of 2 May 2024).

Reasonable Period

Woodside allowed Chevron a reasonable period for consultation in the preparation of this EP because:

- Consultation for this EP commended 13 months ago in February 2024.
- A consultation period was stated in the initial correspondence to Chevron advising of consultation as well as when consultation closed for the purposes of the preparation of the EP. This enabled Woodside to assess feedback before EP submission.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed Chevron 30 days for consultation.
- In this context, Woodside allowed Chevron a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with Chevron is appropriate and adapted to the nature of interests of Chevron:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.

- Woodside considers a reasonable opportunity was provided to Chevron as evidenced by its response on 9 April 2024 when it provided feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- Chevron provided feedback but no objections or claims. In line with the intended outcome of consultation as set out in Section 5.2 and regulations 24 and 34(g), Woodside has:
  - Responded to feedback from Chevron.
  - Made no changes or inclusions to the EP as a result of consultation with Chevron because appropriate measures are already included in the EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.

Western Gas

Summary of information provided and record of consultation for this EP:

- On 28 February 2024, Woodside emailed Western Gas advising of the proposed activity (Record of Consultation, reference 2.19), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- On 18 March 2024, as no response had been received, Woodside proactively sent an email reminder to Western Gas, following up on the proposed activity (Record of Consultation, reference 3.1) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to Western Gas regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Western Gas for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given Western Gas sufficient information to allow Western Gas to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to Western Gas on 28 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed Western Gas a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to Western Gas advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed Western Gas 30 days for consultation. For consultation on EPs, 30 days is the usual period for Western Gas.
- In this context, Woodside allowed Western Gas a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with Western Gas is appropriate and adapted to the nature of interests of Western Gas:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- In absence of feedback, Woodside proactively sent a follow-up consultation email on 18 March 2024, reminding Western Gas of the opportunity to provide feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as Western Gas did not provide feedback for this EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on Western Gas' functions, interests or activities.

Exxon Mobil Australia Resources

Summary of information provided and record of consultation for this EP:

- On 28 February 2024, Woodside emailed Exxon Mobil Australia advising of the proposed activity (Record of Consultation, reference 2.19), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- On 18 March 2024, as no response had been received, Woodside proactively sent an email reminder to Exxon Mobil Australia, following up on the proposed activity (Record of Consultation, reference 3.1) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to Exxon Mobil Australia regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Exxon Mobil Australia for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given Exxon Mobil Australia sufficient information to allow Exxon Mobil Australia to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to Exxon Mobil Australia on 28 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.

- A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
- A timeframe for consultation and the provision of feedback.
- A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
- Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed Exxon Mobil Australia a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to Exxon Mobil Australia advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed Exxon Mobil Australia 30 days for consultation. For consultation on EPs, 30 days is the usual period for Exxon Mobil Australia.
- In this context, Woodside allowed Exxon Mobil Australia a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with Exxon Mobil Australia is appropriate and adapted to the nature of interests of Exxon Mobil Australia:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- In the absence of feedback , Woodside proactively sent a follow-up consultation email on 18 March 2024, reminding Exxon Mobil Australia of the opportunity to provide feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as Exxon Mobil Australia did not provide feedback for this EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on Exxon Mobil Australia's functions, interests or activities.

Shell Australia

Summary of information provided and record of consultation for this EP:

- On 28 February 2024, Woodside emailed Shell Australia advising of the proposed activity (Record of Consultation, reference 2.19), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 18 March 2024, as no response had been received, Woodside proactively sent an email reminder to Shell Australia, following up on the proposed activity (Record of Consultation, reference 3.1) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to Shell Australia regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Shell Australia for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given Shell Australia sufficient information to allow Shell Australia to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to Shell Australia on 28 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.

- Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed Shell Australia a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to Shell Australia advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed Shell Australia 30 days for consultation. For consultation on EPs, 30 days is the usual period for Shell Australia.
- In this context, Woodside allowed Shell Australia a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with Shell Australia is appropriate and adapted to the nature of interests of Shell Australia:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- In the absence of feedback, Woodside proactively sent a follow-up consultation email on 18 March 2024, reminding Shell Australia of the opportunity to provide feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as Shell Australia did not provide feedback for this EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on Shell Australia's functions, interests or activities.

BP Developments Australia

Summary of information provided and record of consultation for this EP:

- On 28 February 2024, Woodside emailed BP Developments Australia advising of the proposed activity (Record of Consultation, reference 2.19), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.

- On 18 March 2024, as no response had been received, Woodside proactively sent an email reminder to BP Developments Australia, following up on the proposed activity (Record of Consultation, reference 3.1) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to BP Developments regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).
- **(1)** On 5 April 2024, BP Developments Australia emailed Woodside to acknowledge the consultation information received and confirmed it had no objections to the activities (SI Report, reference 31.1).
- **(1)** On 8 April 2024, Woodside thanked BP Developments Australia for its feedback and confirming it had no objections to the activities (SI Report, reference 31.2).

Summary of Feedback, Objection or Claim	**Assessment of Merits of Feedback, Objection or Claim and Woodside's Response**	**Inclusion in Environment Plan**
(1) BP Developments Australia confirmed it had no objections to the activities.	**(1)** **Woodside assessment:** Woodside noted BP Developments Australia had no objections to this EP. **Woodside response:** Woodside thanked BP Developments Australia for its feedback.	**(1)** Not required.
While feedback has been received, there were no objections or claims.	Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. Woodside engages in ongoing consultation throughout the life of an EP. Woodside notes that further feedback may be received as part of ongoing consultation. Should further feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with BP Developments Australia for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given Shell Australia sufficient information to allow BP Developments Australia to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to BP Developments Australia on 28 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).
- On 5 April 2024, BP Developments Australia consulted and shared its feedback, claims or objections regarding this activity, indicating the information provided was sufficient to enable BP Developments Australia to make an informed assessment of the possible consequences of the activity on its functions, interests or activities.

Reasonable Period

Woodside allowed BP Developments Australia a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to BP Developments Australia advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed BP Developments Australia 30 days for consultation. For consultation on EPs, 30 days is the usual period for BP Developments Australia.
- In this context, Woodside allowed BP Developments Australia a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with BP Developments Australia is appropriate and adapted to the nature of interests of BP Developments Australia:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside proactively sent a follow-up consultation email on 18 March 2024, reminding BP Developments Australia of the opportunity to provide feedback.
- Woodside considers a reasonable opportunity was provided to BP Developments Australia as evidenced by its response on 5 April 2024 when it provided feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- BP Developments Australia provided feedback but no objections or claims. In line with the intended outcome of consultation as set out in Section 5.2 and regulations 24 and 34(g), Woodside has:
  - Responded to feedback from BP Developments Australia.
  - Made no changes or inclusions to the EP as a result of consultation with BP Developments because appropriate measures are already included in the EP.
- The measures and controls described in this EP address the potential impact from the proposed activity on BP Developments Australia's functions, interests or activities.

Carnarvon Energy

Summary of information provided and record of consultation for this EP:

- On 28 February 2024, Woodside emailed Carnarvon Energy advising of the proposed activity (Record of Consultation, reference 2.19), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- On 18 March 2024, as no response had been received, Woodside proactively sent an email reminder to Carnarvon Energy, following up on the proposed activity (Record of Consultation, reference 3.1) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to Carnarvon Energy regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Carnarvon Energy for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given Carnarvon Energy sufficient information to allow Carnarvon Energy to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to Carnarvon Energy on 28 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed Carnarvon Energy a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to Carnarvon Energy advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed Carnarvon Energy 30 days for consultation. For consultation on EPs, 30 days is the usual period for Carnarvon Energy.
- In this context, Woodside allowed Carnarvon Energy a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with Carnarvon Energy is appropriate and adapted to the nature of interests of Carnarvon Energy:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- In the absence of feedback, Woodside proactively sent a follow-up consultation email on 18 March 2024, reminding Carnarvon Energy of the opportunity to provide feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as Carnarvon Energy did not provide feedback for this EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on Carnarvon Energy's functions, interests or activities.

PE Wheatstone

Summary of information provided and record of consultation for this EP:

- On 28 February 2024, Woodside emailed PE Wheatstone advising of the proposed activity (Record of Consultation, reference 2.19), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- On 18 March 2024, as no response had been received, Woodside proactively sent an email reminder to PE Wheatstone, following up on the proposed activity (Record of Consultation, reference 3.1) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to PE Wheatstone regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with PE Wheatstone for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given PE Wheatstone sufficient information to allow PE Wheatstone to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to PE Wheatstone on 28 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed PE Wheatstone a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to PE Wheatstone advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed PE Wheatstone 30 days for consultation. For consultation on EPs, 30 days is the usual period for PE Wheatstone.
- In this context, Woodside allowed PE Wheatstone a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with PE Wheatstone is appropriate and adapted to the nature of interests of PE Wheatstone:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- In the absence of feedback, Woodside proactively sent a follow-up consultation email on 18 March 2024, reminding PE Wheatstone of the opportunity to provide feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as PE Wheatstone did not provide feedback for this EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.

- The measures and controls described in this EP address the potential impact from the proposed activity on PE Wheatstone's functions, interests or activities.

Kyushu Electric Wheatstone

Summary of information provided and record of consultation for this EP:

- On 28 February 2024, Woodside emailed Kyushu Electric Wheatstone advising of the proposed activity (Record of Consultation, reference 2.19), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- On 18 March 2024, as no response had been received, Woodside proactively sent an email reminder to Kyushu Electric Wheatstone, following up on the proposed activity (Record of Consultation, reference 3.1) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to Kyushu Electric Wheatstone regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Kyushu Electric Wheatstone for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given Kyushu Electric Wheatstone sufficient information to allow Kyushu Electric Wheatstone to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to Kyushu Electric Wheatstone on 28 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.

- A timeframe for consultation and the provision of feedback.
- A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
- Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed Kyushu Electric Wheatstone a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to Kyushu Electric Wheatstone advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed Kyushu Electric Wheatstone 30 days for consultation. For consultation on EPs, 30 days is the usual period for Kyushu Electric Wheatstone.
- In this context, Woodside allowed Kyushu Electric Wheatstone a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with Kyushu Electric Wheatstone is appropriate and adapted to the nature of interests of Kyushu Electric Wheatstone:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- In the absence of feedback, Woodside proactively sent a follow-up consultation email on 18 March 2024, reminding Kyushu Electric Wheatstone of the opportunity to provide feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as Kyushu Electric Wheatstone did not provide feedback for this EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on Kyushu Electric Wheatstone's functions, interests or activities.

Eni Australia

Summary of information provided and record of consultation for this EP:

- On 28 February 2024, Woodside emailed Eni Australia advising of the proposed activity (Record of Consultation, reference 2.19), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 18 March 2024, as no response had been received, Woodside proactively sent an email reminder to Eni Australia, following up on the proposed activity (Record of Consultation, reference 3.1) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to Eni Australia regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).
- **(1)** On 19 April 2024, Eni Australia emailed Woodside to advise it has no concerns regarding the activity (SI Report, reference 34.1).
- **(2)** Requested to be updated of any material changes (SI Report, reference 34.1).
- **(1,2)** On 22 April 2024, Woodside thanked Eni Australia for its feedback and confirmed it will provide Eni Australia with significant updates with respect to the proposed activities when relevant (SI Report, reference 34.2).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
(1) Eni Australia advised it has no concerns regarding this activity.	**(1)** **Woodside assessment:** Woodside noted Eni Australia had no concerns regarding this activity. **Woodside response:** Woodside thanked Eni Australia for its feedback.	**(1)** Not required.
(2) Requested to be updated of any material changes.	**(2)** **Woodside assessment:** Woodside will provide notifications to Eni and relevant stakeholders as outlined in Table 7-6 of this EP. **Woodside response:** Woodside confirmed it will contact Eni Australia with activity updates when relevant.	**(2)** Woodside will provide notification of significant change, as appropriate, to Eni Australia, as referenced in Table 7-6 of the EP.
While feedback has been received, there were no objections or claims.	Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24.	No additional measures or controls are required.

	Woodside engages in ongoing consultation throughout the life of an EP. Woodside notes that further feedback may be received as part of ongoing consultation. Should further feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Eni Australia for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given Eni Australia sufficient information to allow Eni Australia to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to Eni Australia on 28 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).
- On 19 April 2024, Eni Australia consulted and shared its feedback, claims or objections regarding this activity, indicating the information provided was sufficient to enable Eni Australia to make an informed assessment of the possible consequences of the activity on its functions, interests or activities.

Reasonable Period

Woodside allowed Eni Australia a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to Eni Australia advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.

- Woodside's methodology allows a 30-day consultation period and Woodside allowed Eni Australia 30 days for consultation. For consultation on EPs, 30 days is the usual period for Eni Australia.
- In this context, Woodside allowed Eni Australia a reasonable period for consultation in preparation of the EP as evidenced by its response on 19 April 2024.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with Eni Australia is appropriate and adapted to the nature of interests of Eni Australia:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside proactively sent a follow-up consultation email on 18 March 2024, reminding Eni Australia of the opportunity to provide feedback.
- Woodside considers a reasonable opportunity was provided to Eni Australia as evidenced by its response on 19 April 2024.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- Eni Australia provided feedback but no objections or claims. In line with the intended outcome of consultation as set out in Section 5.2 and regulations 24 and 34(g), Woodside has:
  - Responded to feedback from Eni Australia.
  - Made no changes or inclusions to the EP as a result of consultation with Eni because appropriate measures are already included in the EP.
- The measures and controls described in this EP address the potential impact from the proposed activity on Eni Australia's functions, interests or activities.

Finder Energy

Summary of information provided and record of consultation for this EP:

- On 28 February 2024, Woodside emailed Finder Energy advising of the proposed activity (Record of Consultation, reference 2.19), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- **(1)** On 1 March 2024, Finder Energy emailed Woodside and advised it had no objections or feedback for this activity (SI Report, reference 8.1).
- (1) On 6 March 2024, Woodside thanked Finder Energy for its feedback (SI Report, reference 8.2).
- On 27 March 2024, Woodside provided an activity update to Finder Energy regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.5).
- **(1)** On 28 March 2024, Finder Energy emailed Woodside and confirmed it had no objections or comments following the update received (SI Report, reference 8.3).

- **(1)** On 2 April 2024, Woodside thanked Finder Energy for its feedback (SI Report, reference 8.4).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
(1) Finder Energy advised it had no objections or feedback for this activity.	**(1)** **Woodside assessment:** Woodside noted Finder Energy had no objections or feedback for this activity. **Woodside response:** Woodside thanked Finder Energy for its feedback.	**(1)** Not required.
While feedback has been received, there were no objections or claims.	Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. Woodside engages in ongoing consultation throughout the life of an EP. Woodside notes that further feedback may be received as part of ongoing consultation. Should further feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Finder Energy for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given Finder Energy sufficient information to allow Finder Energy to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to Finder Energy on 28 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.

  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).
- On 1 March 2024, Finder Energy consulted and shared its feedback, claims or objections regarding this activity, indicating the information provided was sufficient to enable Eni Australia to make an informed assessment of the possible consequences of the activity on its functions, interests or activities.

Reasonable Period

Woodside allowed Finder Energy a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to Finder Energy advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed Finder Energy 30 days for consultation. For consultation on EPs, 30 days is the usual period for Finder Energy.
- In this context, Woodside allowed Finder Energy a reasonable period for consultation in preparation of the EP as evidenced by its response on 1 March 2024.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with Finder Energy is appropriate and adapted to the nature of interests of Finder Energy:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside considers a reasonable opportunity was provided to Finder Energy as evidenced by its response on 1 March 2024.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- Finder Energy provided feedback but no objections or claims. In line with the intended outcome of consultation as set out in Section 5.2 and regulations 24 and 34(g), Woodside has:
  - Responded to feedback from Finder Energy.
  - Made no changes or inclusions to the EP as a result of consultation with Finder Energy because appropriate measures are already included in the EP.
- The measures and controls described in this EP address the potential impact from the proposed activity on Finder Energy's functions, interests or activities.

Jadestone Energy

Summary of information provided and record of consultation for this EP:

- On 28 February 2024, Woodside emailed Jadestone Energy advising of the proposed activity (Record of Consultation, reference 2.19), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 18 March 2024, as no response had been received, Woodside proactively sent an email reminder to Jadestone Energy, following up on the proposed activity (Record of Consultation, reference 3.1) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to Jadestone Energy regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Jadestone Energy for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given Jadestone Energy sufficient information to allow Jadestone Energy to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to Jadestone Energy on 28 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.

- Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed Jadestone Energy a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to Jadestone Energy advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed Jadestone Energy 30 days for consultation. For consultation on EPs, 30 days is the usual period for Jadestone Energy.
- In this context, Woodside allowed Jadestone Energy a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with Jadestone Energy is appropriate and adapted to the nature of interests of Jadestone Energy:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- In the absence of feedback, Woodside proactively sent a follow-up consultation email on 18 March 2024, reminding Jadestone Energy of the opportunity to provide feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as Jadestone Energy did not provide feedback for this EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on Jadestone Energy's functions, interests or activities.

KUFPEC

Summary of information provided and record of consultation for this EP:

- On 28 February 2024, Woodside emailed KUFPEC advising of the proposed activity (Record of Consultation, reference 2.19), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.

- On 18 March 2024, as no response had been received, Woodside proactively sent an email reminder to KUFPEC, following up on the proposed activity (Record of Consultation, reference 3.1) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to KUFPEC regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).
- On 26 March 2024, KUFPEC emailed Woodside (SI Report, reference 25.1) and:
  - **(1)** asked Woodside to confirm the location coordinates of Xena-03 well.
  - **(2)** requested to be kept informed of any planned offshore interactions.
- On 27 March 2024, Woodside emailed KUFPEC (SI Report, reference 25.2) and:
  - **(1)** advised of an update to 4 well coordinates, including the Xena-03 well.
  - **(2)** confirmed it will inform KUFPEC prior to and on completion of activities.

Summary of Feedback, Objection or Claim	**Assessment of Merits of Feedback, Objection or Claim and Woodside's Response**	**Inclusion in Environment Plan**
(1) KUFPEC asked for confirmation on the Xena-03 well location.	**(1)** **Woodside assessment:** Woodside reviewed the information provided on the Consultation Information Sheet and the planned well locations to answer KUFPEC's question. **Woodside response:** Woodside provided KUFPEC with an update on 4 well locations, including Xena-03.	**(1)** Not required.
(2) KUFPEC requested to be kept informed of offshore activities as part of this EP.	**(2)** **Woodside assessment:** Woodside will provide notifications to KUFPEC and relevant stakeholders as outlined in Table 7-6 of this EP. **Woodside response:** Woodside confirmed it will inform KUFPEC prior to and on completion of activities.	**(2)** Woodside will provide notifications to KUFPEC (see Table 7-6 of this EP) ten days before activity commences, and following completion of activities, as referenced as PS 1.13 of this EP.
While feedback has been received, there were no objections or claims.	Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24.	No additional measures or controls are required.

	Woodside engages in ongoing consultation throughout the life of an EP. Woodside notes that further feedback may be received as part of ongoing consultation. Should further feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with KUFPEC for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given KUFPEC sufficient information to allow KUFPEC to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to KUFPEC on 28 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).
- On 26 March 2024, KUFPEC consulted and shared its feedback, claims or objections regarding this activity, indicating the information provided was sufficient to enable KUFPEC to make an informed assessment of the possible consequences of the activity on its functions, interests or activities.

Reasonable Period

Woodside allowed KUFPEC a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to KUFPEC advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.

- Woodside's methodology allows a 30-day consultation period and Woodside allowed KUFPEC 30 days for consultation. For consultation on EPs, 30 days is the usual period for KUFPEC.
- In this context, Woodside allowed KUFPEC a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with KUFPEC is appropriate and adapted to the nature of interests of KUFPEC:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside proactively sent a follow-up consultation email on 18 March 2024, reminding KUFPEC of the opportunity to provide feedback.
- Woodside considers a reasonable opportunity was provided to KUFPEC as evidenced by its response on 26 March 2024.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- KUFPEC provided feedback but no objections or claims. In line with the intended outcome of consultation as set out in Section 5.2 and regulations 24 and 34(g), Woodside has:
  - Responded to feedback from KUFPEC.
  - Made no changes or inclusions to the EP as a result of consultation with KUFPEC because appropriate measures are already included in the EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable. .

Santos NA Energy Holdings / Santos Ltd / Santos WA Northwest / Santos Offshore / Santos WA Southwest / Santos (BOL) / Santos WA PVG

Summary of information provided and record of consultation for this EP:

- On 28 February 2024, Woodside emailed Santos advising of the proposed activity (Record of Consultation, reference 2.19), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- **(1)** On 8 March 2024, Santos emailed Woodside and advised it had no comments for this EP (SI Report, reference 9.1).
- **(1)** On 1 March 2024, Woodside thanked Santos for its feedback (SI Report, reference 9.2).
- On 27 March 2024, Woodside provided an activity update to Santos regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.5).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
(1) Santos advised it had no comments on this EP.	**(1)** **Woodside assessment:** Woodside noted Santos had no comments for this EP. **Woodside response:** Woodside thanked Santos for its feedback.	**(1)** Not required.
While feedback has been received, there were no objections or claims.	Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. Woodside engages in ongoing consultation throughout the life of an EP. Woodside notes that further feedback may be received as part of ongoing consultation. Should further feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Santos for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given Santos sufficient information to allow Santos to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to Santos on 28 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.

  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).
- On 8 March 2024, Santos consulted and shared its feedback, claims or objections regarding this activity, indicating the information provided was sufficient to enable Santos to make an informed assessment of the possible consequences of the activity on its functions, interests or activities.

Reasonable Period

Woodside allowed Santos a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to Santos advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed Santos 30 days for consultation. For consultation on EPs, 30 days is the usual period for Santos.
- In this context, Woodside allowed Santos a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with Santos is appropriate and adapted to the nature of interests of Santos:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside considers a reasonable opportunity was provided to Santos as evidenced by its response on 8 March 2024.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- Santos provided feedback but no objections or claims. In line with the intended outcome of consultation as set out in Section 5.2 and regulations 24 and 34(g), Woodside has:
  - Responded to feedback from Santos.
  - Made no changes or inclusions to the EP as a result of consultation with Santos because appropriate measures are already included in the EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable. .

Coastal Oil and Gas / Fox Resources

Summary of information provided and record of consultation for this EP:

- On 28 February 2024, Woodside emailed Coastal Oil and Gas advising of the proposed activity (Record of Consultation, reference 2.19), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 29 February 2024, Woodside received a system generated email notification advising the email address used is not working. Woodside attempted to find new contact details for Coastal Oil and Gas.
- On 11 March 2024, Woodside emailed Fox Resources (Record of Consultation, reference 2.20) as the key Principal of Coastal Oil and Gas advising of the proposed activity, provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- On 18 March 2024, as no response had been received, Woodside proactively sent an email reminder to Fox Resources, following up on the proposed activity (Record of Consultation, reference 3.1) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to Fox Resources regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Coastal Oil and Gas / Fox Resources for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given Coastal Oil and Gas / Fox Resources sufficient information to allow Coastal Oil and Gas / Fox Resources to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to Coastal Oil and Gas / Fox Resources on 28 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:

- The purpose of consultation and set out what was being sought through consultation.
- A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
- A timeframe for consultation and the provision of feedback.
- A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
- Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed Coastal Oil and Gas / Fox Resources a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to Coastal Oil and Gas / Fox Resources advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed Coastal Oil and Gas / Fox Resources 30 days for consultation. For consultation on EPs, 30 days is the usual period for Coastal Oil and Gas / Fox Resources.
- In this context, Woodside allowed Coastal Oil and Gas / Fox Resources a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with Coastal Oil and Gas / Fox Resources is appropriate and adapted to the nature of interests of Coastal Oil and Gas / Fox Resources:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- In the absence of feedback, Woodside proactively sent a follow-up consultation email on 18 March 2024, reminding Coastal Oil and Gas / Fox Resources of the opportunity to provide feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as Coastal Oil and Gas / Fox Resources did not provide feedback for this EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on Coastal Oil and Gas / Fox Resources' functions, interests or activities.

Bounty Oil and Gas

Summary of information provided and record of consultation for this EP:

- On 28 February 2024, Woodside emailed Bounty Oil and Gas advising of the proposed activity (Record of Consultation, reference 2.19), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 18 March 2024, as no response had been received, Woodside proactively sent an email reminder to Bounty Oil and Gas, following up on the proposed activity (Record of Consultation, reference 3.1) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to Bounty Oil and Gas regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Bounty Oil and Gas for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given Bounty Oil and Gas sufficient information to allow Bounty Oil and Gas to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to Bounty Oil and Gas on 28 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.

- Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed Bounty Oil and Gas a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to Bounty Oil and Gas advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed Bounty Oil and Gas 30 days for consultation. For consultation on EPs, 30 days is the usual period for Bounty Oil and Gas.
- In this context, Woodside allowed Bounty Oil and Gas a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with Bounty Oil and Gas is appropriate and adapted to the nature of interests of Bounty Oil and Gas:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- In the absence of feedback, Woodside proactively sent a follow-up consultation email on 18 March 2024, reminding Bounty Oil and Gas of the opportunity to provide feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as Bounty Oil and Gas did not provide feedback for this EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on Bounty Oil and Gas' functions, interests or activities.

OMV Australia

Summary of information provided and record of consultation for this EP:

- On 28 February 2024, Woodside emailed OMV Australia advising of the proposed activity (Record of Consultation, reference 2.19), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*

- On 18 March 2024, as no response had been received, Woodside proactively sent an email reminder to OMV Australia, following up on the proposed activity (Record of Consultation, reference 3.1) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to OMV Australia regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with OMV Australia for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given OMV Australia sufficient information to allow OMV Australia to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to OMV Australia on 28 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed OMV Australia a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to OMV Australia advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed OMV Australia 30 days for consultation. For consultation on EPs, 30 days is the usual period for OMV Australia.
- In this context, Woodside allowed OMV Australia a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with OMV Australia is appropriate and adapted to the nature of interests of OMV Australia:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- In the absence of feedback, Woodside proactively sent a follow-up consultation email on 18 March 2024, reminding OMV Australia of the opportunity to provide feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as OMV Australia did not provide feedback for this EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on OMV Australia's functions, interests or activities.

KATO Energy / KATO Corowa

Summary of information provided and record of consultation for this EP:

- On 28 February 2024, Woodside emailed KATO advising of the proposed activity (Record of Consultation, reference 2.19), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 18 March 2024, as no response had been received, Woodside proactively sent an email reminder to KATO, following up on the proposed activity (Record of Consultation, reference 3.1) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to KATO regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with KATO for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given KATO sufficient information to allow KATO to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to KATO on 28 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed KATO a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to KATO advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed KATO 30 days for consultation. For consultation on EPs, 30 days is the usual period for KATO.

- In this context, Woodside allowed KATO a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with KATO is appropriate and adapted to the nature of interests of KATO:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- In the absence of feedback, Woodside proactively sent a follow-up consultation email on 18 March 2024, reminding KATO of the opportunity to provide feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as KATO did not provide feedback for this EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on KATO's functions, interests or activities.

INPEX Alpha

Summary of information provided and record of consultation for this EP:

- On 28 February 2024, Woodside emailed INPEX advising of the proposed activity (Record of Consultation, reference 2.19), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 18 March 2024, as no response had been received, Woodside proactively sent an email reminder to INPEX, following up on the proposed activity (Record of Consultation, reference 3.1) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to INPEX regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate,	No additional measures or controls are required.

	Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with INPEX for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given INPEX sufficient information to allow INPEX to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to INPEX on 28 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed INPEX a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to INPEX advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed INPEX 30 days for consultation. For consultation on EPs, 30 days is the usual period for INPEX.
- In this context, Woodside allowed INPEX a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with INPEX is appropriate and adapted to the nature of interests of INPEX:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- In the absence of feedback, Woodside proactively sent a follow-up consultation email on 18 March 2024, reminding INPEX of the opportunity to provide feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as INPEX did not provide feedback for this EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on INPEX's functions, interests or activities.

JX Nippon O&G Exploration (Australia)

Summary of information provided and record of consultation for this EP:

- On 28 February 2024, Woodside emailed JX Nippon O&G Exploration advising of the proposed activity (Record of Consultation, reference 2.19), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- On 18 March 2024, as no response had been received, Woodside proactively sent an email reminder to JX Nippon O&G Exploration, following up on the proposed activity (Record of Consultation, reference 3.1) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to JX Nippon O&G Exploration regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.
Summary Report – Consultation Complete		

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with JX Nippon O&G Exploration for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given JX Nippon O&G Exploration sufficient information to allow JX Nippon O&G Exploration to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to JX Nippon O&G Exploration on 28 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed JX Nippon O&G Exploration a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to JX Nippon O&G Exploration advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed JX Nippon O&G Exploration 30 days for consultation. For consultation on EPs, 30 days is the usual period for JX Nippon O&G Exploration.
- In this context, Woodside allowed JX Nippon O&G Exploration a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with JX Nippon O&G Exploration is appropriate and adapted to the nature of interests of JX Nippon O&G Exploration:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.

- In the absence of feedback, Woodside proactively sent a follow-up consultation email on 18 March 2024, reminding JX Nippon O&G Exploration of the opportunity to provide feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as JX Nippon O&G Exploration did not provide feedback for this EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on JX Nippon O&G Exploration's functions, interests or activities.

Vermilion Oil and Gas

Summary of information provided and record of consultation for this EP:

- On 28 February 2024, Woodside emailed Vermilion Oil and Gas advising of the proposed activity (Record of Consultation, reference 2.19), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- On 18 March 2024, as no response had been received, Woodside proactively sent an email reminder to Vermilion Oil and Gas, following up on the proposed activity (Record of Consultation, reference 3.1) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to Vermilion Oil and Gas regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Vermilion Oil and Gas for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given Vermilion Oil and Gas sufficient information to allow Vermilion Oil and Gas to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to Vermilion Oil and Gas on 28 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed Vermilion Oil and Gas a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to Vermilion Oil and Gas advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed Vermilion Oil and Gas 30 days for consultation. For consultation on EPs, 30 days is the usual period for Vermilion Oil and Gas.
- In this context, Woodside allowed Vermilion Oil and Gas a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with Vermilion Oil and Gas is appropriate and adapted to the nature of interests of Vermilion Oil and Gas:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- In the absence of feedback, Woodside proactively sent a follow-up consultation email on 18 March 2024, reminding Vermilion Oil and Gas of the opportunity to provide feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as Vermilion Oil and Gas did not provide feedback for this EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on Vermilion Oil and Gas' functions, interests or activities.

Beagle No.1

Summary of information provided and record of consultation for this EP:

- On 28 February 2024, Woodside emailed Beagle No.1 advising of the proposed activity (Record of Consultation, reference 2.19), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 18 March 2024, as no response had been received, Woodside proactively sent an email reminder to Beagle No.1, following up on the proposed activity (Record of Consultation, reference 3.1) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to Beagle No.1 regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Beagle No.1 for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given Beagle No.1 sufficient information to allow Beagle No.1 to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to Beagle No.1 on 28 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed Beagle No.1 a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to Beagle No.1 advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed Beagle No.1 30 days for consultation. For consultation on EPs, 30 days is the usual period for Beagle No.1.
- In this context, Woodside allowed Beagle No.1 a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with Beagle No.1 is appropriate and adapted to the nature of interests of Beagle No.1:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- In the absence of feedback, Woodside proactively sent a follow-up consultation email on 18 March 2024, reminding Beagle No.1 of the opportunity to provide feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as Beagle No.1 did not provide feedback for this EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.

- The measures and controls described in this EP address the potential impact from the proposed activity on Beagle No.1's functions, interests or activities.

Peak Industry representative bodies

Australian Energy Producers (AEP)

Summary of information provided and record of consultation for this EP:

- On 27 February 2024, Woodside emailed AEP advising of the proposed activity (Record of Consultation, reference 2.21), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- On 18 March 2024, as no response had been received, Woodside proactively sent an email reminder to AEP, following up on the proposed activity (Record of Consultation, reference 3.1) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to AEP regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with AEP for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given Beagle No.1 sufficient information to allow AEP to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to AEP on 27 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.

- A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
- A timeframe for consultation and the provision of feedback.
- A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
- Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed AEP a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to AEP advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed AEP 30 days for consultation. For consultation on EPs, 30 days is the usual period for AEP.
- In this context, Woodside allowed AEP a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with AEP is appropriate and adapted to the nature of interests of AEP:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- In the absence of feedback, Woodside proactively sent a follow-up consultation email on 18 March 2024, reminding AEP of the opportunity to provide feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as AEP did not provide feedback for this EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on AEP's functions, interests or activities.

Traditional Custodians and nominated representative corporations

Murujuga Aboriginal Corporation (MAC)

MAC is established under the BMIEA and is the representative body for the Traditional Custodians for Murujuga being the Ngarluma, the Mardudhunera, the Yaburara, the Yindjibarndi and the Wong-Goo-Tt-Oo peoples (collectively Ngarda-Ngarli). MAC is the cultural authority for Murujuga and is responsible for the management and protection of its cultural values.

Woodside has an existing relationship with MAC which extends prior to consultation for this EP. Woodside's consultation approach for Traditional Owners has a focus on building and maintaining relationships with each group. This is underpinned by Woodside's Program of Ongoing Engagement (sent to MAC on 26 July 2023). Woodside has assigned a First Nations Engagement team member as a focal point for EP consultation with MAC who is responsible for building a consultative relationship and is readily available to provide information and take feedback.

On 27 August 2018, MAC and the WA Government announced it was pursuing World Heritage Listing for the Murujuga Cultural Landscape. As such, Woodside considers MAC the appropriate body to consult with about matters relating to Murujuga as a potential World Heritage site.

For consultation on this EP, Woodside contacted MAC and offered to present to members and the MAC Board. Woodside asked MAC how it wished to be consulted, if it required support to participate in consultation, if there were any additional groups that MAC believed should be consulted and requested that all information shared with MAC be cascaded to its members.

Aside from regular consultation about EPs, Woodside invites MAC to Woodside's Quarterly Heritage Meetings and monthly Community Luncheons. Woodside has continually confirmed it is open to receiving or being notified of feedback, claims or objections on EPs during its engagement with MAC.

This context and process demonstrates that Woodside's consultation approach with MAC is appropriate and adapted to the nature and interests of MAC.

Historical Engagement:

- On 18 July 2023, Woodside emailed MAC NOPSEMA's *Consultation Guidelines, Consultation Brochure, and Draft Policy for Managing Gender-Restricted Information*. Woodside requested that MAC advise Woodside of any other Traditional Custodian groups or individuals with whom Woodside should consult.
- On 26 July 2023, Woodside emailed MAC Woodside's planned *Program of Ongoing Engagement with Traditional Custodians*.
- On 21 August 2023, Woodside emailed MAC seeking MAC's cultural clarifications about information in relation to Elder status and whether cultural information about Murujuga can be held by individuals and not known to others.
- **(1)** On 1 September 2023, MAC emailed a letter to Woodside noting the following:
  - The women in its Circle of Elders are the right people to consult with.
  - MAC notes that it would be extremely unusual for knowledge to be held by an individual without surrounding groups knowing about it.
  - The Circle of Elders represent the Ngarda-Ngarli; the collective term for the Traditional Custodians who look after Murujuga Country.
- **(1)** On 14 December 2023, Woodside met with the MAC Board, Circle of Elders and CEO in Karratha. During the meeting MAC reconfirmed it was the cultural authority over Murujuga.

Please see Scarborough Seabed Intervention and Trunkline Installation EP (Appendix F and SI Report) for further details of this correspondence.

Summary of information provided and record of consultation for this EP:

- On 1 March 2024, Woodside emailed MAC advising of the proposed activity (Record of Consultation, reference 2.27), providing a Summary Information Sheet (including a link to the detailed information sheet on Woodside's website), and links to the NOPSEMA consultation brochure and guidelines, and draft policy for managing gender-restricted information. The email requested information on the interests that MAC and its members may have within the EMBA, information on how MAC would like to engage, and requested that MAC provide information to other individuals as required. Woodside requested MAC provide feedback by 29 March 2024.
- On 23 April 2024, Woodside emailed MAC to follow up on this activity, to offer further information, answer queries or attend a meeting if required (SI Report, reference 14.1).
- On 23 April 2024, MAC and Woodside exchanged emails. MAC indicated it would refer the matter to an appropriate person to respond and Woodside again offered to support MAC through the consultation process (SI Report, references 14.2, 14.3).
- On 23 April 2024, MAC emailed Woodside (SI Report, reference 14.4) and raised the following:
  - **(2)** The lack of broader-scale bathymetric information on the submerged landscape and the potential for impact on jinna (songlines).
  - **(3)** That MAC had no specific knowledge of tangible or intangible heritage that may be impacted.
  - **(4)** The size of the EMBA and management procedures in place to protect cultural values in addition to environmental values.
  - **(5)** That the EP capture a process for engaging with MAC to protect cultural, heritage and Outstanding Universal Values in the event of an incident.
  - **(6)** That it recommended Woodside also consult Ngarluma Aboriginal Corporation.
- On 26 April 2024, Woodside emailed MAC advising it would seek information to respond to MAC's feedback (SI Report, reference 14.5).
- On 8 May 2024, Woodside emailed MAC to provide further information (SI Report, reference 14.6) including:
  - **(2)** Woodside's continued support to work with MAC to undertake mapping of areas significant to MAC.
  - **(2)** Woodside's continued support to undertake further ethnographic surveys focussed on jinna at MAC's convenience.
  - **(3)** That Woodside welcomed MAC's advice on identifying cultural features and values in the absence of information from further surveys and mapping.
  - **(4)** How the EMBA is determined.
  - **(5)** How Woodside uses modelling to develop response plans in the unlikely event of an incident, including notification requirements to Traditional Custodians.
  - **(6)** That Woodside has also consulted with Ngarluma Aboriginal Corporation on this activity.

Ongoing Engagement:

- On 2 August 2024, MAC emailed Woodside a letter relating to another EP (SI Report, reference 14.7). Matters relating to this EP include:
  - **(7)** MAC's advice that activities that could potentially affect the natural movement or behaviour of marine species may impact cultural values.
  - **(8)** MAC's request that the protection of environmental values be assessed separately from the protection of cultural values.
  - **(9)** That MAC expects to be consulted about any activity located near Murujuga and informed if there is an environmental incident whereby Murujuga falls within the possible impact zone.
- **(9)** On 2 August 2024, Woodside responded to MAC's email confirming it would inform MAC of all projects located near Murujuga and in the very unlikely case of an

environment incident (SI Report, reference 14.8).

- On 9 September 2024, Woodside invited MAC to share stories and receive updates from Woodside at its Monthly Luncheon for Traditional Owners (SI Report, reference 14.9).
- On 17 September 2024, Woodside emailed MAC responses to matters raised in correspondence on 2 August 2024 (SI Report, reference 14.10). The letter stated:
  - **(7,8)** Woodside assesses potential cultural impacts on marine species including controls for mammal migration paths and behaviour collaboratively with environmental impacts.
  - **(9)** Woodside actively seeks ongoing engagement and consultation with MAC on its cultural interests, activities and functions.
  - Woodside is available to meet with MAC.
- On 25 September 2024, MAC attended Woodside's monthly luncheon for Traditional Owners (SI Report, reference 14.11). During the luncheon Woodside requested feedback from all attendees about EPs and provided information about the consultation process.
- On 3 October 2024, Woodside invited MAC to share stories and receive updates from Woodside at its Monthly Luncheon for Traditional Owners (SI Report, reference 14.12).
- On 23 October 2024, Traditional Owner members from MAC attended Woodside's Monthly Community Luncheon for Traditional Owners held in Roebourne. During the lunch Woodside requested feedback from all attendees about EPs and provided information about the consultation process (SI Report, reference 14.13).
- On 21 November 2024, NYFL emailed Woodside a letter advising that due to the passing of a Senior Elder, Sorry Business was underway in the Roebourne area (SI Report, reference 14.14).
- On 4 March 2025, Woodside invited MAC to share stories and receive updates from Woodside at its Monthly Community Luncheon for Traditional Owners to be held in Roebourne on 5 March 2025 (SI Report, reference 14.15).
- On 5 March 2025, Traditional Owner members from MAC attended Woodside's Monthly Community Luncheon for Traditional Owners held in Roebourne. During the lunch Woodside requested feedback from all attendees about EPs and provided information about the consultation process (SI Report, reference 14.16).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
(1) On 1 September 2023, MAC advised that it was the appropriate body corporate and cultural authority over Murujuga.	**(1)** **Woodside assessment:** Woodside accepts and respects MAC's position as the appropriate body corporate and cultural authority over Murujuga. **Woodside response:** Woodside continues to consult and engage with MAC as the appropriate body corporate and cultural authority over Murujuga.	**(1)** Not required.
(2) On 23 April 2024, MAC raised that there was a lack of broader-scale bathymetric information for the trunkline	**(2)** **Woodside Assessment:** Woodside acknowledges MAC's position that there is a lack of bathymetric information. Woodside	**(2)** Cultural features and heritage values including jinna (songlines) are identified and assessed in

area and the impact on jinna (songlines).	notes that this EP is for continued operation of existing infrastructure. The EP includes the Unexpected Finds Procedure (Section 7.8) which addresses the risk of discovery of potential underwater cultural material. **Woodside Response:** Woodside has previously proposed to MAC that MAC work to determine a scope of works to determine further bathymetric information on the area. This proposal is under consideration by MAC and Woodside remains supportive of undertaking this work. Woodside also remains supportive of conducting further ethnographic surveys with MAC, following the initial phase of works in 2020 which focussed on jinna and their connection from Murujuga to inland areas.	Sections 4.9 and 6.11 of the EP.
(3) On 23 April 2024, MAC advised it had no specific knowledge of tangible or intangible heritage that might be impacted.	**(3)** **Woodside Assessment:** Woodside uses multiple sources of information including publicly available literature, heritage databases and feedback from consultation in order to identify tangible and intangible cultural features of the environment, as described in Sections 4.9 and 6.11. **Woodside Response:** Woodside recognises the difficulty MAC faces in identifying tangible and intangible heritage on the submerged continental shelf in the absence of bathymetric mapping and ethnographic assessment of the results. In June 2023 Woodside proposed a project to MAC that would undertake mapping of areas identified by MAC as a priority in understanding this landscape. MAC has not accepted this proposal and through several meetings with MAC between July 2023 and February 2024 Woodside understands that MAC intends to issue a modified proposal to conduct this work.	**(3)** Cultural features and heritage values are identified and assessed in Sections 4.9 and 6.11 of the EP.
(4) On 23 April 2024, MAC noted the size of the EMBA and management procedures in place to protect cultural values.	**(4)** **Woodside Assessment**: Woodside aligns with industry guidance in developing the EMBA. Many replicate model simulations are completed to understand the potential behaviour of the worst-case release under various wind, wave and current conditions and these are combined to create an overall EMBA. Woodside welcomes any advice MAC provides on identifying cultural	**(4)** Woodside has addressed oil spill preparedness and response strategy in Appendix H.

	features or heritage values within the EMBA. **Woodside Response:** The EMBA for this activity is determined by a highly unlikely release of marine diesel as the result of damage to the production facility or vessel collision. Woodside considers it adopts appropriate controls to prevent a hydrocarbon spill and controls to respond in the highly unlikely event of a hydrocarbon spill, as demonstrated in Sections 6.9 of the EP, and Appendix I.	
(5) On 23 April 2024, MAC advocated for a process for engagement to protect cultural heritage and Outstanding Universal values in the event of an incident.	**(5)** **Woodside Assessment:** Woodside accepts MAC's advice on the need for engagement in the event of an incident. **Woodside Response:** Consultation with relevant Traditional Custodian representatives, including MAC, in the event of an incident is already anticipated under our oil spill response plan.	**(5)** Woodside has addressed oil spill preparedness and response strategy in Appendix H.
(6) On 23 April 2024, MAC advised that Woodside should consult with Ngarluma Aboriginal Corporation.	**(5)** **Woodside Assessment:** Woodside accepts MAC's advice on the need to consult with NAC. **Woodside Response:** Woodside has consulted with NAC as a relevant person for this EP.	**(5)** Woodside has consulted with NAC as outlined in Appendix F.
(7) During ongoing engagement, MAC advised Woodside that any activities that could potentially affect the natural movement or behaviour of marine species may impact cultural values.	**(7)** **Woodside assessment:** When developing EPs, Woodside considers potential cultural impacts on marine species including impacts and associated controls for marine mammal migration paths and behaviour. **Woodside response:** Woodside recognises that whales and other species of totemic importance need to be protected, including their populations and migration patterns. As assessed in Section 6, Woodside considers that when the impacts and risks to marine species, including potential totemic species, have been reduced to ALARP and an acceptable level in offshore areas, the potential impacts and risks to cultural values associated with coastal Indigenous connection with, or traditional uses of marine species and associated ecosystems in nearshore coastal waters	**(7)** Woodside has assessed impacts and risks to marine species in Section 6 of the EP. Items relating to MAC appear in section 4.9.

	are also reduced to ALARP and an acceptable level.	
(8) During ongoing engagement, MAC stated that the protection of environmental values should be assessed separately from the protection of cultural values in EPs.	**(8)** **Woodside assessment:** Woodside undertakes assessments for both environmental and cultural values. These are considered individually and collaboratively. **Woodside response:** Woodside has responded to MAC and informed it that environmental and cultural impacts have been assessed both individually and collaboratively**.**	**(8)** Woodside's First Nations Cultural Features and Heritage Values Assessment is in section 6.11.
(9) During ongoing engagement MAC stated that it expects to be consulted about any activity located near Murujuga and contacted in the event of an environmental incident whereby Murujuga falls within the possible impact zone.	**(9)** **Woodside assessment:** Woodside acknowledges MAC's advice that it should be consulted about any activity located near Murujuga and in the unlikely case of an environmental incident. **Woodside response:** Woodside has advised MAC that it will inform MAC of projects proposed on Murujuga.	**(9)** Under Woodside's methodology for identifying relevant persons, MAC is considered a relevant person for EPs with an EMBA covering/in proximity to Murujuga. Woodside's Oil Spill Preparedness and Response Mitigation Assessment is in Appendix H of the EP. Woodside's Oil Pollution First Strike Plan is in Appendix I of the EP Woodside's emergency response protocols (Section 7.14) include a review of potentially impacted stakeholders, including Traditional Owners. Woodside engages with Traditional Owners for applicable events.
While feedback has been received, there were no objections or claims.	Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. Woodside engages in ongoing consultation throughout the life of an EP. Woodside notes that further feedback may be received as part of ongoing consultation. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2)	Based on the engagement to date, no additional measures or controls are required.
Summary Report: Consultation Complete		
Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with MAC for the purpose of regulation 25 is		

complete. Sufficient information and a reasonable period have been provided, as described in Section 5.5 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given MAC sufficient information to allow MAC to make an informed assessment of the possible consequences of the activity on MAC's functions, interests and activities because:

- Woodside has been consulting with MAC generally since 2018. There have been numerous meetings with MAC and the Circle of Elders since that time.
- Woodside has given MAC relevant consultation documents, including NOPSEMA's *Consultation Guidelines, Consultation Brochure and Draft Policy for Managing Gender-Restricted Information* (informing stakeholders on how consultation is conducted and providing avenues for providing information on sensitive matters) (see 18 July 2023).
- In February 2024, Woodside made the Consultation Information Sheet about this EP publicly available on the Woodside website. The EP was published on the NOPSEMA website in May 2024.
- Woodside provided information to MAC on 1 March 2024 (when Woodside commenced consulting with MAC on this EP) and subsequently on 23 April 2024. Woodside provided MAC:
  - A Summary Information Sheet developed specifically for First Nations groups and reviewed by a First Nations staff member. This sheet included:
    - An overview of the activity and proposed timing
    - Maps showing the location and EMBA
    - A summary of the risks and impacts of the activity
    - Diagrams
    - Details about how to provide feedback.
  - The purpose of consultation, and what was being sought by Woodside through consultation including understanding the nature of MAC's interests and how the activity could impact those interests.
  - That Woodside had undertaken assessments to identify potential impacts and risks to the marine environment and developed mitigation and management measures.
  - Woodside asked MAC to forward the information to its members.
  - Woodside offered to provide more specific information, maps and images to MAC if required.
- Woodside provided contact information for Woodside and NOPSEMA.

Reasonable Period

Woodside allowed MAC a reasonable period for consultation in the preparation of this EP because:

- Woodside commenced consultation on this EP with MAC in March 2024 and provided information the EP on that date. Since then, Woodside and MAC have engaged in consultation for 14 months demonstrating a "reasonable period" of consultation.
- A consultation period was communicated to MAC during Woodside's initial email on 1 March 2024. MAC was asked to provide feedback by 29 March 2024 in line with Woodside's methodology of a 30-day consultation period. This period enabled Woodside to assess feedback before the EP was submitted.

- Woodside provided MAC with two months to consult ahead of preparing the EP and continues to take feedback in relation to the EP.
- Woodside notes that during consultation, it also respectfully paused consultation in periods when MAC was observing Sorry Business or cultural matters.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided and Woodside's approach to consultation is appropriate and adapted because:

- Woodside asked for MAC's input into how MAC would like to engage in consultation and has consulted in a way that Woodside understands is appropriate for First Nations groups.
- Woodside has made information on this EP publicly available for 14 months. This has included publishing advertisements in Indigenous, regional, state and national, newspapers including Indigenous publications the National Indigenous Times (26 February 2024) and the Koori Mail advising of the proposed activities and requesting feedback.
- Woodside ran a targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP.
- Woodside's initial email about this EP on 1 March 2024:
  - Included a general email address and telephone number for Woodside as well as direct email and telephone number for a dedicated focal person from Woodside's First Nations Engagement team. Woodside also provided contact details for NOPSEMA.
  - Offered for Woodside to speak with MAC members as well as the MAC Board.
  - Asked MAC to advise how it would like Woodside to engage and whether MAC required further information.
- Woodside offered to meet MAC on a number of occasions.
- Woodside asked MAC if it was aware of any other Traditional Custodian groups or individuals with whom Woodside should consult. MAC identified Ngarluma Aboriginal Corporation (NAC) as a relevant group to consult. Woodside is already consulting with NAC on this EP.
- Woodside has provided a reasonable opportunity for input as evidenced by its initial email to MAC about the activity on 1 March 2024 and follow-up email on 23 April 2024. A genuine two-way dialogue has occurred via written exchanges to further understand the environment in which the activity will take place. Woodside's ongoing relationship with MAC is evidenced by MAC's emails to Woodside on 23 April and 2 August 2024 in which MAC provided relevant information about cultural values and consultation requirements. Woodside has accepted this feedback and has incorporated it in the EP.

Outcomes of consultation

The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- MAC raised that there was a lack of broader-scale bathymetric information for the trunkline area and the impact on jinna (songlines). Woodside notes that this EP is for continued operation of existing infrastructure. The EP includes the Unexpected Finds Procedure (Section 7.8) which addresses the risk of discovery of potential underwater cultural material. Cultural features and heritage values including jinna (songlines) are identified and assessed in Sections 4.9 and 6.11 of the EP.
- MAC advised it had no specific knowledge of tangible or intangible heritage that might be impacted. Woodside uses multiple sources of information including publicly available literature, heritage databases and feedback from consultation in order to identify tangible and intangible cultural features of the environment, as described in Sections 4.9 and 6.11.
- MAC noted the size of the EMBA and management procedures in place to protect cultural values. MAC advocated for a process for engagement to protect cultural heritage and Outstanding Universal values in the event of an incident. Woodside has addressed oil spill preparedness and response strategy in Appendix H.

- MAC advised Woodside that any activities that could potentially affect the natural movement or behaviour of marine species may impact cultural values. Woodside has assessed impacts and risks to marine species in Section 6 of the EP. Items relating to MAC appear in section 4.9.
- MAC stated that the protection of environmental values should be assessed separately from the protection of cultural values in EPs. Woodside undertakes assessments for both environmental and cultural values. These are considered both individually and collaboratively. Woodside's First Nations Cultural Features and Heritage Values Assessment is in section 6.11.
- MAC stated that it expects to be consulted about any activity located near Murujuga and contacted in the event of an environmental incident whereby Murujuga falls within the possible impact zone. Woodside's Oil Spill Preparedness and Response Mitigation Assessment is in Appendix H of the EP. Woodside's Oil Pollution First Strike Plan is in Appendix I of the EP. Woodside engages with Traditional Owners for applicable events.
- Woodside engages with ongoing consultation, beyond that required by regulation 25 of the Environment Regulations, throughout the life of an EP. Should feedback be received after the EP has been accepted (including any relevant new information on cultural values), it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of the EP). Woodside considers the measures and controls described in this EP address the potential impact from the proposed activity on MAC's functions, interests or activities.

Nganhurra Thanardi Garrbu Aboriginal Corporation (NTGAC)

NTGAC is established under the Native Title Act 1993 by the Baiyungu people to represent the Baiyungu people (defined broadly by reference to descent from the set of ancestors who were known to have a continuous and unbroken connection as the Traditional Custodians at the time of European colonisation) and represent their communal interests including, among other things, management and protection of cultural values.

Woodside has an existing relationship with NTGAC that extends to a period prior to consultation for this EP. Woodside's consultation approach for NTGAC and Traditional Owners has a focus on building and maintaining relationships with each group. This is underpinned by Woodside's Program of Ongoing Engagement (sent to NTGAC on 26 July 2023). Woodside has assigned a First Nations Engagement team member as a focal point for EP consultation with NTGAC who is responsible for building a relationship and is available to provide information and take feedback.

Aside from regular consultation about EPs, Woodside invites NTGAC to Woodside's Quarterly Heritage Meetings and monthly Community Luncheons. Woodside has continually confirmed it is open to receiving or being notified of feedback, claims or objections on EPs during its engagement with NTGAC, including on this EP. Woodside made multiple offers during consultation for this EP to meet with NTGAC. This led to a half-day meeting in Carnarvon, a location of NTGAC's choice (see 12 September 2024). YMAC is the NTRB for the Aboriginal corporations in the Yamatji and Pilbara regions, including NTGAC. NTRBs exist to provide assistance to native title claimants and holders in relation to their native title rights.

As part of its ongoing consultation and relationship building, Woodside provided NTGAC via YMAC a 7-page consultation framework agreement in February which sought from NTGAC, confirmation as to how NTGAC would like to be consulted, including NTGAC's views on what constituted sufficient information, a reasonable period of time and a reasonable opportunity for consultation. During consultation for this EP, Woodside agreed to pay reasonable costs for YMAC to review this draft agreement. While an agreement like this is useful to outline consultation norms for NTGAC, Woodside has noticed that there appears to be limited appetite from groups like NTGAC to enter in a framework agreement that sets this position out in an agreement form. While Woodside has continued to attempt to progress the framework agreement, it remains in a draft form and has not been progressed. We note, however, that this has not prevented consultation on this EP from progressing in parallel to discussions on the framework agreement.

This context and process demonstrates that Woodside's consultation approach with NTGAC is appropriate and adapted to the nature of and interests of NTGAC.

Historical Engagement:

- On 19 July 2023, Woodside emailed NTGAC NOPSEMA's *Consultation Guidelines, Consultation Brochure, and Draft Policy for Managing Gender-Restricted Information*. This email also reiterated Woodside's request that NTGAC advise Woodside of any other Traditional Custodian groups or individuals with whom Woodside should consult.
- On 26 July 2023, Woodside emailed NTGAC via YMAC Woodside's planned *Program of Ongoing Engagement with Traditional Custodians*, noting that Woodside's Program would complement what is proposed in NTGAC's proposed Framework.

  Please see Scarborough Seabed Intervention and Trunkline Installation EP (Appendix F and SI Report) for further details of this correspondence.

Summary of information provided and record of consultation for this EP:

- On 20 March 2024, Woodside emailed NTGAC via YMAC advising of the proposed activity (Record of Consultation, reference 2.28), providing a Summary Information Sheet (including a link to the detailed information sheet on Woodside's website), and links to the NOPSEMA consultation brochure and guidelines, and draft policy for managing gender-restricted information. The email requested information on the interests that NTGAC and its members may have within the EMBA, information on how NTGAC would like to engage, and requested that NTGAC provide information to other individuals as required. Woodside asked NTGAC/YMAC to provide feedback before 18 April 2024.
- On 26 March 2024, NTGAC/YMAC emailed Woodside with an out of office message advising the recipient was on leave until 2 April 2024 and providing a contact for urgent queries (SI Report, reference 15.1).
- On 12 April 2024, Woodside emailed NTGAC/YMAC to offer further information and any assistance required including a meeting or discussion (SI Report, reference 15.2).
- Between 16 May and 19 June 2024, Woodside and NTGAC/YMAC exchanged emails about a request by Woodside to meet with the NTGAC Board to discuss EPs (SI Report, references 15.3, 15.4, 15.5 15.6, 15.7) While the possibility of Woodside attending NTGAC's July Board meeting was briefly mentioned, this meeting did not go ahead. Woodside and NTGAC instead met in September 2024.

Ongoing Engagement

- Between 27 June and 10 July 2024, Woodside and NTGAC/YMAC exchanged emails about a draft consultation agreement provided by Woodside in February. **(1)** NTGAC/YMAC requested Woodside pay costs associated with reviewing the agreement. **(1)** During the exchange Woodside agreed to pay costs quoted by NTGAC/YMAC to review the agreement (SI Report 15.8, 15.9, 15.10, 15.11).
- Between 30 July and 20 August 2024, NTGAC via YMAC and Woodside exchanged emails to arrange a half day meeting on 12 September 2024 in Carnarvon (SI Report, references 15.12, 15.13, 15.14).
- On 6 September 2024, Woodside spoke to NTGAC on the phone (SI Report, reference 15.15). Matters discussed relevant to this EP include:
  - The agenda for the 12 September 2024 meeting including EPs intended to be presented.
  - NTGAC thanked Woodside for efforts in making a personal connection.
- Between 10 September and 11 September 2024, Woodside and NTGAC via YMAC exchanged emails about meeting on 12 September 2024 (SI Report, references 15.16, 15.17, 15.18, 15.19, 15.20, 15.21, 15.22.
- On 12 September 2024, Woodside and NTGAC/YMAC met (SI Report, reference 15.23). Matters discussed that were relevant to this EP include:

- Woodside confirmed attendees were familiar with EPs and NOPSEMA. Attendees acknowledged they were.
- Woodside displayed a map of its activities in WA.
- Woodside explained the EP consultation process.

- On 3 October 2024, Woodside emailed NTGAC an invitation to share stories and receive updates from Woodside at its Monthly Luncheon for Traditional Owners (SI Report, reference 15.24).
- On 5 December 2024, Woodside emailed NTGAC/YMAC an update on this activity (SI Report, reference 15.25). Woodside:
  - Informed NTGAC/YMAC that Woodside would resubmit this EP for further assessment by NOPSEMA.
  - Notified NTGAC/YMAC that consultation for this EP would close on 19 December 2024 and that feedback provided by that date would be reflected in the EP and considered by NOPSEMA.
  - Acknowledged discussions relating to framework agreements had been ongoing since August 2023 but consultation had occurred in parallel for this EP.
  - Provided an attachment (Attachment A) outlining:
    - **(2)** NTGAC had requested information about whale sightings and response
    - **(2)** Woodside provided an EP reference to potential impacts to marine fauna.
    - **(3)** NTGAC had requested information about ballast water discharges.
    - **(3)** Woodside provided an EP reference to potential impacts from ballast water transfer.
  - Woodside stated:
    - That NTGAC/YMAC was welcome to state its preferred method of consultation including whether it would like to meet face-to-face.
    - That Feedback can continue to be provided during the life of an EP, including after consultation for the EP has closed, during EP assessment, and after an EP has been accepted by NOPSEMA. Woodside continues to receive, assess and respond to claims and objections from relevant persons throughout the life of the EP. Should a claim or objection be received following the acceptance of an EP that Woodside assesses, and which identifies a measure or control that Woodside considers requires implementation or updates to meet the intended outcome of consultation, Woodside will apply its Management of Change and Review process as appropriate.
- On 10 March 2025, Woodside emailed NTGAC/YMAC to correct EP references provided in its email on 5 December 2024 (SI Report 15.26). Woodside:
  - Directed NTGAC/YMAC to the published Pluto Operations EP on NOPSEMA's website and provided correct references to:
    - **(2)** Whale sighting reporting and controls.
    - **(3)** Woodside's assessment of potential impacts from ballast water transfer.
  - Explained that there could be slight changes to the numbering of these references when Woodside submits an updated version of the EP to NOPSEMA.
  - Explained that while consultation had closed for the purposes of preparing the EP, feedback could continue to be provided during the life of the EP.
  - Invited NTGAC/YMAC to contact Woodside for more information.

Summary of Feedback, Objection or Claim	**Assessment of Merits of Feedback, Objection or Claim and Woodside's Response**	**Inclusion in Environment Plan**

(1) NTGAC/YMAC has requested Woodside pay costs associated with reviewing a consultation agreement draft	**(1)** **Woodside assessment:** Woodside is supportive of a sustainable consultation framework and has a commitment to ongoing consultation with Traditional Custodians for the life of an EP. Woodside pays reasonable costs for consultation. **Woodside response:** Separate from consultation for this activity under regulation 25 of the Environment Regulations, Woodside has sent a draft agreement to NTGAC via YMAC in February 2024. This would be used to frame ongoing consultation to occur as part of Woodside's commitment to consultation post regulation 25 of the Environment Regulations. The draft agreement is under review by NTGAC/YMAC and Woodside has agreed to pay reasonable costs associated with this.	**(1)** Woodside is implementing a program to actively support Traditional Custodians' capacity for ongoing engagement and consultation on EPs (Appendix G). This includes continued engagement regarding NTGAC and Woodside's proposed draft Consultation Agreement and potential opportunities for alignment with NTGAC's Strategic Plan. Although consultation for the purpose of regulation 25 of the Environment Regulations is complete, Woodside will continue to consult following acceptance of the EP, as required by the implementation strategy as set out in regulation 35(7) of the Environment Regulations.
(2) During consultation about previous EPs, NTGAC requested information about whale sightings and response.	**(2)** **Woodside assessment:** Woodside has incorporated NTGAC's feedback into this EP. **Woodside response:** Woodside has informed NTGAC about how this feedback has been incorporated into the EP. On 10 March 2025, Woodside directed NTGAC to the published EP on NOPSEMA's website and provided correct references to whale sighting reporting and controls.	**(2)** Woodside has described whale sighting reporting in Section 7.13.3.2 in the published EP on the NOPSEMA website and 7.13.3.2 in this submission to NOPSEMA. Controls in response to whale sightings are listed in Section 6.7.3 in the published EP on the NOPSEMA website and 6.7.3 in this submission to NOPSEMA.
(3) During consultation about previous EPs, NTGAC requested information about ballast water discharges.	**(3)** **Woodside assessment:** Woodside has incorporated NTGAC's feedback into this EP. **Woodside response:** Woodside has informed NTGAC about how this feedback has been incorporated into the EP. On 10 March 2025, Woodside directed NTGAC to the published EP on NOPSEMA's website and provided correct references to potential impacts from ballast water transfer.	**(3)** Woodside has addressed potential impacts from ballast water transfer in Section 6.9.10 of the published EP on the NOPSEMA website and 6.9.10 in this submission to NOPSEMA.

While feedback has been received, there were no objections or claims.	Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. Woodside engages in ongoing consultation throughout the life of an EP. Woodside notes that further feedback may be received as part of ongoing consultation. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	Based on the engagement to date, no additional measures or controls are required.
Summary Report: Consultation Complete		

Woodside has discharged its obligations for consultation under Regulation 25 of the Environment Regulations and consultation with NTGAC for the purpose of Regulation 25 is complete. Sufficient information, a reasonable period and reasonable opportunity have been provided, as described in Section 5.5 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Sufficient information has been provided because:

- Woodside provided NTGAC with relevant consultation documents, including NOPSEMA's *Consultation Guidelines, Consultation Brochure and Draft Policy for Managing Gender-Restricted Information* (informing stakeholders on how consultation is conducted and providing avenues for providing information on sensitive matters) (see 19 July 2023).
- In February 2024, Woodside made the Consultation Information Sheet about this EP publicly available on the Woodside website. The EP was published on the NOPSEMA website in May 2024.
- On 20 March 2024, Woodside commenced consultation with NTGAC on this EP. Woodside provided NTGAC:
  - A Summary Information sheet. developed specifically for First Nations groups and reviewed by a Woodside First Nations staff member. This sheet included:
    - An overview of the activity and proposed timing
    - Maps showing the location and EMBA
    - A summary of the risks and impacts of the activity
    - Diagrams
    - Details about how to provide feedback.
  - The purpose of consultation, and what was being sought by Woodside through consultation including understanding the nature of NTGAC's interests and how the activity could potentially impact those interests.
  - That Woodside had undertaken assessments to identify potential impacts and risks to the marine environment and developed mitigation and management measures.
  - Woodside asked NTGAC to forward the information to its members.
  - Woodside offered to provide more specific information, maps and images to NTGAC if required.
- Woodside followed-up with NTGAC on 12 April 2024 and made repeated offers to meet to discuss this EP and others. This led to a meeting in Carnarvon on 12 September 2024.
- On 5 December 2024, Woodside advised NTGAC/YMAC that it would resubmit the EP. Woodside again provided NTGAC/YMAC with information relating to this EP and invited NTGAC/YMAC to provide feedback no later than 19 December 2024. Woodside also advised that consultation for this EP had run in parallel to discussions about consultation framework agreements.
- On 10 March 2025, Woodside emailed NTGAC/YMAC a correction to EP reference numbers provided in the 5 December 2024 email.

Reasonable Period

Woodside allowed NTGAC a reasonable period for consultation in the preparation of this EP because:

- Woodside commenced consultation on this EP with NTGAC in March 2024 and provided further information on the EP on that date. Since then, Woodside and NTGAC have engaged in consultation for 14 months demonstrating a “reasonable period” of consultation, where a genuine two-way dialogue has occurred during both written and face-to-face exchanges on this EP.
- A consultation period was communicated to NTGAC during Woodside’s initial email on 20 March 2024. NTGAC was asked to provide feedback by 18 April 2024 in-line with Woodside’s methodology of a 30-day consultation period. This period enabled Woodside to assess feedback before the EP was submitted.
- Woodside ultimately provided NTGAC with two months to consult ahead of Woodside preparing the EP and continues to take feedback in relation to the EP.
- Woodside provided NTGAC/YMAC an additional two-weeks in December to provide feedback ahead of the EP being resubmitted to NOPSEMA.

Reasonable Opportunity

Woodside allowed NTGAC a reasonable period for consultation in the preparation of this EP because:

- Woodside asked for NTGAC’s input into how NTGAC would like to engage in consultation and has consulted in a way that Woodside understands is appropriate for NTGAC and First Nations groups more generally.
- Woodside has made information on this EP publicly available for 14 months. This has included publishing advertisements in Indigenous, regional, state and national, newspapers including the National Indigenous Times (26 February 2024), the Koori Mail, the North West Telegraph, the Pilbara News, the Australian and the West Australian (28 February 2024) advising of the proposed activities and requesting feedback.
- Woodside ran a targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP.
- Woodside has an existing relationship with NTGAC and both Woodside and NTGAC commonly use email to consult and correspond. Woodside also engages with NTGAC in face-to-face meetings, at forums and in phone calls.
- Woodside’s initial email about this EP on 20 March 2024:
  - Included a general email address and telephone number for Woodside as well as direct email and telephone number for a focal person from Woodside’s First Nations Engagement team. Woodside also provided contact details for NOPSEMA.
  - Offered for Woodside to speak with NTGAC members as well as the NTGAC Board.
  - Asked NTGAC to advise how it would like Woodside to engage and whether NTGAC required further information.
- Woodside met with NTGAC on 12 September 2024. The meeting was attended by Woodside’s First Nations Engagement team focal person and environmental subject matter experts who were available to answer questions and provide specialist information. This was done deliberately so that information could be provided to NTGAC in a way that enabled NTGAC to understand the information (in a time frame and with questions controlled by NTGAC).
- Woodside asked NTGAC if it was aware of any other Traditional Custodian groups or individuals with whom Woodside should consult.
- Woodside provided NTGAC/YMAC a further opportunity in December 2024 to provide feedback ahead of resubmitting this EP to NOPSEMA.

Outcomes of Consultation

The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- During the past 14 months NTGAC has not provided feedback about this EP.

- During consultation about previous EPs, NTGAC has sought information about whale sightings and response and ballast water discharges. Woodside has addressed these matters in the EP and provided references to NTGAC.
- Woodside engages in ongoing consultation once an EP has been submitted for assessment as well as throughout the life of an EP. Should feedback be received after the EP has been accepted (including relevant new information on cultural values), it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).
- Woodside considers the measures and controls described in this EP address the potential impact from the proposed activity on NTGAC's functions, interests or activities.

Buurabalayji Thalanyji Aboriginal Corporation (BTAC)

BTAC is established under the Native Title Act 1993 by the Thalanjyi people to represent the Thalanjyi people (defined broadly by reference to descent from the set of ancestors who were known to have a continuous and unbroken connection as the Traditional Custodians at the time of European colonisation) and represent their communal interests including, among other things, management and protection of cultural values.

Woodside has been working with BTAC for more than two years. Woodside's consultation approach for Traditional Custodians has a focus on building and maintaining relationships with each group. This is underpinned by Woodside's Program of Ongoing Engagement (sent to BTAC on 26 July 2023). Woodside has assigned a First Nations Engagement team member as a focal point for EP consultation with BTAC who is responsible for building a consultative relationship and is available to provide information and take feedback from BTAC.

On 13 October 2023, BTAC appointed a legal representative and requested that Woodside correspond with both the CEO and BTAC's legal representative moving forward. In some instances, during the course of consultation, BTAC's legal representative raised items in relation to legal fees and indemnity agreements. Woodside confirmed it would not action these requests as they did not fall within Woodside's policies and procedures. BTAC's legal representative also maintained a strong focus on agreements rather than consultation. Despite this, Woodside remained open to consult on this EP and consultation for this EP did not cease during this period and was not impeded during this process.

As part of its ongoing consultation and relationship building, Woodside provided BTAC with a 7-page consultation framework agreement which sought from BTAC, confirmation as to how BTAC would like to be consulted, including BTAC's views of what constituted sufficient information, a reasonable period of time and a reasonable opportunity for consultation. While an agreement like this is useful to outline consultation norms for BTAC, Woodside has noticed that there appears to be limited appetite from groups like BTAC to enter in a framework agreement that sets this position out in an agreement form. We note, however, that this has not prevented consultation progressing in parallel to discussions on the framework agreement.

Woodside has offered BTAC financial support for Sea Country mapping. Woodside is still working with BTAC for the scope of this mapping (most recently in July 2024).

Historical Engagement:

- On 20 February 2023, BTAC emailed Woodside a letter in relation to another project but relevant to all Woodside activities in the Pilbara including the footprint of this activity. BTAC stated that :

- **(1)** BTAC on behalf of the Thalanyji people had an enduring deep connection to Sea Country north of Onslow, extending out to islands off the Pilbara coast such as the Montebello islands, Barrow Island and the Mackerel islands.
- **(2)** BTAC sought support from Woodside to enable it to define and articulate is Sea Country values in a manner that could be more clearly understood by the offshore sector.

- On 19 July 2023, Woodside emailed BTAC NOPSEMA's *Consultation Guidelines, Consultation Brochure, and Draft Policy for Managing Gender-Restricted Information*. This email also reiterated Woodside's request that BTAC advise Woodside of any other Traditional Custodian groups or individuals with whom Woodside should consult.
- On 26 July 2023, Woodside emailed BTAC Woodside's planned *Program of Ongoing Engagement with Traditional Custodians*.
- **(1, 2)** On 31 July 2023, in response to BTAC's request for support, Woodside emailed 3 letters to BTAC, one of which outlined support for an ethnographic assessment to:
  - Identify Sea Country values generally sufficient to inform all Woodside EPs.
  - Identify any work necessary to clarify or define the offshore areas that are relevant to the Thalanyji People.

Please see Scarborough Seabed Intervention and Trunkline Installation EP (Appendix F and SI Report) and Scarborough Offshore Facility and Trunkline (Operations) EP (Appendix F and SI Report currently under assessment by NOPSEMA) for further details of this correspondence.

Summary of information provided and record of consultation for this EP:

- On 1 March 2024, Woodside emailed BTAC via its legal representative advising of the proposed activity (Record of Consultation, reference 2.29), providing a Summary Information Sheet (including a link to the detailed information sheet on Woodside's website), and links to the NOPSEMA consultation brochure and guidelines, and draft policy for managing gender-restricted information. The email requested information on the interests that BTAC and its members may have within the EMBA, information on how BTAC would like to engage, and requested that BTAC provide information to other individuals as required Woodside requested feedback by 29 March 2024.
- On 5 March 2024, BTAC via its legal representative emailed Woodside to request a face-to-face meeting for consultation on this activity (SI Report reference 16.1).
- On 6 March 2024, Woodside emailed BTAC (via its legal representative) to indicate its willingness to meet face-to-face and to request a suitable meeting date (SI Report reference 16.2).
- On 11 March 2024, BTAC via a legal representative emailed Woodside to advise it had appointed a Woodside NOPSEMA Engagement Committee (SI Report reference 16.3).
- On 26 March 2024, Woodside emailed BTAC another notification of this activity and attached a Summary Information Sheet (SI Report reference 16.4).
- On 27 March 2024, BTAC via a legal representative emailed Woodside in response to another activity but attaching the initial email and response from this activity, advising BTAC wished to consult in a face-to-face meeting (SI Report reference 16.5).
- On 27 March 2024, Woodside emailed BTAC via a legal representative thanking BTAC for its email and indicating it would await BTAC's advice on a suitable meeting date (SI Report, reference 16.6).
- Between 15 – 22 April 2024, BTAC and Woodside exchanged emails (SI Report, references 16.7, 16.8, 16.9, 16.10, 16.11) to confirm Woodside would attend a meeting with BTAC Directors on 22 May 2024.

- On 22 May 2024, Woodside and BTAC met for the purpose of consulting on EPs, including this activity (SI Report, reference 16.12). Matters discussed included:
  - An overview of the Pluto Operations activity including the EMBA and possible impacts. No questions were raised.
  - **(3)** BTAC queried support to engage a third-party independent expert to interpret EPs due to an internal lack of expertise.
  - **(2)** Woodside's ongoing commitment to support BTAC to articulate their Sea Country values.
  - Woodside's interest in understanding BTAC's thoughts on any additional steps for the management of heritage.

Ongoing Engagement

- **(2, 3)** On 13 June 2024, Woodside emailed BTAC to request an update on how Woodside can assist BTAC to articulate Sea Country values, and offering continued support for this work and an ethnographic survey (SI Report, reference 16.13).
- **(2)** Between 19 June and 31 July 2024, Woodside and BTAC exchanged emails BTAC's proposed scope for Sea Country mapping (SI Report, references 16.14, 16.15, 16.16, 16.17, 16.18, 16.19)
- On 9 September 2024, Woodside invited BTAC to share stories and receive updates from Woodside at its Monthly Luncheon for Traditional Owners (SI Report, reference 16.20).
- On 3 October 2024, Woodside invited BTAC to share stories and receive updates from Woodside at its Monthly Luncheon for Traditional Owners (SI Report, reference 16.21).
- On 18 November 2024, Woodside emailed BTAC in relation to a meeting that had occurred on 15 November 2024 about a matter not related to this EP (SI Report, reference 16.22). Matters relating to this EP included:
  - **(3)** Woodside and BTAC would finalise a sea country mapping scope.
  - **(4)** BTAC would send a ranger program proposal to Woodside. **(4)** Woodside would consider the proposal.

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
(1) BTAC stated that its interests include archaeological sites identified on nearshore islands including the Montebello Islands, Barrow Island and the Mackerel Islands.	**(1)** **Woodside Assessment:** Given the EMBA overlaps some of this area these values may be relevant in the event of an unplanned hydrocarbon release. Woodside will engage with Traditional Custodians whose interests may be affected in the event of a hydrocarbon release, as outlined in Appendix H. **Woodside Response:** Woodside has sought to engage BTAC in further assessments of sea country values. BTAC has not provided further detail regarding heritage value of places or cultural features of the Operational Area or the EMBA.	**(1)** Existing controls considered sufficient as described in Section 6.11 and Appendix H.
(2)	**(2)**	**(2)**

BTAC has a cultural obligation to care for the environmental values of sea country but needed support to articulate these in a format suitable for consultation.	**Woodside Assessment:** Woodside assessed BTAC's cultural obligation to care for the environmental values of sea country to represent potential cultural values. **Woodside Response:** Woodside updated relevant sections in the EP to record BTAC's interests and potential cultural values, assessed the potential impact on these and included controls. Woodside agreed to support the articulation and recording of sea country values and offered financial support. Woodside is still working with BTAC to finalise the scope..	Woodside updated Section 4.9 to record BTAC's interests and potential cultural values and assessed potential impact on these, including controls, in Section 6.11. The proposed Consultation Agreement **(5)** enables an ethnographic survey to be undertaken at a later date but is not required to discharge regulation 25 of the Environment Regulations requirements. Should feedback be received after the EP has been accepted (including any relevant new information on cultural values), it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2).
(3) Requested Woodside supports BTAC in obtaining technical advice relating to proposed activities.	**(3)** **Woodside Assessment:** Woodside considers it beneficial for Thalanyji to have technical advice to ensure the delivery of an outcome that does justice to the work involved to record the sea country values. **Woodside Response:** Woodside has offered support for sea country mapping and is working with BTAC to finalise the scope.	**(3)** Not required
(4) BTAC will send a ranger proposal to Woodside.	**(4)** **Woodside Assessment:** Woodside is supportive of ongoing engagement with Traditional Custodians through ranger programs. **Woodside Response:** Woodside will assess BTAC's ranger proposal.	**(4)** Ranger programs are able to be addressed as part of Woodside's Program of Ongoing Engagement (Appendix G)
Woodside has addressed objections and claims as noted above.	Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. Woodside engages in ongoing consultation throughout the life of an EP. Woodside notes that further feedback may be received as part of ongoing consultation. Should feedback be received after	Based on the engagement to date, no additional measures or controls are required.

	the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	

Summary Report: Consultation Complete

Woodside has discharged its obligations for consultation under Regulation 25 of the Environment Regulations and consultation with NTGAC for the purpose of Regulation 25 is complete. Sufficient information, a reasonable period and reasonable opportunity have been provided, as described in Section 5.**5** of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

- Woodside has provided BTAC with relevant consultation documents, including NOPSEMA's *Consultation Guidelines, Consultation Brochure, and Draft Policy for Managing Gender-Restricted Information*, informing stakeholders on how consultation is conducted and providing avenues for providing information on sensitive matters (see 18 July 2023).
- In February 2024, Woodside made the Consultation Information Sheet about this EP publicly available on the Woodside website. The EP was published on the NOPSEMA website in May 2024.
- On 1 March 2024, Woodside commenced consultation with BTAC on this EP. Woodside provided BTAC:
  - A Summary Information sheet developed specifically for First Nations groups and reviewed by a First Nations staff member. This sheet included:
    - An overview of the activity and proposed timing.
    - Maps showing the location and EMBA.
    - A summary of the risks and impacts of the activity.
    - Diagrams.
    - Details about how to provide feedback.
  - The purpose of consultation, and what was being sought by Woodside through consultation including understanding the nature of BTAC's interests and how the activity could impact those interests.
  - That Woodside had undertaken assessments to identify potential impacts and risks to the marine environment and developed mitigation and management measures.
  - Woodside asked BTAC to forward the information to its members.
  - Woodside offered to provide more specific information, maps and images to BTAC if required.
- Further information was provided to BTAC on 26 March when Woodside emailed BTAC another notification of this activity and attached a summary information sheet and on 22 May when Woodside met BTAC face-to-face to discuss this EP and others. This meeting was attended by the BTAC CEO, directors and legal representatives. Members from Woodside's First Nations Team (including BTAC's assigned focal person for EP consultation) and environmental subject matters experts were available to answer all questions and provide specialist information on this EP.

Reasonable Period

Woodside allowed BTAC a reasonable period for consultation in the preparation of this EP because:

- Woodside commenced consultation with BTAC in March 2024 and provided information on the EP on that date. Since then, Woodside and BTAC have engaged in

consultation for 14 months, demonstrating a “reasonable period” of consultation, where a genuine two-way dialogue has occurred through both written and face-to-face exchanges on this activity.

- A consultation period was communicated to BTAC during Woodside’s initial email on 1 March 2024. BTAC was asked to provide feedback by 29 March 2024 in line with Woodside’s methodology of a 30-day consultation period. This period enabled Woodside to assess feedback before the EP was submitted.
- Woodside provided BTAC with two months to consult ahead of preparing the EP and continues to take feedback in relation to the EP.
- Woodside commenced consultation with BTAC in March 2024. Woodside has addressed and responded to BTAC queries over 14 months, demonstrating a “reasonable period” of consultation.

Reasonable Opportunity

A reasonable period for consultation in the preparation of this EP has been provided because:

- Woodside asked for BTAC’s input into how BTAC would like to engage in consultation and has consulted in a way that Woodside understands is appropriate for First Nations groups.
- Woodside has made information on this EP publicly available for 14 months. This has included publishing advertisements in Indigenous, regional, state and national, newspapers including the National Indigenous Times (26 February 2024), the Koori Mail, the North West Telegraph, the Pilbara News, the Australian and the West Australian (28 February 2024) advising of the proposed activities and requesting feedback.
- Woodside ran a targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP.
- Woodside’s initial email about this EP on 1 March 2024:
  - Included a general email address and telephone number for Woodside as well as a direct email address and telephone number for a dedicated focal person from the Woodside First Nations Engagement team. It also included contact details for NOPSEMA.
  - Offered for Woodside to speak with BTAC members as well as the BTAC Board.
- Asked BTAC to advise how it would like Woodside to engage and whether BTAC required further information.
  - Woodside asked BTAC if it was aware of any other Traditional Custodian groups or individuals with whom Woodside should consult.
- Throughout the consultation period (and following submission of the EP for assessment), Woodside and BTAC have exchanged multiple emails, had phone calls and met on a number of occasions. BTAC also has a legal representative who is able to support BTAC through the consultation process.
- Woodside met with BTAC on 22 May 2024 This meeting was attended by Woodside’s First Nations Team and environmental subject matter experts who were available to answer all questions and provide specialist information this EP.
- Woodside invites BTAC to monthly luncheons.

Outcomes of Consultation

The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- BTAC did not provide feedback or information during consultation for this EP relating to cultural values but has done so in consultation for other activities. Woodside has assessed potential impact on these, including controls, in Section 6.9.

- Woodside continues to work with BTAC on the scope of a Sea Country mapping proposal. Woodside has conducted desktop research to inform its understanding of the cultural features and heritage values of the environment. Woodside updated Section 4.9 to record BTAC's interests and potential cultural values and assessed potential impact on these, including controls, in Section 6.11.
- Woodside engages in ongoing consultation, once an EP has been submitted for assessment as well as throughout the life of an EP. Should feedback be received after the EP has been accepted (including relevant new information on cultural values), it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of the EP).
- Woodside considers the measures and controls described in this EP address the potential impact from the proposed activity on BTAC's functions, interests or activities

Yinggarda Aboriginal Corporation (YAC)

YAC is established under the Native Title Act 1993 by the Yinggarda people to represent the Yinggarda people (defined broadly by reference to descent from the set of ancestors who were known to have a continuous and unbroken connection as the Traditional Custodians at the time of European colonisation) and represent their communal interests including, among other things, management and protection of cultural values.

Woodside's consultation approach for Traditional Custodians has a focus on building and maintaining long-term relationships with each group. This is underpinned by Woodside's Program of Ongoing Engagement (sent to YAC on 26 July 2023). Woodside assigns an individual from the First Nations team to act as a relationship focal person for each group to provide a personalised experience. In August 2023 YAC retained a legal representative to engage with Woodside on NOPSEMA matters. Woodside has adapted its consultation processes to YAC's requirements by sending all correspondence relating to this EP to the legal representative, as requested by YAC. YAC is also assisted by Gumala Aboriginal Corporation (GAC)with administrative matters.

As part of its ongoing consultation and relationship building, Woodside provided YAC with a 7-page consultation framework agreement which sought from YAC, confirmation as to how YAC would like to be consulted, including YAC's views of what constituted sufficient information, a reasonable period of time and a reasonable opportunity for consultation. While an agreement like this is useful for Woodside to understand consultation norms for YAC, Woodside has noticed that there appears to be limited appetite from groups like YAC to enter into a framework agreement that sets this position out in an agreement form. While Woodside has continued to attempt to progress the framework agreement, despite numerous attempts, it remains in a draft form and has not been progressed. We note, however, that this has not prevented consultation progressing in parallel to discussions on the framework agreement.

This context and process demonstrates that Woodside's consultation approach with YAC is appropriate and adapted to the nature and interests of YAC.

Historical Engagement:

- On 5 July 2023, Woodside met YAC and gave a presentation about several EPs. Matters relevant to this EP included:
  - **(1)** YAC stated that plants, animals and the environment are inexorably linked to its culture and asked whether Woodside had undertaken environmental studies, whether these studies were ongoing and what environmental monitoring occurred after EPs were approved.
  - **(1)** Woodside responded that it had undertaken numerous environmental studies that form part of EPs and had an ongoing commitment to environmental studies and research. Woodside also explained that environmental monitoring was an ongoing activity and was committed to ongoing consultation with YAC and would take feedback if any new information in relation to risks came to light.
  - **(2)** YAC expressed concern about potential impacts to patterns of whales and potential collisions.

- **(2)** Woodside responded by explaining controls that would be put in place to minimise impacts and risks to whales.

- On 19 July 2023, Woodside emailed YAC via GAC NOPSEMA's *Consultation Guidelines, Consultation Brochure, and Draft Policy for Managing Gender-Restricted Information.* This email also reiterated Woodside's request that YAC advise Woodside of any other Traditional Custodian groups or individuals with whom Woodside should consult.
- On 26 July 2023, Woodside emailed YAC via GAC Woodside's planned *Program of Ongoing Engagement with Traditional Custodians*.

Please see Scarborough Seabed Intervention and Trunkline Installation EP (Appendix F and SI Report) for further details of this correspondence.

Summary of information provided and record of consultation for this EP:

- On 26 March 2024, Woodside emailed YAC via its legal representative advising of the proposed activity (Record of Consultation, reference 2.30), providing a Summary Information Sheet (including a link to the detailed information sheet on Woodside's website), and links to the NOPSEMA consultation brochure and guidelines, and draft policy for managing gender-restricted information. The email requested information on the interests that YAC and its members may have within the EMBA, information on how YAC would like to engage, and requested that YAC provide information to other individuals as required. Woodside requested feedback by 25 April 2024.
- On 27 March 2024, YAC via its legal representative emailed Woodside confirming YAC wished to consult on the EP. Woodside responded, acknowledging the email (SI Report, references 17.1, 17.2).
- On 4 April 2024, Woodside emailed YAC via its legal representative about an administrative matter relating to legal fees and requested the date of the next YAC Board meeting (SI Report, reference 17.3).
- On 8 April 2024, YAC via its legal representative emailed Woodside (SI Report, reference 17.4) advising the next YAC Board meeting would be held on 9 May 2024.
- On 10 May 2024, Woodside emailed YAC via its legal representative (SI Report, reference 17.5) a request to meet with YAC either during or outside of a Board meeting, for 3 hours at YAC's preferred location. Woodside agreed to fund the meeting and requested a cost estimate. Proposed matters for discussion included:
  - EP consultation: overview and EPs current at the time of meeting.
  - Upcoming consultation.
  - Matters Yinggarda would like to discuss.
  - Actions arising and next steps.

Ongoing Engagement

- Between 20 June and 16 July 2024, Woodside and YAC via its legal representative and GAC exchanged emails and phone calls to arrange a meeting on 18 July 2024 (SI Report, references 17.6, 17.7, 17.8, 17.9, 17.10, 17.11, 17.12).
- On 18 July 2024, Woodside met with the YAC Board (SI Report, reference 17.28). Matters discussed relating to this EP included:
  - **(3)** Support for education and training including ranger programs.
  - **(4)** Possibility of setting up workshops to discuss the formalisation of an agreement between Woodside and YAC.
- On 26 July 2024, Woodside emailed YAC via its legal representative a letter (SI Report, reference 17.14). Matters relevant to this EP included:
  - **(3)** Woodside would keep YAC informed about Woodside's consideration of ranger initiatives.
  - **(4)** Woodside looked forward to receiving YAC's feedback on the consultation framework and to hearing when YAC would like to meet again.

- Woodside was committed to continuing consultation with Traditional Custodians beyond the submission of EPs and this would not be YAC's only opportunity to engage with Woodside.
- Woodside invited YAC to share information with other organisations and individuals.

- On 2 November 2024, Woodside attended the Dampier Markets and engaged with relevant persons from Yinggarda. Woodside discussed EPs generally (SI Report, reference 17.15).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
(1) YAC stated that plants, animals and the environment are inexorably linked to its culture and asked whether Woodside had undertaken environmental studies, whether these studies were ongoing and what environmental monitoring occurred after EPs were approved.	**(1)** **Woodside assessment:** Woodside acknowledges YAC's feedback that plants, animals and the environment are inexorably linked to its culture. Woodside has undertaken numerous environmental studies, has an ongoing commitment to research and conducts environmental monitoring after EPs are accepted. **Woodside response:** Woodside has advised YAC that it has undertaken numerous environmental studies, has an ongoing commitment to research and conducts environmental monitoring after EPs are accepted. Woodside has also advised YAC that it continues to take feedback for the life on an EP and will inform YAC of any new information in relation to risks.	**(1)** Woodside has updated Section 4.9.4 to record YAC's interests and potential cultural values. Potential impact on these, including controls are detailed in Section 4.9.4. Woodside's commitment to ongoing engagement with YAC including informing YAC if new information becomes available about potential risks is detailed in Section 5.7. Woodside's environmental controls are described in Section 6.

(2) YAC expressed concern about potential impacts to patterns of whales and potential collisions.	**(2)** **Woodside assessment:** Woodside has noted YAC's interest in whales and has controls in place to minimise impacts and risks to whales. **Woodside response:** Woodside has advised YAC that controls are put in place to minimise impacts and risks to whales**.**	**(2)** Woodside has updated Section 4.9.4 to record YAC's interests and potential cultural values. Information about whales and migration patterns is recorded in Sections 4.6.3 and 4.6.5. Potential impact on these, including controls are detailed in Section 6.
(3) YAC enquired about support for education and training including ranger programs.	**(3)** **Woodside assessment:** Woodside considers value in having rangers on the ground trained up in the highly unlikely event of an oil spill. It would be beneficial to an immediate response in an emergency situation. **Woodside response:** Woodside looks forward to hearing about YAC's plans for a ranger program and will keep YAC informed about Woodside's consideration of ranger initiatives.	**(3)** The Program for Ongoing Engagement with Traditional Custodians (Appendix G) includes consideration of programs to support Indigenous Rangers, and support for Indigenous oil spill response capabilities.
(4) YAC is seeking the formalisation of a Consultation Framework Agreement.	**(4)** **Woodside assessment:** An agreement with YAC aligns with Woodside's Program of Ongoing Engagement with Traditional Custodians and will frame ongoing consultation processes. **Woodside response:** Woodside will finalise an agreement with YAC, although Woodside does not consider YAC's request for a consultation agreement as a pre-requisite for consultation under regulation 25 of the Environment Regulations. Sufficient information to allow informed assessment has already been provided by other means, including summary sheets developed by Indigenous staff. Woodside has also provided a reasonable period and opportunity for consultation.	**(4)** Woodside's program to actively support Traditional Custodians' capacity for ongoing engagement and consultation on EPs is currently being implemented, the draft agreement with YAC (among other things) will set out the process for ongoing engagement. This is described further in the Program of Ongoing Engagement with Traditional Custodians (Appendix G).
While feedback has been received, there were no objections or claims.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	Based on the engagement to date, no additional measures or controls are required.

Summary Report: Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and considers consultation with YAC for the purpose of Regulation 25 is complete. Sufficient information, a reasonable period and reasonable opportunity to provide feedback have been provided, as described in Section 5.5 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Sufficient information has been provided because:

- Woodside provided YAC with NOPSEMA's *Consultation Guidelines, Consultation Brochure and Draft Policy for Managing Gender-Restricted Information* (informing stakeholders on how consultation is conducted and providing avenues for providing information on sensitive matters) (see 19 July 2023).
- In February 2024, Woodside made the Consultation Information Sheet about this EP publicly available on the Woodside website. The EP was published on the NOPSEMA website in May 2024.
- On 26 March 2024, Woodside commenced consultation with YAC on this EP. Woodside provided YAC:
  - A Summary Information sheet developed specifically for First Nations groups and reviewed by a First Nations staff member. This sheet included:
    - An overview of the activity and proposed timing.
    - Maps showing the location and EMBA.
    - A summary of the risks and impacts of the activity.
    - Diagrams.
    - Details about how to provide feedback.
  - The purpose of consultation, and what was being sought by Woodside through consultation including understanding the nature of YAC's interests and how the activity could impact those interests.
  - That Woodside had undertaken assessments to identify potential impacts and risks to the marine environment and developed mitigation and management measures.
  - Woodside asked YAC to forward the information to its members.
  - Woodside offered to provide more specific information, maps and images to YAC if required.
- Woodside sought direction on YAC's preferred method of consultation. This resulted in a face-to-face meeting in the Pilbara between YAC and Woodside on 18 July 2024.

Reasonable Period

Woodside allowed YAC a reasonable period for consultation in the preparation of this EP because:

- Woodside commenced consultation on this EP with YAC on 26 March 2024 and provided information on the EP on that date. Woodside and YAC have engaged in consultation for 14 months, demonstrating a "reasonable period" of consultation.
- A consultation period was communicated to YAC via its legal representative during Woodside's initial email on 26 March 2024. YAC was asked to provide feedback by 25 April 2024 in line with Woodside's methodology of a 30-day consultation period. This period enabled Woodside to assess feedback before the EP was submitted.
- Woodside provided YAC with two months to consult ahead of preparing the EP and continues to take feedback in relation to the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided and Woodside's approach to consultation is appropriate and adapted because:

- Woodside asked for YAC's input into how YAC would like to engage in consultation and has consulted in a way that Woodside understands is appropriate for YAC and First Nations groups.
- Woodside has made information on this EP publicly available for 14 months. This has included publishing advertisements in Indigenous, regional, state and national, newspapers including the National Indigenous Times (26 February 2024), the Koori Mail, the North West Telegraph, the Pilbara News, the Australian and the West Australian (28 February 2024) advising of the proposed activities and requesting feedback.
- Woodside ran a targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP.
- Woodside's initial email about this EP on 26 March 2024:
  - Included a general email address and telephone number for Woodside as well as direct email and telephone number for a dedicated focal person from Woodside's First Nations Engagement team. Woodside also provided contact details for NOPSEMA.
  - Offered for Woodside to speak with YAC members as well as the YAC Board.
  - Asked YAC to advise how it would like Woodside to engage and whether YAC required further information.
  - Woodside asked YAC if it was aware of any other Traditional Custodian groups or individuals with whom Woodside should consult.
- Woodside invited YAC to monthly Community Luncheons.

Outcomes of Consultation

The measures (if any) that Woodside has adopted or proposes to adopt because of consultation are appropriate because:

- YAC raised relevant cultural heritage matters ahead of consultation for this EP These matters have been incorporated into this EP (see 1 and 2).
- Woodside engages in ongoing consultation once an EP is submitted for assessment as well as throughout the life of an EP. Should feedback be received after the EP has been accepted (including relevant new information on cultural values), it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).
- Woodside considers the measures and controls described in this EP address the potential impact from the proposed activity on YAC's functions, interests or activities

Kariyarra Aboriginal Corporation (Kariyarra)

Kariyarra is established under the Native Title Act 1993 by Kariyarra people to represent the Kariyarra people (defined broadly by reference to descent from the set of ancestors who were known to have a continuous and unbroken connection as the Traditional Custodians at the time of European colonisation) and represent their communal interests including, among other things, management and protection of cultural values.

Woodside has an existing relationship with KAC which extends prior to consultation for this EP. Woodside's consultation approach for Traditional Owners has a focus on building and maintaining long-term relationships with each group. This is underpinned by Woodside's Program of Ongoing Engagement (sent to KAC on 26 July 2023). Woodside has

assigned a First Nations Engagement team member as a dedicated focal person for EP consultation with KAC who is responsible for building a consultative relationship and ii readily available to provide information and take feedback. Aside from regular consultation about EPs, Woodside invites KAC to monthly luncheons.

For consultation on this EP, Woodside contacted KAC's legal representative offering an opportunity to present to KAC Elders, office holders and other interested parties. Woodside asked KAC how it wished to be consulted, if it required support to participate in consultation, if there were other relevant persons or groups that KAC considered should be consulted and requested that all information shared with KAC be cascaded to its members.

Woodside notes that during the course of consultation for this EP, there were a number of administrative changes at KAC. Woodside was advised by KAC in August 2024 that it had appointed a new CEO and Woodside updated its contact details to engage with the new CEO. KAC also advised that it changed legal representation during the consultation.

Woodside continues to work with KAC to finalise a consultation framework agreement. This agreement seeks confirmation from KAC as to how it would like to be consulted, including KAC's views on what constitutes sufficient information, a reasonable period of time and a reasonable opportunity for consultation, While an agreement like this is useful to outline consultation norms for KAC, Woodside has noticed that there appears to be limited appetite from groups like KAC to enter in a framework agreement that sets this position out in an agreement form. We note that while the agreement remains in draft form, this has not prevented consultation progressing in parallel to discussions on the framework agreement. We also note that in August 2024, following administrative changes and a change of legal advisor, KAC has requested discussions "start fresh" on the consultation framework agreement.

This context and process demonstrates that Woodside's consultation approach with KAC is appropriate and adapted to the nature and interests of KAC.

Historical Engagement:

- On 18 July 2023 Woodside emailed KAC NOPSEMA's *Consultation Guidelines, Consultation Brochure, and Draft Policy for Managing Gender-Restricted Information* This email also requested that KAC advise Woodside of any other Traditional Custodian groups or individuals with whom Woodside should consult.
- On 26 July 2023, Woodside emailed KAC Woodside's *Program of Ongoing Engagement with Traditional Custodians*.
- On 5 December 2023, Woodside and KAC met in Port Hedland. Matters relating to this EP included:
  - **(1)** KAC gave a presentation about its Sea Country Rights and Duties. This included:
    - Having access to Sea Country for fishing, trapping, crabbing, catching turtle and collecting shellfish.
    - Visiting offshore islands at low tide.
    - Hunting dugong and taking stingray barbs for spears
    - Having duties to look after and protect Sea Country, noting Yinta is associated with Sea Country and can be dangerous.
- On 20 December 2023, Woodside emailed KAC via its legal representative Matters relating to this EP included:
  - **(1)** Woodside confirmed the cultural values raised by KAC.
- On 20 December 2023, KAC via its legal representative emailed Woodside about another EP. Matters relevant to this EP included:
  - **(2)** KAC asked Woodside to add a reference to its EPs to avoid impacts to coastal landforms, coastal native vegetation, tangible Aboriginal cultural heritage sites and places and intangible Aboriginal heritage associated with the coast and ocean. **(2)** Woodside acknowledged this information.

Please see Scarborough Seabed Intervention and Trunkline Installation EP (Appendix F and SI Report) for further details of this correspondence.

Summary of information provided and record of consultation for this EP:

- On 6 March 2024, Woodside emailed Kariyarra via a legal representative advising of the proposed activity (Record of Consultation, reference 2.31), providing a Summary Information Sheet (including a link to the detailed information sheet on Woodside's website), and links to the NOPSEMA consultation brochure and guidelines, and draft policy for managing gender-restricted information. The email requested information on the interests that Kariyarra and its members may have within the EMBA, information on how Kariyarra would like to engage, and requested that Kariyarra provide information to other individuals as required. Woodside requested feedback by 3 April 2024.
- **(3)** On 10 March 2024, KAC via legal representative emailed Woodside (SI Report, reference 37.1) a draft consultation agreement for Woodside to review.
- **(3)** On 12 March 2024, Woodside emailed KAC via its legal representative (SI Report, reference 37.2) to acknowledge receipt of the draft agreement and note it would review and return to KAC in the future.
- **(3)** On 4 April 2024, Woodside and KAC's legal representative exchanged emails about the content of the draft agreement. (SI Report, references 37.3, 37.4).
- On 5 April 2024, Woodside emailed KAC via legal representative with a reminder of consultation for this activity and notification of an unrelated activity (SI Report, reference 37.5).

Ongoing Engagement

- On 26 June 2024, Woodside emailed KAC via legal representative to ask if there were further instructions from KAC on the draft agreement and proposed amendments (SI Report, reference 37.6).
- **(3)** On 3 July 2024, KAC's legal representative emailed Woodside and advised that the consultation agreement and recent Woodside EPs would be addressed by KAC's in-house counsel. The in-house counsel would revert to Woodside about the proposed agreement and EP consultation (SI Report, reference 37.7).
- On 3 July 2024, Woodside emailed KAC's legal representative and requested contact details for KAC's in-house counsel (SI report, reference 37.8).
- On 28 August 2024, KAC's in-house counsel emailed Woodside about a different EP, in the email KAC confirmed it was no longer represented by its former legal representative. The in-house counsel enquired about Woodside's availability for a phone call or online meeting to discuss and plan next steps (SI Report, reference 37.9).
- On 28 August 2024, Woodside emailed KAC and offered to speak on the phone or meet in person (SI Report, reference 37.10)
- On 29 August 2024, Woodside spoke to KAC on the phone (SI Report, reference 37.11). During the conversation:
  - Woodside confirmed its commitment to building meaningful relationships with First Nations groups.
  - KAC confirmed it had recruited a new CEO.
  - KAC expressed interest in negotiating a consultation agreement.
  - Woodside advised that negotiation of the consultation agreement work would run in parallel with EP consultation.
  - Woodside confirmed availability to consult and willingness to travel for meetings.
  - KAC confirmed it wanted to "start fresh" and requested a copy of the draft agreement.
  - KAC requested an online meeting on 3 September 2024.
  - Woodside offered to provide a copy of its presentation ahead of time to allow KAC to review and distribute it to its Board prior to the meeting.
  - KAC requested information about Woodside assets and Woodside advised it has no assets within the determination.

- Woodside explained how EMBAs are used as part of the methodology to ascertain and contact relevant people.

- On 3 September 2024, Woodside emailed its presentation to KAC for a meeting that day (SI Report, reference 37.12). Matters relevant to this EP that were discussed included:
  - Woodside's current projects including Pluto.
  - Woodside's commitment to working with First Nations communities.
  - How Woodside consults with First Nations communities, including ongoing consultation on EPs.

- On 3 September 2024, Woodside and KAC met virtually (SI Report, reference 37.13). Matters discussed included the following:
  - KAC wanted to build a valuable relationship with Woodside.
  - KAC advised it had undergone a recent internal restructure resulting in a new CEO, General Counsel and Native Title Representative.

- **(2)** On 3 September 2024, Woodside provided KAC with a copy of the draft consultation agreement originally provided in February 2024. KAC acknowledged receipt of the email. (SI Report, references 37.14, 37.15).
- On 4 September 2024, Woodside travelled from Karratha to South Hedland to meet KAC in-person (SI Report, reference 37.16). Matters discussed that were relevant to this EP included:
  - **(3)** KAC expressed a desire to finalise the consultation agreement.
  - **(3)** Woodside confirmed that consultation agreement negotiations run in parallel to EP consultations and it was important KAC provide feedback before the closure of consultation for each EP.
  - Woodside confirmed feedback deadlines are in consultation emails.
  - Woodside also confirmed that feedback is open for the life of an EP.
  - **(4)** KAC advised it would like to discuss opportunities with Woodside to support its ranger program. **(4)** Woodside replied that it was looking into a ranger assistance program.

- On 9 September 2024, Woodside invited KAC to share stories and receive updates from Woodside at its Monthly Community Luncheon for Traditional Owners for September (SI Report, reference 37.17).
- On 3 October 2024, Woodside invited KAC to share stories and receive updates from Woodside at its Monthly Community Luncheon for Traditional Owners for October 2024 (SI Report, reference 37.18).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
(1) KAC has outlined its Sea Country rights and duties, including: Looking after and protecting sea country, mentioning fishing, trapping, crabbing, catching turtle, hunting	**(1)** **Woodside assessment:** Woodside recognises that KAC may have Sea Country values within the EMBA for this EP. **Woodside response:** Woodside understands cultural and environmental values are intrinsically linked; in addition to the	**(1)** Woodside recognises KAC's connection to Sea Country (Section 4.9). Potential impacts on Cultural Features and Heritage Values are assessed in Section 6.11 of the EP.

dugong, and using stingray barbs for spears and collecting shellfish.	specific controls for cultural features and heritage values outlined in Section 6.11, the controls and performance standards in Section 6.7, 6.8 and 6.9 will ensure impacts to cultural features and heritage values, including marine species and habitats, are acceptable and ALARP.	
(2) KAC asked Woodside to add a reference to its EPs to avoid impacts to coastal landforms, coastal native vegetation, tangible Aboriginal cultural heritage sites and places and intangible Aboriginal heritage associated with the coast and ocean.	**(2)** **Woodside assessment:** Woodside accepts that KAC has an interest in the impacts on coastal landforms and coastal native vegetation. Woodside seeks to avoid damage or disturbance to cultural heritage (including intangible heritage) and assesses cultural heritage impacts, including both direct and indirect impacts and risks associated with PAPs. Mitigation can include any measure or control aimed at ensuring the viability of the intangible cultural heritage and its intergenerational transmission. **Woodside response:** Assessment of the impacts and risks associated with coastal landforms and coastal native vegetation have been captured in Section 4.9 and Section 6.11. Woodside understands cultural and environmental values are intrinsically linked; in addition to the specific controls for cultural features and heritage values, the controls and performance standards in section 6 will reduce impacts to cultural features and heritage values, including marine species and habitats.	**(2)** Woodside recognises KAC's connection to Sea Country (Section 4.9). Potential impacts on Cultural Features and Heritage Values are assessed in Section 6.11 of the EP.
(3) KAC has requested a consultation agreement with Woodside	**(3)** **Woodside assessment:** A consultation agreement with KAC aligns with Woodside's Program of Ongoing Engagement with Traditional Custodians. **Woodside response:** Woodside is working to finalise a draft agreement with KAC. Woodside does not consider KAC's request for a consultation agreement as a pre-requisite for consultation under regulation 25 of the Environment Regulations. Sufficient information to allow informed assessment has already been provided by other means, including summary sheets developed by Indigenous staff. Woodside has also provided a reasonable period and opportunity	**(3)** Woodside's program to actively support Traditional Custodians' capacity for ongoing engagement and consultation on EPs is currently being implemented. The draft agreement with KAC (among other things) will set out the process for ongoing engagement. This is described further in the Program of Ongoing Engagement with Traditional Custodians, (Appendix G). Woodside will continue to consult following acceptance of the EP, as set out in Section 7.12 of the EP

	for consultation.	
(4) KAC would like to discuss opportunities for Woodside to support its ranger program	**(4)** **Woodside assessment:** Woodside acknowledges the value in having trained rangers available in the highly unlikely event of an oil spill and agrees it would be beneficial to an immediate response in an emergency situation. **Woodside response:** Woodside is reviewing a ranger assistance program and will provide details to KAC once this has matured and notes a ranger program is not relevant to the activity under this EP.	**(4)** The Program for Ongoing Engagement with Traditional Custodians (Appendix G) includes commitments to social investment to support Indigenous Ranger programs, and support for Indigenous oil spill response capabilities.
While feedback has been received, there were no objections or claims.	Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. Woodside engages in ongoing consultation throughout the life of an EP. Woodside notes that further feedback may be received as part of ongoing consultation. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	Based on the engagement to date, no additional measures or controls are required.

Summary Report: Consultation Complete

Woodside has discharged its obligations for consultation under Regulation 25 of the Environment Regulations and consultation with KAC for the purpose of Regulation 25 is complete. Sufficient information, a reasonable period and reasonable opportunity have been provided, as described in Section 5.5 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Sufficient information has been provided because:

- Woodside has given KAC relevant consultation documents, including NOPSEMA's *Consultation Guidelines, Consultation Brochure and Draft Policy for Managing Gender-Restricted Information* (informing stakeholders on how consultation is conducted and providing avenues for providing information on sensitive matters) (see 18 July 2023).
- In February 2024, Woodside made the Consultation Information Sheet about this EP publicly available on the Woodside website. The EP was published on the NOPSEMA website in May 2024.
- On 6 March 2024, Woodside commenced consultation with KAC on this EP. Woodside gave KAC:
  - A Summary Information sheet developed specifically for First Nations groups and reviewed by a First Nations staff member. This sheet included:

  - An overview of the activity and proposed timing.
  - Maps showing the location and EMBA.
  - A summary of the risks and impacts of the activity.
  - Diagrams.
  - Details about how to provide feedback.
- The purpose of consultation, and what was being sought by Woodside through consultation including understanding the nature of KAC's interests and how the activity could impact those interests.
- That Woodside had undertaken assessments to identify potential impacts and risks to the marine environment and developed mitigation and management measures.
- Woodside asked KAC to forward the information to its members.
- Woodside offered to provide more specific information, maps and images to KAC if required.

- Woodside followed-up with KAC on this activity on 5 April 2024.
- Woodside sought direction on KAC's preferred method of consultation. This resulted in a phone call on 29 August 2024, an online meeting on 3 September 2024 and a face-to-face meeting on 4 September 2024.

Reasonable Period:

Woodside allowed KAC a reasonable period for consultation in the preparation of this EP because:

- Woodside commenced consultation on this EP with KAC in March 2024 and provided information on the EP on that date. Since then, Woodside and KAC have engaged in consultation for 14 months, demonstrating a "reasonable period" of consultation, where a two-way dialogue has occurred.
- A consultation period was communicated to KAC during Woodside's initial email on 6 March 2024. KAC was asked to provide feedback by 3 April 2024 in line with Woodside's methodology of a 30-day consultation period. This period enabled Woodside to assess feedback before the EP was submitted.
- Woodside provided KAC with two months to consult ahead of preparing the EP and continues to take feedback in relation to the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided and Woodside's approach to consultation is appropriate and adapted because:

- Woodside asked for KAC's input into how KAC would like to engage in consultation and has consulted in a way that Woodside understands is appropriate for First Nations groups.
- Woodside has made information on this EP publicly available for 14 months. This has included publishing advertisements in Indigenous, regional, state and national, newspapers including Indigenous publications the National Indigenous Times (26 February 2024) and the Koori Mail advising of the proposed activities and requesting feedback.
- Woodside ran a targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP.
- Woodside's initial email about this EP on 6 March 2024:
  - Included a general email address and telephone number for Woodside as well as direct email and telephone number for a dedicated focal person from Woodside's First Nations Engagement team. Woodside also provided contact details for NOPSEMA.
  - Offered for Woodside to speak with KAC members as well as the KAC Board.

- Asked KAC to advise how it would like Woodside to engage and whether KAC required further information.

Outcomes of Consultation

The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- KAC has outlined its Sea Country rights and duties, including looking after and protecting Sea Country, mentioning fishing, trapping, crabbing, catching turtle, hunting dugong, and using stingray barbs for spears and collecting shellfish. KAC has also asked Woodside to add a reference to its EPs to avoid impacts to coastal landforms, coastal native vegetation, tangible Aboriginal cultural heritage sites and places and intangible Aboriginal heritage associated with the coast and ocean. Woodside recognises KAC's connection to Sea Country (Section 4.9). Potential impacts on Cultural Features and Heritage Values are assessed in Section 6.11 of the EP.
- Woodside engages in ongoing consultation once an EP has been submitted for assessment as well as throughout the life of an EP. Should feedback be received after the EP has been accepted (including relevant new information on cultural values), it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).
- Woodside considers the measures and controls described in this EP address the potential impact from the proposed activity on KAC's functions, interests or activities.

Wanparta Aboriginal Corporation (Wanparta)

Wanparta is established under the Native Title Act 1993 by the Ngarla people to represent the Ngarla people (defined broadly by reference to descent from the set of ancestors who were known to have a continuous and unbroken connection as the Traditional Custodians at the time of European colonisation) and represent their communal interests including, among other things, management and protection of cultural values.

Wanparta jointly manages the 80 Mile Beach Marine Park which is adjacent to the EMBA. Woodside has a sound relationship with Wanparta. Woodside has assigned a First Nations Engagement team member as a dedicated focal point for EP consultation with Wanparta who is responsible for building a consultative relationship and is available to provide information and take feedback. This team member meets with Wanparta regularly. Woodside also attends Wanparta's Board Meetings when invited.

On 31 August 2023, Woodside met with the Wanparta Board and members in South Hedland. Woodside and Wanparta discussed the project and exchanged information. Following consultation, Wanpara's lawyer provided verbal confirmation that Wanparta supported the activity and confirmed Wanparta's commitment to continuing its relationship with Woodside.

Historical Engagement:

- On 18 July 2023 Woodside emailed Wanparta *NOPSEMA's Consultation Guidelines, Consultation Brochure, and Draft Policy for Managing Gender-Restricted Information* This email also requested that Wanparta advise Woodside of any other Traditional Custodian groups or individuals with whom Woodside should consult.
- On 26 July 2023, Woodside emailed Wanparta Woodside's planned *Program of Ongoing Engagement with Traditional Custodians*.
- **(1)** On 31 August 2023, Woodside met with the Wanparta Board and members in South Hedland. During the meeting Wanparta stated that water is extremely important to Ngarla people and they feel a responsibility to look after the ocean and lore.

Please see Scarborough Seabed Intervention and Trunkline Installation EP (Appendix F and SI Report) for further details of this correspondence.

Summary of information provided and record of consultation for this EP:

- On 28 February 2024, Woodside emailed Wanparta advising of the proposed activity (Record of Consultation, reference 2.36), providing a Summary Information Sheet (including a link to the detailed information sheet on Woodside's website), and links to the NOPSEMA consultation brochure and guidelines, and draft policy for managing gender-restricted information. The email requested information on the interests that Wanparta and its members may have within the EMBA, information on how Wanparta would like to engage, and requested that Wanparta provide information to other individuals as required.
- Between 16-22 April 2024, Woodside and Wanparta exchanged emails regarding logistics and funding for a meeting about this EP (SI Report, references, 21.1, 21.2, 21.3, 21.4, 21.5, 21.6, 21.7, 21.8, 21.9, 21.10).
- On 24 April 2024, Woodside met with Wanparta at Murujuga. Matters discussed relevant to this EP included:
  - Woodside provided an overview about the EP and asked for questions and feedback.
  - **(2)** Wanparta asked about the potential of vessel collision with seals, dolphins and turtles. **(2)** Woodside responded that it avoids migration times and has controls in place to manage marine fauna.
  - Woodside provided an update about the Pluto train 2 module, no questions were asked by the group.
  - Wanparta informed Woodside that the meeting had gone well and there were no issues.
- On 7 May 2024, Wanparta emailed Woodside a letter in relation to its meeting on 24 April 2024 (SI Report, reference 21.12). Wanparta advised:
  - **(3)** The Ngarla People have a deep connection to Sea Country.
  - **(4)** Octopus, stingray, spiny bream fish and kestrel are significant totem species.
  - **(5)** Wanparta would require further consultation with Woodside should the parameters of this EP change.
- On 30 May 2024, Woodside emailed Wanparta (SI Report, reference 21.13). Woodisde:
  - **(4)** Acknowledged the significance of the Ngarla People's totem species.
  - **(3)** Acknowledged the Ngarla People's right to exercise native title rights and interests on a well managed Sea Country.
  - **(5)** Woodside would provide timely updates on any changes to the Pluto Facility Operations.
- On 5 June 2024, Wanparta emailed Woodside in response to information provided by Woodside about other EPs (SI Report, reference 21.14). Wanparta shared details of a proposed meeting in August.
- On 28 August 2024, Woodside and Wanparta met in Port Hedland (SI Report, reference 21.15). Matters discussed relating to this EP:
  - **(6)** Wanparta asked for an update about Woodside's Ranger Program.
  - **(6)** Woodside said the Ranger Program was under assessment and it would respond soon.
- On 29 August 2024, Wanparta emailed Woodside a letter (SI Report, reference 21.16). Matters relevant to this EP included:
  - Wanparta requested Woodside attend its annual Board meeting for the purposes of consultation

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan

(1) During face-to-face engagement related to other activities Wanparta provided feedback on the importance of water and the ocean.	(**1**) **Woodside Assessment:** Woodside assessed Wanparta's interest in water to represent potential cultural values. **Woodside Response:** Wanparta's interests and potential cultural values have been recorded in the EP, the potential impact on the interests and values, including controls, have been assessed.	**(1)** Woodside updated Section 4.9 to record Wanparta's interests and potential cultural values and assessed potential impact on these, including controls, in Section 6.11.
(2) Wanparta has asked about the potential of vessel collision with seals, dolphins and turtles.	**(2)** **Woodside Assessment:** Woodside has mitigation measures in place to address potential risks to marine fauna. **Woodside Response:** Woodside has informed Wanparta that it avoids activity during migration periods and has controls in place to manage marine fauna.	**(2)** Information about interactions with marine fauna is contained in Section 6.9.9.
(3) On 7 May 2024, Wanparta advised of its connection to sea country.	**(3)** **Woodside Assessment:** Woodside assessed Wanparta's connection to sea country to represent potential cultural values. **Woodside Response:** Wanparta's interests and potential cultural values have been recorded in the EP, the potential impact on the interests and values, including controls, have been assessed.	**(3)** Woodside recognises that Wanparta holds Sea Country rights and interests that need to be protected (Section 4.9).
(4) On 7 May 2024, Wanparta advised of the significance of their totem species including the octopus, stingray, spiny bream fish and kestrel.	**(4)** **Woodside assessment:** Woodside respects Wanparta's cultural connections and knowledge, including their totem species. **Woodside response:** Woodside has noted the Wanparta's values and interests in their totem species in Section 4.9.4.	**(4)** Woodside updated Section 4.9 to record Wanparta's interests and potential cultural values.
(5) On 7 May 2024, Wanparta requested it be advised on any change in activity parameters.	**(5)** **Woodside assessment:** Woodside will provide notification to Wanparta in the event of significant change. **Woodside response:** Woodside has outlined this requirement in Table 7-6 of the EP.	**(5)** Woodside will provide notification of significant change, as appropriate, to Wanparta, as referenced in Table 7-6 of the EP.
(6) Wanparta has expressed an interest in Woodside's Ranger Program.	**(6)** **Woodside assessment:** Woodside considers value in having rangers on the ground trained up in the highly unlikely event of an oil spill. It	**(6)** The Program for Ongoing Engagement with Traditional Custodians (Appendix G) includes consideration of programs to

	would be beneficial to an immediate response in an emergency situation. **Woodside response:** Woodside will keep Wanparta updated about its ranger program.	support Indigenous Rangers, and support for Indigenous oil spill response capabilities.
While feedback has been received, there were no objections or claims.	Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. Woodside engages in ongoing consultation throughout the life of an EP. Woodside notes that further feedback may be received as part of ongoing consultation. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under Regulation 25 of the Environment Regulations and considers consultation with Wanparta for the purpose of Regulation 25 is complete. Sufficient information, a reasonable period and reasonable opportunity have been provided, as described in Section 5.5 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Sufficient information has been provided because:

- Woodside has given Wanparta relevant consultation documents, including NOPSEMA's Consultation Guidelines, Consultation Brochure and Draft Policy for Managing Gender-Restricted Information (informing stakeholders on how consultation is conducted and providing avenues for providing information on sensitive matters) (see 18 July 2023).
- In February 2024, Woodside made the Consultation Information Sheet about this EP publicly available on the Woodside website. The EP was published on the NOPSEMA website in May 2024.
- On 28 February 2024, Woodside commenced consulting with Wanparta on this EP. Woodside provided Wanparta:
  - A Summary Information sheet developed specifically for First Nations groups. This sheet included:
    - An overview of the activity and proposed timing.
    - Maps showing the location and EMBA.
    - A summary of the risks and impacts of the activity.
    - Diagrams.
    - Details about how to provide feedback.
  - The purpose of consultation, and what was being sought by Woodside through consultation including understanding the nature of WAC's interests and how the

activity could impact those interests.
- That Woodside had undertaken assessments to identify potential impacts and risks to the marine environment and developed mitigation and management measures.
- Woodside invited Wanparta to speak to Woodside. Woodside provided contact details including a general email address and telephone number for Woodside as well as the direct email address and telephone number of the assigned Woodside focal person. Woodside also provided Wanparta NOPSEMA's contact information.
- Woodside asked Wanparta to forward the information to its members
- Woodside offered to provide more specific information, maps and images to Wanparta if required.

- On 24 April 2024, Woodside met with Wanparta at Murujuga. Woodside made cultural heritage, First Nations engagement and marine specialists available to answer questions during the meeting. Wanparta informed Woodside that the meeting went well and there were no issues.
- Following the April meeting, Wanparta emailed Woodside and provided information about cultural values, demonstrating an understanding of the information provided by Woodside.

Reasonable Period

Woodside allowed Wanparta a reasonable period for consultation in the preparation of this EP because:

- Woodside commenced consultation on this EP with Wanparta on 28 February 2024 and provided information on the EP on that date. Since then, Woodside and Wanparta have engaged in consultation for a period of over 14 months, demonstrating a "reasonable period" of consultation.
- A consultation period was communicated to Wanparta during Woodside's initial email on 28 February 2024. Wanparta was asked to provide feedback by 29 March 2024 in line with Woodside's methodology of a 30-day consultation period. This period enabled Woodside to assess feedback before the EP was submitted.
- Woodside provided Wanparta with two months to consult ahead of preparing the EP and continues to take feedback in relation to the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided and Woodside's approach to consultation is appropriate and adapted because:

- Woodside asked for Wanparta's input into how Wanparta would like to engage in consultation and has consulted in a way that Woodside understands is appropriate for First Nations groups.
- Woodside has made information on this EP publicly available for 14 months. This has included publishing advertisements in Indigenous, regional, state and national, newspapers including Indigenous publications the National Indigenous Times (26 February 2024) and the Koori Mail advising of the proposed activities and requesting feedback.
- Woodside ran a targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP.
- Woodside's initial email about this EP on 28 February 2024:
  - Included a general email address and telephone number for Woodside as well as a direct email address and telephone number for a dedicated focal person from the Woodside First Nations Engagement team. It also included contact details for NOPSEMA.
  - Offered for Woodside to speak with Wanparta members as well as the Wanparta Board.
  - Asked Wanparta to advise how it would like Woodside to engage and whether Wanparta required further information.

- On 26 July 2023, Woodside emailed Wanparta Woodside's planned Program of Ongoing Engagement with Traditional Custodians providing information on how

Woodside supports ongoing consultation with First Nations groups.

Outcomes of Consultation:

The measures (if any) that Woodside has adopted or proposes to adopt because of consultation are appropriate because:

- Wanparta stated that water and the ocean are extremely important, and that members have a responsibility to look after the ocean and their law. Bream, octopus, stingray and kestrel were noted as totemic species. Woodside updated Section 4.9 to record Wanparta's interests and potential cultural values and assessed potential impact on these, including controls, in Section 6.11.
- Woodside engages in ongoing consultation once an EP has been submitted for assessment as well as throughout the life of an EP. Should feedback be received after the EP has been accepted (including relevant new information on cultural values), it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).
- Woodside considers the measures and controls described in this EP address the potential impact from the proposed activity on Wanparta's functions, interests or activities.

Wirrawandi Aboriginal Corporation (WAC)

WAC is established under the Native Title Act 1993 by the Mardudhunera and Yaburara people to represent the Mardudhunera and Yaburara people (defined broadly by reference to descent from the set of ancestors who were known to have a continuous and unbroken connection as the Traditional Custodians at the time of European colonisation) and represent their communal interests including, among other things, management and protection of cultural values.

Woodside has an existing relationship with WAC prior to consultation for this EP. Woodside's consultation approach for Traditional Owners has a focus on building and maintaining relationships with each group. This is underpinned by Woodside's Program on Ongoing Engagement (sent to WAC on 26 July 2023). Woodside has assigned First Nations Engagement team member as a focal person for WAC who is responsible for building a consultative relationship and is available to provide information and take feedback.

For consultation on this EP, Woodside contacted WAC offering an opportunity to present to the WAC Board. Woodside asked WAC how it wished to be consulted, if it required support to participate in consultation, whether there were additional groups that WAC believed should be consulted and requested that all information shared with WAC be cascaded to its members.

During consultation for this EP, WAC underwent organisational restructures. By way of courtesy, Woodside respectfully engaged with various representatives from the group including a General Manager, three Acting Director/Chairs, a CEO and an Operations Manager. Woodside understands that WAC currently has one employee who Woodside understands is focussed on supporting the Board with its AGM and Director elections (November 2024). Woodside's focus has been on supporting WAC through its period of change so it is informed about Woodside's activities and is enabled to engage in consultation. This has included Woodside's focal person visiting the WAC office each week, facilitating Quarterly Heritage Meetings and running monthly community meetings over lunch.

It should also be noted that, Woodside provided WAC (on a number of occasions) with a draft 7-page framework agreement for consultation. This agreement proposes to obtain WAC's input regarding how WAC would like consultation to occur (what is sufficient information, how much time is a reasonable period etc). It has become clear during engagements that this framework agreement is not a priority. Consultation for this EP has occurred in parallel to discussions around the framework consultation agreement (which remain ongoing).

Aside from regular consultation about EPs relevant to WAC, Woodside meets WAC regularly during Quarterly Heritage Meetings, monthly community luncheons and monthly relationship building meetings. Woodside has continually confirmed it is open to receiving or being notified of feedback, claims or objections on EPs at those meetings.

This context and process demonstrates that Woodside's consultation approach with WAC is appropriate and adapted to the nature of interests of WAC.

Historical Engagement:

- On 18 July 2023, Woodside emailed WAC NOPSEMA's *Consultation Guidelines, Consultation Brochure, and Draft Policy for Managing Gender-Restricted Information*. This email also reiterated Woodside's request that WAC advise Woodside of any other Traditional Custodian groups or individuals with whom Woodside should consult.
- On 26 July 2023, Woodside emailed WAC Woodside's planned *Program of Ongoing Engagement with Traditional Custodians*.

Please see Scarborough Seabed Intervention and Trunkline Installation EP (Appendix F and SI Report) for further details of this correspondence.

Summary of information provided and record of consultation for this EP:

- On 5 March 2024, Woodside emailed WAC advising of the proposed activity (Record of Consultation, reference 2.32), providing a Summary Information Sheet (including a link to the detailed information sheet on Woodside's website), and links to the NOPSEMA consultation brochure and guidelines, and draft policy for managing gender-restricted information. The email requested information on the interests that WAC and its members may have within the EMBA, information on how WAC would like to engage, and requested that WAC provide information to other individuals as required.
- On 6 March 2024, Woodside emailed WAC a letter setting out the draft terms of an agreement between WAC and Woodside and offered to meet to discuss the document further (SI Report, reference 18.1). This draft agreement had been sent to two previous CEOs. The purpose of the agreement was to seek input from WAC on its preferred method of consultation. The agreement (among other things) included the following:
  - Confirmation of what is sufficient information for WAC for consultation.
  - Confirmation of what is a reasonable period for WAC for consultation.
  - WAC's preferred method for provision of information.
  - WAC's preferred method for providing objections or claims.
  - How information is to be published in the EP
  - Cost and termination of the agreement.
- On 6 March 2024, WAC and Woodside exchanged emails about the draft consultation agreement (SI Report, references 18.2, 18.3)
- On 5 April 2024, Woodside emailed WAC to follow up on whether WAC required more information about this EP, and to offer a meeting or a discussion on this activity and another activity (SI Report, reference 18.4).

Ongoing Engagement

- On 25 June 2024, WAC attended Woodside's Quarterly Heritage Meeting. There was general discussion about EPs (SI Report, reference 18.5).
- On 15 July 2024, Woodside and WAC met (SI Report, reference 18.6). Matters relevant to this EP include:
  - WAC is appointing a casual manager to attend to daily operations until a permanent manager is recruited.
- On 9 September 2024, Woodside invited WAC to share stories and receive updates from Woodside at its Monthly Luncheon for Traditional Owners (SI Report, reference 18.7).

- On 25 September 2024, WAC attended Woodside's Monthly Luncheon for Traditional Owners. During the luncheon Woodside requested feedback from all attendees about EPs and provided information about the consultation process (SI Report, reference 18.8).
- On 30 September 2024, Woodside met WAC (SI Report, reference 18.9). During the meeting:
  - WAC confirmed it has one employee who is attending to consultation.
  - WAC confirmed its priority was appointing a new Board at its AGM in November.
- On 1 October 2024, WAC emailed Woodside and suggested Woodside attend its next Board meeting to discuss EPs (SI Report, reference 18.10).
- On 3 October 2024, Woodside invited WAC to share stories and receive updates from Woodside at its Monthly Luncheon for Traditional Owners (SI Report, reference 18.11).
- On 10 October 2024, WAC attended Woodside's Quarter 3 Heritage Meeting in Roebourne (SI Report, reference 18.12). Matters relevant to this EP included:
  - Consultation for Woodside EPs including an explanation of State and Commonwealth regulatory requirements.
  - An explanation of EMBAs and the process Woodside undertakes to identify Traditional Owners groups.
  - How Traditional Owners could provide information to Woodside about cultural values, interests and activities.
- On 14 October 2024, Woodside was notified that Sorry Business was taking place in the Roebourne and Karratha area (SI Report, reference 18.13).
- On 18 October 2024, Woodside emailed WAC to discuss Woodside's attendance at the next WAC Board meeting (SI Report, reference 18.14).
- On 28 October 2024, Woodside attended WAC's Board meeting (SI Report, reference 18.15). Matters discussed that were relevant to this EP include:
  - Woodside's consultation processes.
  - **(1)** WAC asked about oil spill reporting. **(1)** Woodside responded that Woodside conducts an internal investigation and abides by an Oil Spill Management Plan.
- On 21 November 2024, NYFL emailed Woodside to advise that Sorry Business was taking place in the Roebourne Community (SI Report, reference 18.16)
- On 5 December 2024, WAC attended Woodside's Quarter 4 Heritage Meeting in Karratha (SI Report, reference 18.17). Matters discussed relevant to this EP included:
  - Woodside provided an update on the Pluto Project.
  - Woodside reminded the meeting about ongoing consultation.
- On 11 December 2024, Woodside became aware via a social media post from RRKAC that due to the recent passings of two significant Elders cultural grieving protocols were underway (SI Report, reference 18.18).
- On 22 January 2025, Woodside emailed WAC a schedule for the 2025 Quarterly Heritage Meetings. WAC replied to acknowledge the email (SI Report, references 18.19, 18.20).
- On 4 March 2025, Woodside emailed WAC a reminder for the Quarterly Heritage meeting on 13 March 2025 (SI Report, reference 18.21).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
(1)	**(1)**	**(1)**

During ongoing consultation, WAC asked Woodside about oil spill reporting.	**Woodside assessment:** Woodside aligns with industry guidance about oil spill reporting. **Woodside response:** Woodside considers it adopts appropriate controls to prevent a hydrocarbon spill and controls to respond in the highly unlikely event of a hydrocarbon spill, as demonstrated in Sections 6.9 of the EP, and Appendix I.	Woodside's Oil Spill Preparedness and Response Mitigation Assessment is in Appendix H and its Pluto Offshore Operations First Strike Plan is in Appendix I.
While feedback has been received, there were no objections or claims.	Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. Woodside engages in ongoing consultation throughout the life of an EP. Woodside notes that further feedback may be received as part of ongoing consultation. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	Based on the engagement to date, no additional measures or controls are required.

Summary Report: Consultation Complete

Woodside has discharged its obligations for consultation under Regulation 25 of the Environment Regulations and considers consultation with WAC for the purpose of Regulation 25 is complete. Sufficient information, a reasonable period and reasonable opportunity have been provided, as described in Section 5.5 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Sufficient information has been provided because:

- Woodside has given WAC relevant consultation documents, including NOPSEMA's *Consultation Guidelines, Consultation Brochure and Draft Policy for Managing Gender-Restricted Information* (informing stakeholders on how consultation is conducted and providing avenues for providing information on sensitive matters) (see 18 July 2023).
- In February 2024, Woodside made the Consultation Information Sheet about this EP publicly available on the Woodside website. The EP was published on the NOPSEMA website in May 2024.
- On 5 March 2024 Woodside commenced consulting with WAC on this EP. Woodside provided WAC:
  - A Summary Information sheet developed specifically for First Nations groups and reviewed by a First Nations staff member. This sheet included:
    - An overview of the activity and proposed timing.
    - Maps showing the location and EMBA.
    - A summary of the risks and impacts of the activity.

    - Diagrams.
    - Details about how to provide feedback.
  - The purpose of consultation, and what was being sought by Woodside through consultation including understanding the nature of WAC's interests and how the activity could impact those interests.
  - That Woodside had undertaken assessments to identify potential impacts and risks to the marine environment and developed mitigation and management measures.

- Woodside invited WAC to speak to Woodside. Woodside provided contact details including a general email address and telephone number for Woodside as well as the direct email address and telephone number of the assigned Woodside focal person. Woodside also provided WAC NOPSEMA's contact information.
- Woodside asked WAC to forward the information to its members.
- Woodside offered to provide more specific information, maps and images to WAC if required.
- Woodside followed up with WAC to request their feedback on this EP via email on 5 April 2024.

Reasonable Period

Woodside allowed WAC a reasonable period for consultation in the preparation of this EP because:

- Woodside commenced consultation on this EP with WAC on 5 March 2024 and provided information on the EP on that date. Since then, Woodside and WAC have engaged in consultation for a period of 14 months, demonstrating a "reasonable period" of consultation.
- A consultation period was communicated to WAC during Woodside's initial email on 5 March 2024. WAC was asked to provide feedback by 5 April 2024 in line with Woodside's methodology of a 30-day consultation period. This period enabled Woodside to assess feedback before the EP was submitted.
- Woodside provided WAC with two months to consult ahead of preparing the EP and continues to take feedback in relation to the EP.
- Woodside notes that, during consultation, it has also respectfully paused consultation in periods when WAC was observing sorry time or cultural matters (see October and November 2024) and has been sensitive to WAC's structural and other changes (see July 2024).

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided and Woodside's approach to consultation is appropriate and adapted because:

- Woodside asked for WAC's input into how WAC would like to engage in consultation and has consulted in a way that Woodside understands is appropriate for First Nations groups.
- Woodside has made information on this EP publicly available for 14 months. This has included publishing advertisements in Indigenous, regional, state and national, newspapers including Indigenous publications the National Indigenous Times (26 February 2024) and the Koori Mail advising of the proposed activities and requesting feedback.
- Woodside ran a targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP.
- Woodside's initial email about this EP on 5 March 2024:
  - Included a general email address and telephone number for Woodside as well as a direct email address and telephone number for a dedicated focal person from the Woodside First Nations Engagement team. It also included contact details for NOPSEMA.
  - Offered for Woodside to speak with WAC members as well as the WAC Board.

- Asked WAC to advise how it would like Woodside to engage and whether WAC required further information.

- On 26 July 2023, Woodside emailed WAC Woodside's planned Program of Ongoing Engagement with Traditional Custodians providing information on how Woodside supports ongoing consultation with First Nations groups. Woodside's commitment to ongoing consultation is demonstrated by its Quarterly Heritage Meetings with WAC. To this end, Woodside invites WAC to Quarterly Heritage Meetings, monthly luncheons, and weekly visits by Woodside's focal point to WAC's office.

Outcomes of Consultation

The measures (if any) that Woodside has adopted or pr

poses to adopt because of consultation are appropriate because:

- During the past 14 months WAC has provided feedback but has not raised objections or claims about the adverse impact of each activity to which this EP relates.
- Woodside engages in ongoing consultation once an EP has been submitted for assessment as well as throughout the life of an EP. Should feedback be received after the EP has been accepted (including relevant new information on cultural values), it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).
- Woodside considers the measures and controls described in this EP address the potential impact from the proposed activity on WAC's functions, interests or activities

Robe River Kuruma Aboriginal Corporation (RRKAC)

RRKAC is established under the Native Title Act 1993 by the Robe River Kuruma people to represent the Robe River Kuruma people (defined broadly by reference to descent from the set of ancestors who were known to have a continuous and unbroken connection as the Traditional Custodians at the time of European colonisation) and represent their communal interests including, among other things, management and protection of cultural values.
Woodside had an existing relationship with RRKAC which extends prior to consulting on this EP. Woodside has assigned a First Nations Engagement team member as a focal point to RRKAC who is responsible for building a consultative relationship and is available to provide information and take feedback.
During consultation for this EP, RRKAC has asked for assistance with resourcing and has taken time to recruit subject matter experts to assist with consultation. Woodside's focus has been on supporting RRKAC through this period whilst enabling RRKAC to remain informed about Woodside's activities, including activities proposed to be undertaken for this EP. Aside from regular consultation about EPs, Woodside invites RRKAC to monthly luncheons.

Historical Engagement:

- On 18 July 2023, Woodside emailed WAC NOPSEMA's *Consultation Guidelines, Consultation Brochure, and Draft Policy for Managing Gender-Restricted Information*. This email also reiterated Woodside's request that WAC advise Woodside of any other Traditional Custodian groups or individuals with whom Woodside should consult.
- On 26 July 2023, Woodside emailed WAC Woodside's planned *Program of Ongoing Engagement with Traditional Custodians*.

Please see Scarborough Seabed Intervention and Trunkline Installation EP (Appendix F and SI Report) for further details of this correspondence.

Summary of information provided and record of consultation for this EP:

- On 5 March 2024, Woodside emailed RRKAC advising of the proposed activity (Record of Consultation, reference 2.33), providing a Summary Information Sheet (including a link to the detailed information sheet on Woodside's website), and links to the NOPSEMA consultation brochure and guidelines, and draft policy for managing gender-restricted information. The email requested information on the interests that RRKAC and its members may have within the EMBA, information on how RRKAC would like to engage, and requested that RRKAC provide information to other individuals as required. Woodside requested feedback by 2 April 2024.
- On 5 March 2024, RRKAC and Woodside exchanged emails about EP consultation and staffing at RRKAC (SI Report, references 19.1 and 19,2).
- On 18 March 2024, Woodside emailed RRKAC to follow up on this EP and request a meeting to discuss the activity (SI Report, reference 19.3).
- On 20 March 2024, Woodside and RRKAC held an online meeting (SI Report, reference 19.4). Matters discussed included:
  - Staffing at RRKAC.
  - An overview of EPs and the importance of consultation with Traditional Owners.
  - Woodside explained the purpose of meeting with First Nations groups to provide opportunities for feedback.
  - Woodside requested to meet the RRKAC Board and other interested persons and groups.
  - Woodside's availability if RRKAC would like to pursue subsea mapping.
- On 26 March 2024, Woodside emailed RRKAC (SI Report, reference 19.5) to follow up on the meeting, and to outline current EPs for consultation including this one. Woodside informed RRKAC that it would provide reasonable financial support for meetings and provided a copy of the Program of Ongoing Engagement.
- On 26 March 2024, Woodside emailed RRKAC (SI Report, reference 19.6) Woodside resent information about this activity and included the Summary Information Sheet.
- On 5 April 2024, Woodside emailed RRKAC to follow up on previous emails relating to this activity and to ask if RRKAC required more information (SI Report, reference 19.7).

Ongoing Engagement

- On 5 July 2024, RRKAC emailed Woodside (SI Report, reference 19.8) in response to another activity and raised:
  - **(1)** Its lack of resourcing as an issue for consultation
  - **(2)** the potential for a bathymetric survey of the coastal shelf as a large-scale project with all affected groups
- On 5 July 2024, Woodside replied to RRKAC's email (SI report, reference 19.9). Woodside:
  - **(1)** Offered to meet RRKAC to discuss RRKAC's challenges.
  - Enquired how RRKAC would prefer to be informed about EPs.

- **(2)** Noted Woodside would make enquires about RRKAC's proposed bathymetric survey.

- On 29 July 2024, Woodside emailed RRKAC regarding bathymetric surveys and suggested that RRKAC and Woodside meet to discuss opportunities to use publicly available data to assist in generating information that might be useful to RRKAC (SI Report, reference 19.10)
- On 9 September 2024, Woodside invited RRKAC to share stories and receive updates from Woodside at its Monthly Luncheon for Traditional Owners (SI Report, reference 19.11).
- On 3 October 2024, Woodside invited RRKAC to share stories and receive updates from Woodside at its Monthly Community Luncheon for Traditional Owners (SI Report, reference 19.12).
- On 5 December 2024, Woodside emailed RRKAC and update on this EP (SI Report, reference 19.13). Woodside:
  - Informed that Woodside would resubmit this EP for further assessment by NOPSEMA.
  - Notified RRKAC that consultation for this EP would close on 19 December 2024 and that feedback provided by that date would be reflected in the EP and considered by NOPSEMA.
  - Woodside stated:
    - That RRKAC was welcome to state its preferred method of consultation including whether it would like to meet face-to-face.
    - That Feedback can continue to be provided during the life of an EP, including after consultation for the EP has closed, during EP assessment, and after an EP has been accepted by NOPSEMA. Woodside continues to receive, assess and respond to claims and objections from relevant persons throughout the life of the EP. Should a claim or objection be received following the acceptance of an EP that Woodside assesses, and which identifies a measure or control that Woodside considers requires implementation or updates to meet the intended outcome of consultation, Woodside will apply its Management of Change and Review process as appropriate.
- On 11 December 2024, RRKAC emailed Woodside a response to its letter of 5 December 2024 (SI Report, reference 19.14). In the email RRKAC stated:
  - **(1)** Due to capacity limitations, it was not in a position to consult on this EP, RRKAC may be in a position to engage in consultation the future.
  - **(3)** RRKAC does not consider emails or meetings to constitute formal consultation.
  - **(4)** RRKAC requests that any reference to consultation with RRKAC be removed from Woodside's register.
- On 18 December 2024, Woodside emailed RRKAC a response to its email of 11 December 2024 (SI Report, reference 19.15). In the email:
  - **(3)** Woodside confirmed it had consulted with RRKAC in relation to the preparation of this EP in accordance with Commonwealth regulations.
  - **(3)** Woodside summarised its correspondence to RRKAC about this EP.
  - **(4)** It is a requirement that Woodside provide full copies of all consultation correspondence to NOPSEMA.
  - **(1)** Woodside acknowledged RRKAC's capacity limitations and offered to discuss how Woodside might be able to further support RRKAC with the consultation process.
  - **(3)** Woodside offered to meet RRKAC to discuss the EP.
  - **(3)** Woodside explained that feedback could be provided for the life of the EP, including after consultation for the EP had closed, during EP assessment and after an EP had been accepted by NOPSEMA.
- On 18 December 2024, Woodside received an 'out-of-office' reply from RRKAC to its email sent that day (SI Report, reference 19.16).

- On 19 December 2024 RRKAC emailed Woodside (SI Report, reference 19.17). RRKAC stated:
  - **(3)** RRKAC does not consider emails or meetings to constitute formal consultation.
  - **(5)** Under the regulations, a relevant person must be provided with sufficient information and a reasonable period for consultation. RRKAC considers the 'relevant person' in this matter to be the RRKAC Heritage Advisory Committee (HAC). RRKAC invited Woodside to the next HAC meeting on 18 February 2025.
  - **(4)** RRKAC requested Woodside remove any reference to 'consultation' with RRKAC in the EP.
  - **(2)** RRKAC is keen to discuss a seascape scale approach to heritage values.
  - **(1)** RRKAC has capacity limitations but will be in a position to engage in consultation in 2025.
- On 14 January 2024, Woodside replied to RRKAC's email of 19 December 2024 (SI Report, reference 19.18). Woodside stated:
  - **(3, 5)** Woodside disagrees that formal consultation has not occurred in relation to the EP and has complied with regulations by providing RRKAC with sufficient information, a reasonable opportunity and reasonable time to provide feedback.
  - **(5)** In accordance with Woodside's methodology, Woodside contacted RRKAC as a relevant person and requested it forward information to its members and other relevant people and organisations. Woodside reiterated its availability to meet RRKAC and other interested members.
  - **(3, 5)** Woodside communicated clear dates for RRKAC to submit feedback for consideration ahead of submitting the EP.
  - **(5)** Woodside accepts RRKAC's invitation to the HAC meeting on 18 February 2025, noting consultation has closed for the purposes of preparation of this EP and its attendance at the HAC meeting would form part of ongoing consultation.
  - **(1)** Woodside welcomes an opportunity to meet with RRKAC to discuss reasonable ways to adapt its consultation process for consultation with RRKAC moving forward.
  - **(1)** Woodside requests a quote for its attendance at the HAC meeting.
  - **(4)** Woodside has assessed RRKAC as a relevant person for this EP and as such, has a regulatory obligation to provide full copies of all consultation correspondence to NOPSEMA.
  - **(2)** With regard to seascape mapping, Woodside does not have plans to conduct bathymetric surveys but is open to meeting with RRKAC to discuss publicly available datasets and Woodside's own mapping of deeper water areas that may support RRKAC's request.
  - **(1)** Woodside again acknowledges RRKAC's capacity limitations and as previously discussed is willing to provide reasonable funding for consultation activities relating to EPs.
- **(5)** On 15 January 2024, RRKAC emailed Woodside a response to its email on 14 January 2025 (SI Report, reference 19.19) RRKAC provided details relating to the planned HAC meeting.
- **(5)** On 22 January 2025, Woodside phoned RRKAC to discuss the upcoming HAC meeting, RRKAC did not answer the call (SI Report, reference 19.20).
- **(5)** On 29 January 2025, following a call between Woodside and RRKAC, Woodside emailed RRKAC confirming that Woodside would not attend the 18 February HAC meeting and would instead attend the HAC meeting in May 2025. Woodside confirmed that it consulted for the life of EPs and welcomed further feedback in relation to this EP (SI Report, reference 19.21)
- On 4 March 2025, Woodside invited RRKAC to share stories and receive updates from Woodside at its Monthly Community Luncheon for Traditional Owners to be held in Roebourne on 5 March 2025 (SI Report, reference 19.22).

• On 5 March 2025, Traditional Owner members from RRKAC attended Woodside's Monthly Community Luncheon for Traditional Owners held in Roebourne. During the lunch Woodside requested feedback from all attendees about EPs and provided information about the consultation process (SI Report, reference 19.23)		
Summary of Feedback, Objection or Claim	**Assessment of Merits of Feedback, Objection or Claim and Woodside's Response**	**Inclusion in Environment Plan**
(1) RRKAC noted it is insufficiently resourced to fully engage and respond regarding EPs.	**(1)** **Woodside assessment:** Woodside supports ongoing engagement for the life of an EP. **Woodside response:** Woodside supports reasonable requests for resourcing and has provided support for meetings for the purpose of consultation.	**(1)** Woodside is implementing a program to actively support Traditional Custodians' capacity for ongoing engagement and consultation on environment plans. This is described further in the Program of Ongoing Engagement with Traditional Custodians, (Appendix G).
(2) RRKAC raised the potential of a bathymetric survey of the coastline, working with all relevant coastal groups.	**(2)** **Woodside Assessment:** Woodside does not have plans to conduct regional bathymetric surveys but there are publicly available datasets covering coastal regions. **Woodside Response:** Woodside is seeking a meeting with RRKAC to find ways to interpret existing data sets to generate information which may be useful to RRKAC.	**(2)** Not required.
(3) RRKAC does not consider emails or meetings to constitute formal consultation.	**Woodside Assessment:** Woodside rejects RRKAC's assertion that emails or meetings do not constitute formal consultation. Woodside has consulted with RRKAC in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth) (Regulations)*. Woodside has provided RRKAC sufficient information, a reasonable period and reasonable opportunity to provide feedback about this EP. **Woodside Response:** Woodside has informed RRKAC that it has consulted with RRKAC in accordance with the Regulations. Woodside has provided RRKAC a summary of the consultation that has occurred for this EP and offered to discuss the EP further.	**(3)** Not required

(4) RRKAC has requested that Woodside remove any reference to consultation in its register.	**(4)** **Woodside Assessment:** Woodside rejects RRKAC'S assertion that consultation has not occurred on this EP. **Woodside Response:** Woodside has provided a summary to RRKAC of consultation that has occurred and has informed RRKAC that Woodside is required to provide a record of this correspondence to NOPSEMA.	**(4)** Not required
(5) Under the regulations, a relevant person must be provided with sufficient information and a reasonable period for consultation. RRKAC considers the 'relevant person' in this matter to be the RRKAC Heritage Advisory Committee (HAC). RRKAC invited Woodside to the next HAC meeting on 18 February 2025.	**(5)** **Woodside Assessment:** In accordance with Woodside's consultation methodology, Woodside assessed RRKAC in its capacity as a nominated representative corporation as a 'relevant person' for this EP. Woodside initially contacted RRKAC about this EP on 5 March 2024 and requested RRKAC to forward information to its members and other relevant people and organisations. Woodside provided sufficient information, a reasonable period and reasonable opportunity for consultation on this EP. **Woodside Response:** Woodside has accepted RRKAC's invitation to the HAC meeting on 18 February 2025. Woodside has reminded RRKAC that consultation for the purposes of preparing this EP has closed and attendance at the HAC meeting will form part of ongoing consultation.	**(5)** Not required
While feedback has been received, there were no objections or claims.	Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. Woodside engages in ongoing consultation throughout the life of an EP. Woodside notes that further feedback may be received as part of ongoing consultation. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.
Summary Report: Consultation Complete		

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with RRKAC for the purpose of regulation 25 is complete. Sufficient information and a reasonable period have been provided, as described in Section 5.5 of the EP. Specifically:

Sufficient Information:

Sufficient information has been provided because:

- On 19 July 2023, Woodside emailed RRKAC NOPSEMA's *Consultation Guidelines, Consultation Brochure, and Draft Policy for Managing Gender-Restricted Information*, informing stakeholders on how consultation is conducted and providing avenues for providing information on sensitive matters.
- On 26 July 2023, Woodside emailed RRKAC Woodside's planned Program of Ongoing Engagement with Traditional Custodians, providing information on how Woodside supports ongoing consultation with First Nations groups.
- In February 2024, Woodside made the Consultation Information Sheet about this EP publicly available on the Woodside website. The EP was published on the NOPSEMA website in May 2024.
- On 5 March 2024, Woodside commenced consulting with RRKAC on this EP. Woodside's email to RRKAC included:
  - A Summary Information sheet developed specifically for First Nations groups and reviewed by a First Nations staff member. This sheet included:
    - An overview of the activity
    - Maps showing the location and EMBA
    - Diagrams
    - Details about how to provide feedback.
  - The purpose of consultation, and what was being sought by Woodside through consultation including understanding the nature of RRKAC's interests and how the activity could impact those interests.
  - That Woodside had undertaken assessments to identify potential impacts and risks to the marine environment and developed mitigation and management measures.
  - Woodside invited RRKAC to speak to Woodside. Woodside provided contact details including a general email address and telephone number for Woodside as well as the direct email address and telephone number of the assigned Woodside focal person. Woodside also provided AC NOPSEMA's contact information.
  - Woodside asked RRKAC to forward the information to its members and offered to speak to RRKAC members as well as the RRKAC Board.
  - Woodside offered to provide more specific information, maps and images to RRKAC if required.
  - Woodside advised RRKAC that reasonable financial support was available for meetings for the purpose of consultation.
- On 5 December 2024, Woodside again provided information to RRKAC about this EP and advised Woodside would resubmit this EP for further assessment by NOPSEMA. Woodside informed RRKAC that feedback received by 19 December would be reflected in the EP and considered by NOPSEMA.
- On 18 December 2024, Woodside again offered to meet RRKAC to discuss the EP.

Reasonable Period:

Woodside allowed RRKAC a reasonable period for consultation in the preparation of this EP because:

- Woodside commenced consultation with RRKAC in March 2024. Woodside has responded to RRKAC over 14 months, demonstrating a "reasonable period" of consultation, where a genuine two-way dialogue has occurred on this activity.

- A clear consultation period was communicated to RRKAC during Woodside's initial email on 5 March 2024. RRKAC was asked to provide feedback by 2 April 2024, in line with Woodside's methodology of a 30-day consultation period. This period enabled Woodside to assess feedback before the EP was submitted.
- Woodside provided RRKAC with two months to consult ahead of preparing the EP and continues to take feedback in relation to the EP.
- Woodside commenced consultation with RRKAC in March 2024. Woodside has addressed and responded to RRKAC queries over 14 months, demonstrating a "reasonable period" of consultation.
- Woodside emailed RRKAC on 5 December and invited it to provide further feedback by 19 December ahead of Woodside resubmitting this EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided and Woodside's approach to consultation is appropriate and adapted because:

- Woodside asked for WAC's input into how RRKAC would like to engage in consultation and has consulted in a way that Woodside understands is appropriate for First Nations groups.
- Woodside has made information on this EP publicly available for 14 months. This has included publishing advertisements in Indigenous, regional, state and national, newspapers including Indigenous publications the National Indigenous Times (26 February 2024) and the Koori Mail advising of the proposed activities and requesting feedback.
- Woodside ran a targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP.
- Woodside sent the initial email about this EP on 5 March 2024:
  - Included email addresses and telephone numbers for a Woodside focal point and NOPSEMA.
  - Offered for Woodside to speak with RRKAC members as well as the RRKAC Board.
  - Asked RRKAC to advise how it would like Woodside to engage and whether RRKAC required further information.
  - Woodside asked RRKAC if it was aware of any other Traditional Custodian groups or individuals with whom Woodside should consult.
- Woodside invited RRKAC to monthly luncheons.
- Woodside provided RRKAC an additional opportunity to provide feedback ahead of resubmitting this EP. Woodside emailed RRKAC on 5 December 2025 and requested feedback by 19 December 2024.

Outcomes of Consultation

- During the past 14 months, RRKAC has not raised matters relevant to this EP.
- Woodside engages in ongoing consultation, beyond that required by regulation 25 of the Environment Regulations, throughout the life of an EP. Should feedback be received after the EP has been accepted (including any relevant new information on cultural values), it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of the EP).
- Woodside considers the measures and controls described in this EP address the potential impact from the proposed activity on RRKAC's functions, interests or activities.

Ngarluma Aboriginal Corporation (NAC)

NAC is established under the Native Title Act 1993 by the Ngarluma people to represent the Ngarluma people (defined broadly by reference to descent from the set of ancestors who were known to have a continuous and unbroken connection as the Traditional Custodians at the time of European colonisation) and represent their communal interests including, among other things, management and protection of cultural values.

Woodside has an existing relationship with NAC which extends prior to consulting on this EP. Woodside's consultation approach for Traditional Owners has a focus on building and maintaining relationships with each group. This is underpinned by Woodside's Program of Ongoing Engagement (sent to NAC on 26 July 2023). Woodside has assigned a First Nations Engagement team member as a dedicated focal point for EP consultation with NAC who is responsible for building a consultative relationship and is available to provide information and take feedback.

For consultation on this EP, Woodside contacted NAC offering an opportunity to present to the NAC Board. Woodside asked NAC how it wished to be consulted, if it required support to participate in consultation, whether there are additional persons that NAC believed should be consulted and requested that all information shared with NAC be cascaded to its members.

During consultation for this EP, Woodside became aware that NAC was experiencing staff turnover and structural change. Woodside understands that NAC has fewer than five staff members and that NAC engages consultants and contractors to engage in EP consultation and conduct other business activities on NAC's behalf. During the consultation period (and following), Woodside's focus has been on supporting NAC through the period of change whilst enabling NAC to consult and remain informed about Woodside's, activities including activities proposed to be undertaken for this EP.

As part of its ongoing consultation and relationship building, Woodside provided NAC with a consultation framework agreement which sought from NAC, confirmation as to how NAC would like to be consulted, including NAC's views on what constituted sufficient information, a reasonable period of time and a reasonable opportunity for consultation. It has become clear during engagements with NAC that this framework agreement is not a priority and negotiation of it will likely continue into the future. Consultation for this EP has occurred in parallel to discussions around the framework consultation agreement (which remain ongoing).

In April and November 2024, Woodside was notified that the cultural protocols associated with Sorry Business were in place. Woodside understood that this would impact NAC and, out of respect, did not contact NAC during these periods.

In addition to consultation for specific EPs relevant to NAC, Woodside meets NAC regularly during Quarterly Heritage Meetings, monthly community luncheons and monthly relationship meetings. Woodside has continually confirmed it is open to receiving or being notified of feedback, claims or objections on EPs at these meetings.

This context and process demonstrates that Woodside's consultation approach with NAC is appropriate and adapted to the nature and interests of NAC.

Historical Engagement:

- On 18 July 2023, Woodside emailed NAC NOPSEMA's *Consultation Guidelines, Consultation Brochure, and Draft Policy for Managing Gender-Restricted Information*. This email also requested NAC advise Woodside of any other Traditional Custodian groups or individuals with whom Woodside should consult.
- On 26 July 2023, Woodside emailed NAC Woodside's planned *Program of Ongoing Engagement with Traditional Custodians*.

Please see Scarborough Seabed Intervention and Trunkline Installation EP (Appendix F and SI Report) for further details of this correspondence.

Summary of information provided and record of consultation for this EP:

- On 1 March 2024, Woodside emailed NAC advising of the proposed activity (Record of Consultation, reference 2.34), providing a Summary Information Sheet (including a link to the detailed information sheet on Woodside's website), and links to the NOPSEMA consultation brochure and guidelines, and draft policy for managing gender-restricted information. The email requested information on the interests that NAC and its members may have within the EMBA, information on how NAC would like to engage, and requested that NAC provide information to other individuals as required. Woodside requested feedback by 29 March 2024.

- On 1 March 2024, Woodside emailed NAC a draft consultation agreement for review (SI Report, reference 38.1).
- On 17 April 2024, Woodside received an email from NYFL informing it that there had been a tragic passing in the Roebourne community and that Sorry Business was underway (SI Report, reference 38.2).
- On 26 April 2024, Woodside emailed NAC to follow up on the draft consultation agreement and asked for an update from NAC on its review of the agreement (SI Report, reference 38.3).
- On 20 May 2024, Woodside emailed NAC to follow up on the status of the draft consultation agreement review, to request feedback and offered to meet to discuss EPs. (SI Report, reference 38.4).

Ongoing Engagement

- On 5 September 2024, Woodside emailed NAC after meeting its newly appointed acting CEO. Woodside invited NAC to its Quarterly Heritage Meetings, included proposed dates for the meetings, information about attendance fees and requested NAC confirm a list of attendees prior to each meeting (SI Report, reference 38.5).
- On 9 September 2024, Woodside invited NAC to share stories and receive updates from Woodside at its Monthly Luncheon for Traditional Owners (SI Report, reference 38.6).
- On 22 September 2024, Woodside emailed NAC about an administrative matter relating to the Quarterly Heritage Meetings (SI Report, reference 38.7)
- On 25 September 2024, NAC attended Woodside's Monthly Luncheon for Traditional Owners (SI Report, reference 38.8). During the luncheon Woodside requested feedback from all attendees about EPs and provided information about the consultation process.
- On 3 October 2024, Woodside invited NAC to share stories and receive updates from Woodside at its Monthly Community Luncheon for Traditional Owners (SI Report, reference 38.9).
- On 23 October 2024, Traditional Owner members from NAC attended Woodside's Monthly Community Luncheon for Traditional Owners held in Roebourne. During the lunch Woodside requested feedback from all attendees about EPs and provided information about the consultation process (SI Report, reference 38.10).
- On 21 November 2024, NYFL emailed Woodside a letter advising that due to the passing of a Senior Elder, Sorry Business was underway in the Roebourne area (SI Report, reference 38.11).
- On 5 December 2024, Woodside emailed NAC an update on this EP (SI Report, reference 38.12). Woodside:
  - Informed that Woodside would resubmit this EP for further assessment by NOPSEMA.
  - Notified NAC that consultation for this EP would close on 19 December 2024 and that feedback provided by that date would be reflected in the EP and considered by NOPSEMA.
  - Acknowledged discussions relating to framework agreements were ongoing but consultation had occurred in parallel for this EP.
  - Woodside stated:
    - That NAC was welcome to state its preferred method of consultation including whether it would like to meet face-to-face.
    - That feedback can continue to be provided during the life of an EP, including after consultation for the EP has closed, during EP assessment, and after an EP has been accepted by NOPSEMA. Woodside continues to receive, assess and respond to claims and objections from relevant persons throughout the life of the EP. Should a claim or objection be received following the acceptance of an EP that Woodside assesses, and which identifies a measure or control that Woodside considers requires implementation or updates to meet the intended outcome of consultation, Woodside will apply its Management of Change and

Review process as appropriate.

- On 11 December 2024, Woodside became aware through social media about the passing of two significant Elders. This news was relevant to NAC (SI Report, reference 38.13).
- On 22 January 2025, Woodside emailed NAC information about Quarterly Heritage meetings scheduled for 2025 (SI Report, reference 38.14).
- On 4 March 2025, Woodside emailed NAC a reminder about the Quarterly Heritage meeting scheduled for 13 March 2025 (SI Report, reference 38.15).
- On 4 March 2025, Woodside invited NAC to share stories and receive updates from Woodside at its monthly community luncheon for Traditional Owners to be held in Roebourne on 5 March 2025(SI Report, reference 38.16).
- On 5 March 2025, Traditional Owner members from NAC attended Woodside's Monthly Community Luncheon for Traditional Owners held in Roebourne. During the lunch Woodside requested feedback from all attendees about EPs and provided information about the consultation process (SI Report, reference 38.17).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report: Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with NAC for the purpose of Regulation 25 is complete. Sufficient information, a reasonable period and reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Sufficient information has been provided because:

- Woodside has given NAC relevant consultation documents, including NOPSEMA's *Consultation Guidelines, Consultation Brochure and Draft Policy for Managing Gender-Restricted Information* (informing stakeholders on how consultation is conducted and providing avenues for providing information on sensitive matters) (see 18 July 2023).
- In February 2024, Woodside made the Consultation Information Sheet about this EP publicly available on the Woodside website. The EP was published on the NOPSEMA website in May 2024.
- On 1 March 2024, Woodside commenced consultation with NAC on this EP. Woodside provided NAC:
  - A Summary Information sheet developed specifically for First Nations groups and reviewed by a First Nations staff member. This sheet included:
    - An overview of the activity and proposed timing.
    - Maps showing the location and EMBA.
    - A summary of the risks and impacts of the activity.

  - Diagrams.
  - Details about how to provide feedback.
- The purpose of consultation, and what was being sought by Woodside through consultation including understanding the nature of NAC's interests and how the activity could impact those interests.
- That Woodside had undertaken assessments to identify potential impacts and risks to the marine environment and developed mitigation and management measures.
- Woodside asked NAC to forward the information to its members.
- Woodside offered to provide more specific information, maps and images to NAC if required.

- On 20 May 2024, Woodside offered to meet NAC to discuss EPs.
- On 5 December 2024, Woodside again provided information to NAC about this EP and advised Woodside would resubmit this EP for further assessment by NOPSEMA. Woodside informed NAC that feedback received by 19 December would be reflected in the EP and considered by NOPSEMA.

Reasonable Period

Woodside allowed NAC a reasonable period for consultation in the preparation of this EP because:

- Woodside commenced consultation on this EP with NAC in March 2024 and provided information on the EP on that date. Since then, Woodside and NAC have engaged in consultation for over 14 months, demonstrating a "reasonable period" of consultation.
- A consultation period was communicated to NAC during Woodside's initial email on 1 March 2024. NAC was asked to provide feedback by 29 March in line with Woodside's methodology of a 30-day consultation period. This period enabled Woodside to assess feedback before the EP was submitted.
- Woodside ultimately provided NAC with two months to consult ahead of preparing the EP for submission and continues to take feedback in relation to the EP.
- Woodside emailed NAC on 5 December and invited it to provide further feedback by 19 December ahead of Woodside resubmitting this EP.
- Woodside notes that, during consultation, it has also respectfully paused consultation in periods when NAC was observing sorry time or cultural matters (see April and November 2024) and has been sensitive to NAC's structural and other changes.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided and Woodside's approach to consultation is appropriate and adapted because:

- Woodside asked for NAC's input into how NAC would like to engage in consultation and has consulted in a way that Woodside understands is appropriate for First Nations groups.
- Woodside has made information on this EP publicly available for 14 months. This has included publishing advertisements in Indigenous, regional, state and national, newspapers including Indigenous publications the National Indigenous Times (26 February 2024) and the Koori Mail advising of the proposed activities and requesting feedback.
- Woodside ran a targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP.
- Woodside's initial email about this EP on 1 March 2024:
  - Included a general email address and telephone number for Woodside as well as a direct email address and telephone number for a dedicated focal person from the Woodside First Nations Engagement team. It also included contact details for NOPSEMA.

- Offered for Woodside to speak with NAC members as well as the NAC Board.
- Asked NAC to advise how it would like Woodside to engage and whether NAC required further information.

- Throughout the consultation period (and following submission of the EP for assessment), Woodside has emailed NAC, met members during community luncheons and have otherwise had direct contact lines to each other during the period.
- Woodside invites NAC to Quarterly Heritage Meetings, and monthly relationship meetings and luncheons.
- Woodside provided NAC an additional opportunity to provide feedback ahead of resubmitting this EP. Woodside emailed NAC on 5 December 2025 and requested feedback by 19 December 2024.

Outcomes of Consultation

The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- During the past 14 months NAC has not provided feedback about this EP.
- Woodside engages in ongoing consultation, once an EP has been submitted for assessment as well as throughout the life of an EP. Should feedback be received after the EP has been accepted (including relevant new information on cultural values), it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).
- Woodside considers the measures and controls described in this EP address the potential impact from the proposed activity on NAC's functions, interests or activities.

Yindjibarndi Aboriginal Corporation

Yindjibarndi Aboriginal Corporation (Yindjibarndi) is established under the Native Title Act 1993 by the Yindjibarndi people to represent the Yindjibarndi people (defined broadly by reference to descent from the set of ancestors who were known to have a continuous and unbroken connection as the Traditional Custodians at the time of European colonisation) and represent their communal interests including, among other things, management and protection of cultural values.

Woodside's consultation approach for Traditional Owners has a focus on building and maintaining relationships with each group. This is underpinned by Woodside's Program of Ongoing Engagement (sent to Yindjibarndi on 26 July 2023). Woodside has assigned a First Nations Engagement team member as a focal point for EP consultation with Yindjibarndi who is responsible for building a consultative relationship and is available to provide information and take feedback from Yinjibarndi.

For this consultation, Woodside asked Yindjibarndi how it wished to be consulted, if it required support to participate in consultation, whether there are additional persons that Yindjibarndi believed should be consulted and requested that all information shared with Yindjibarndi be cascaded to its members.

Yindjibarndi has informed Woodside that it will not be providing comment on oil and gas matters. Yindjibarndi requested Woodside refer all correspondence about EPs to the Ngarluma Yindjibarndi Foundation Ltd (NYFL).

Historical Engagement:

- On 18 July 2023, Woodside emailed Yindjibarndi NOPSEMA's *Consultation Guidelines, Consultation Brochure, and Draft Policy for Managing Gender-Restricted Information*. This email also reiterated Woodside's request that Yindjibarndi advise Woodside of any other Traditional Custodian groups or individuals with whom Woodside should consult.

- On 26 July 2023, Woodside emailed Yindjibarndi Woodside's planned *Program of Ongoing Engagement with Traditional Custodians* (SI Report, reference 20.2).

(1) On 1 August 2023, Yindjibarndi emailed Woodside advising Ngarluma Yindjibarndi Foundation Ltd (NYFL) would manage oil and gas matters on its behalf. **(1)** Woodside directed future correspondence to NYFL as requested.

P*lease see Scarborough Seabed Intervention and Trunkline Installation EP (Appendix F and SI Report) for further details of this correspondence.*

Summary of information provided and record of consultation for this EP:

- On 6 March 2024, Woodside emailed Yindjibarndi via NYFL advising of the proposed activity (Record of Consultation, reference 2.35), providing a Summary Information Sheet (including a link to the detailed information sheet on Woodside's website), and links to the NOPSEMA consultation brochure and guidelines, and draft policy for managing gender-restricted information. The email requested information on the interests that Yindjibarndi and its members may have within the EMBA, information on how Yindjibarndi would like to engage, and requested that Yindjibarndi provide information to other individuals as required. Woodside requested feedback by 3 April 2024.

See NYFL on behalf of Yindjibarndi below for record of further engagement.

Summary of Feedback, Objection or Claim	**Assessment of Merits of Feedback, Objection or Claim and Woodside's Response**	**Inclusion in Environment Plan**
(1) Yindjibarndi has instructed Woodside that it will be represented by NYFL in ongoing discussion about EPs.	**(1)** **Woodside assessment:** Woodside accepts Yindjibarndi's right to be represented at their own choosing. **Woodside response:** Woodside will engage with NYFL on behalf of Yindjibarndi for ongoing consultation related to this activity.	**(1)** Ongoing consultation will be undertaken as set out in Section 7.12 of the EP.
No feedback, objections or claims received despite follow up.	Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. Woodside engages in ongoing consultation throughout the life of an EP. Woodside notes that further feedback may be received as part of ongoing consultation. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional controls or measure required.

Summary Report: Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with Yindjibarndi for the purpose of Regulation 25 is complete. Sufficient information, a reasonable period and reasonable opportunity to provide feedback have been provided, as described in Section 5.5 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Sufficient information has been provided because:

- Woodside has given Yindjibarndi relevant consultation documents, including NOPSEMA's *Consultation Guidelines, Consultation Brochure and Draft Policy for Managing Gender-Restricted Information* (informing stakeholders on how consultation is conducted and providing avenues for providing information on sensitive matters) (see 18 July 2023).
- In February 2024, Woodside made the Consultation Information Sheet about this EP publicly available on the Woodside website. The EP was published on the NOPSEMA website in May 2024.
- On 6 March 2024, Woodside commenced consulting with Yindjibarndi via NYFL on this EP. Woodside's provided Yindjibarndi via NYFL:
  - A Summary Information sheet developed specifically for First Nations groups and reviewed by a First Nations staff member. This sheet included:
    - An overview of the activity and proposed timing.
    - Maps showing the location and EMBA.
    - A summary of the risks and impacts of the activity.
    - Diagrams.
    - Details about how to provide feedback.
  - The purpose of consultation, and what was being sought by Woodside through consultation including understanding the nature of Yindjibarndi's interests and how the activity could impact those interests.
  - That Woodside had undertaken assessments to identify potential impacts and risks to the marine environment and developed mitigation and management measures.
  - Woodside asked Yindjibarndi to forward the information to its members.
  - Woodside offered to provide more specific information, maps and images to Yindjibarndi if required.

Reasonable Period

Woodside allowed Yindjibarndi a reasonable period for consultation in the preparation of this EP because:

- Woodside commenced consultation on this EP with Yindjibarndi in March 2024 and provided information via NYFL on that date. Woodside has corresponded with NYFL over 14 months, demonstrating a "reasonable period" of consultation.
- A consultation period was communicated to Yindjibarndi via NYFL during Woodside's initial email on 6 March 2024. Yindjibarndi was asked to provide feedback by 3 April 2024 in line with Woodside's methodology of a 30-day consultation period. This period enabled Woodside to assess feedback before the EP was submitted.
- Woodside provided Yindjibarndi with two months to consult ahead of preparing the EP and continues to take feedback in relation to the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided and Woodside's approach to consultation is appropriate and adapted because:

- Woodside has asked for Yindjibarndi's input into how it would like to engage in consultation and has consulted in a way that Woodside understands is appropriate for First Nations groups.
- Woodside has made information on this EP publicly available for 14 months. This has included publishing advertisements in Indigenous, regional, state and national, newspapers including Indigenous publications the National Indigenous Times (26 February 2024) and the Koori Mail advising of the proposed activities and requesting feedback.

- Woodside ran a targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP.
- Woodside's initial email about this EP on 6 March 2024:
  - Included a general email address and telephone number for Woodside as well as a direct email address and telephone number for a dedicated focal person from Woodside's First Nations Engagement team. It also included contact details for NOPSEMA.
  - Offered for Woodside to speak with Yindjibarndi members as well as the Yindjibarndi Board.
  - Asked Yindjibarndi to advise how it would like Woodside to engage and whether Yindjibarndi required further information.
  - Woodside asked Yindjibarndi if it was aware of any other Traditional Custodian groups or individuals with whom Woodside should consult.

Outcomes of Consultation

The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- During the past 14 months Yindjibarndi has not raised matters relevant to this EP.
- Woodside engages in ongoing consultation, once an EP has been submitted for assessment as well as throughout the life of an EP. Should feedback be received after the EP has been accepted (including any relevant new information on cultural values), it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of the EP).
- Woodside considers the measures and controls described in this EP address the potential impact from the proposed activity on Yindjibarndi's functions, interests or activities.

Native Title representative bodies

Yamatji Marlpa Aboriginal Corporation (YMAC)

YMAC is the NTRB for the Yamatji and Pilbara regions of Western Australia. As such, they are not a Prescribed or Registered Native Title Body Corporate but exist to assist native title claimants and holders.

In March 2023, YMAC notified Woodside that it was a 'relevant person' under regulation 25(1) of the Environment Regulations for the purposes of consultation on EPs only in relation to its facilitation and coordination function as a NTRB under applicable federal legislation. YMAC confirmed it did not intend to provide substantive comment on the content of EPs.

YMAC provides administrative and legal assistance to NTGAC, a group identified as a relevant person for this EP. Woodside has consulted with YMAC in this capacity.

Woodside has an existing relationship with YMAC that extends to a period prior to consulting on this EP. Woodside's consultation approach for Traditional Owners has a focus on building and maintaining relationships with each group. This is underpinned by Woodside's Program of Ongoing Engagement (sent to YMAC on 25 July 2023). Woodside has assigned a First Nations Engagement team member as a focal point for EP consultation with YMAC who is responsible for building a consultative relationship and is available to provide information and take feedback.

In June 2023, YMAC requested Woodside enter into a draft consultation framework and fund an in-house position to assist YMAC's clients including NTGAC in consultation on EPs. In response to this request, Woodside provided YMAC with a 7-page draft consultation framework in February 2024 which sought confirmation from YMAC as to how it would like to be consulted, including its views on what constituted sufficient information, a reasonable period of time and a reasonable opportunity for consultation. While

Woodside has continued to attempt to progress the framework agreement, despite numerous attempts, it remains in a draft form and has not been progressed. We note, however, that this has not prevented consultation on this EP from progressing in parallel to discussions on the framework agreement.

For consultation on this EP, Woodside contacted YMAC offering an opportunity to present to the YMAC Board. Woodside asked YMAC how it wished to be consulted, if it required support to participate in consultation, whether there are additional persons that YMAC believed should be consulted and requested that all information shared with YMAC be cascaded to its members.

This context and process demonstrates that Woodside's consultation approach with YMAC is appropriate and adapted to the nature and interests of YMAC.

Historical Engagement:

- **(1)** On 20 March 2023, YMAC responded to an earlier email from Woodside to confirm that in its view YMAC is a 'relevant person' under regulation 25(1) of the Environment Regulations for the purposes of consultation on EPs only in relation to its facilitation and coordination function as a NTRB under applicable federal legislation. YMAC confirmed that its role is limited and that it does not intend to provide substantive comment on the content of EPs. **(1)** Woodside acknowledged YMAC's feedback.
- On 19 July 2023, Woodside emailed YMAC and NTGAC NOPSEMA's *Consultation Guidelines, Consultation Brochure, and Draft Policy for Managing Gender-Restricted Information*. This email also reiterated Woodside's request that YMAC/NTGAC advise Woodside of any other Traditional Custodian groups or individuals with whom Woodside should consult.
- On 25 July 2023, Woodside emailed YMAC ***Woodside's Program for Ongoing Engagement with Traditional Custodians***.

Please see Scarborough Seabed Intervention and Trunkline Installation EP (Appendix F and SI Report) for further details of this correspondence.

Summary of information provided and record of consultation for this EP:

- On 20 March 2024, Woodside emailed YMAC as the representative for NTGAC, advising of the proposed activity (Record of Consultation, reference 2.37), providing a Summary Information Sheet (including a link to the detailed information sheet on Woodside's website), and links to the NOPSEMA consultation brochure and guidelines, and draft policy for managing gender-restricted information. The email requested information on the interests that NTGAC and its members may have within the EMBA, information on how NTGAC would like to engage, and requested that NTGAC provide information to other individuals as required.
- On 5 December 2024, Woodside emailed NTGAC/YMAC an update on this activity (SI Report, reference 15.25). Woodside:
- On 10 March 2025, Woodside emailed NTGAC/YMAC to correct EP references provided in its email on 5 December 2024 (SI Report 15.26). Woodside:

Please see NTGAC for further details of the above correspondence.

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
(1) YMAC has provided feedback that in its view it is a 'relevant person' under regulation 25 of the Environment Regulations for the purposes of consultation on EPs only in relation to its facilitation and coordination function as a	**(1)** **Woodside assessment:** Woodside accepts YMAC's feedback that it is a relevant person only in relations to its facilitation and coordination function as a representative body. **Woodside response:** Woodside has consulted with YMAC in relation to its facilitation and coordination as a NTRB under applicable federal legislation and	**(1)** Not required

NTRB under applicable federal legislation and does not intend to provide substantive comment on the content of EPs.	has accepted YMAC's advice that it does not intend to provide substantive comment on the content of EPs.	
While feedback has been received, there were no objections or claims.	Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. Woodside engages in ongoing consultation throughout the life of an EP. Woodside notes that further feedback may be received as part of ongoing consultation. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	Based on the engagement to date, no additional measures or controls are required.

Summary Report: Consultation Complete

YMAC has informed Woodside it will not provide substantiative comments on EPs and YMAC has therefore not provided substantive feedback, claims or objections on the content of this EP. Woodside has discharged its obligations for consultation under Regulation 25 of the Environment Regulations and consultation with YMAC for the purpose of Regulation 25 is complete. Sufficient information, a reasonable period and reasonable opportunity have been provided, as described in Section 5 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Sufficient information has been provided because:

- Woodside has provided YMAC/NTGAC with relevant consultation documents, including NOPSEMA's Consultation Guidelines, Consultation Brochure and Draft Policy for Managing Gender-Restricted Information (informing stakeholders on how consultation is conducted and providing avenues for providing information on sensitive matters) (see 19 July 2023).
- In February 2024, Woodside made the Consultation Information Sheet about this EP publicly available on the Woodside website. The EP was published on the NOPSEMA website in May 2024.
- On 20 March 2024, Woodside commenced consultation with YMAC/NTGAC on this EP. Woodside provided YMAC/NTGAC:
  - A Summary Information sheet developed specifically for First Nations groups and reviewed by a First Nations staff member. This sheet included:
    - An overview of the activity and proposed timing
    - Maps showing the location and EMBA
    - A summary of the risks and impacts of the activity
    - Diagrams
    - Details about how to provide feedback.
  - The purpose of consultation, and what was being sought by Woodside through consultation including understanding the nature of YMAC/NTGAC's interests and how the activity could impact those interests.

- That Woodside had undertaken assessments to identify potential impacts and risks to the marine environment and developed mitigation and management measures.
- Woodside asked YMAC to forward the information to NTGAC and its members.
- Woodside offered to provide more specific information, maps and images to YMAC/NTGAC if required.

Reasonable Period

Woodside allowed YMAC a reasonable period for consultation in the preparation of this EP because:

- Woodside commenced consultation on this EP with YMAC/NTGAC in March 2024 and provided information on the EP on that date. Since then, Woodside and YMAC/NTGAC have engaged in consultation for 14 months, demonstrating a "reasonable period" of consultation.
- A consultation period was communicated to YMAC/NTGAC during Woodside's initial email on 20 March 2024. YMAC/NTGAC was asked to provide feedback by 18 April 2024 in line with Woodside's methodology of a 30-day consultation period. This period enabled Woodside to assess feedback before the EP was submitted.
- Woodside ultimately provided YMAC/NTGAC with two months to consult ahead of preparing the EP and continues to take feedback in relation to the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided and Woodside's approach to consultation is appropriate and adapted because:

- Woodside and YMAC have a history of consulting and engaging. A primary means of consultation is by email. Consultation for this EP therefore commenced via email.
- Woodside asked for YMAC's input into how YMAC would like to engage in consultation and has consulted in a way that Woodside understands is appropriate for YMAC and First Nations groups.
- Woodside has made information on this EP publicly available for 14 months. This has included publishing advertisements in Indigenous, regional, state and national, newspapers including Indigenous publications the National Indigenous Times (26 February 2024) and the Koori Mail advising of the proposed activities and requesting feedback.
- Woodside ran a targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP.
- Woodside's initial email about this EP on 20 March 2024:
  - Included a general email address and telephone number for Woodside as well as direct email and telephone number for a focal person from Woodside's First Nations Engagement team. Woodside also provided contact details for NOPSEMA.
  - Offered for Woodside to speak with YMAC/NTGAC members as well as the YMAC/NTGAC Board.
  - Asked YMAC to advise how it would like Woodside to engage and whether YMAC/NTGAC required further information.
  - Woodside asked YMAC if it was aware of any other Traditional Custodian groups or individuals with whom Woodside should consult.
- Woodside has consulted in the way that YMAC has asked and in the capacity that YMAC has asked it consult.

Outcomes of Consultation

The measures (if any) that Woodside has adopted or proposes to adopt because of consultation are appropriate because:

- During the past 14 months, consistent with its purpose and aims, YMAC has not provided feedback or raised objections or claims about the content of the EP or the adverse impact of each activity to which this EP relates.

- Woodside engages in ongoing consultation once an EP has been submitted for assessment as well as throughout the life of an EP. Should feedback be received after the EP has been accepted (including relevant new information on cultural values), it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).
- Woodside considers the measures and controls described in this EP address the potential impact from the proposed activity on Yindjibarndi's functions, interests or activities.

Self-identified First Nations Groups

Ngarluma Yindjibarndi Foundation Ltd (NYFL)

NYFL was created to act as Trustee for the Trust under the Northwest Shelf Agreement 1998 struck between the Ngarluma and Yindjibarndi registered native title claimants, the NWS JVs and Woodside, prior to the resolution of the Ngarluma and Yindjibarndi native title claim. Its purpose is to carry on the business of enterprise development, investment and social welfare.

In 1999 the Ngarluma and Yindjibarndi native title claim was settled with the Federal Court appointing, at the request of the common law native title holders, the Ngarluma Aboriginal Corporation (NAC) as PBC to represent the communal interests of the Ngarluma people and the Yindjibarndi Aboriginal Corporation (YAC) as PBC to represent the communal interests of the Yindjibarndi people. Woodside consulted both NAC and YAC as relevant persons in the course of preparing this EP. NYFL self-identified and has advised it is relevant for this EP.

Woodside had an existing relationship with NYFL on other matters and consultations prior to consulting on this EP. Consultation on previous EPs has primarily occurred by email and face to face meetings – there is a history and pattern of consultation in this manner being undertaken by, and being acceptable to NYFL.

Woodside's consultation approach for Traditional Owners has a focus on building and maintaining relationships with each group. This is underpinned by Woodside's Program of Ongoing Engagement (sent to NYFL on 26 July 2023). Woodside has assigned a First Nations Engagement team member as a focal point for EP consultation with NYFL who is responsible for building a relationship and is available to provide information and take feedback.

Woodside and NYFL are in the process of finalising a draft consultation agreement. Woodside regarded initial quotes by NYFL to review the agreement as excessive and outside of Woodside's policies and procedures. Woodside and NYFL have since agreed on funding for review and close out of the consultation agreement.

Woodside provides reasonable funding for consultation and has provided NYFL with further information about amounts available and processes to be followed. Woodside disagrees with NYFL's assertion that a consultation agreement is required for consultation to occur. It has been made clear to NYFL that consultation for this EP has occurred in parallel to discussions about the consultation agreement (which remains ongoing).

Historical Engagement:

- On 19 July 2023, Woodside emailed NYFL NOPSEMA's *Consultation Guideline, Consultation Brochure, and Draft Policy for Managing Gender-Restricted Information*. This email also requested that NYFL advise Woodside of any other Traditional Custodian groups or individuals with whom Woodside should consult.
- On 26 July 2023, Woodside emailed NYFL Woodside's planned *Program of Ongoing Engagement with Traditional Custodians*.

Please see Scarborough Seabed Intervention and Trunkline Installation EP (Appendix F and SI Report) for further details of this correspondence.

Summary of information provided and record of consultation for this EP:

- On 6 March 2024, Woodside emailed NYFL advising of the proposed activity (Record of Consultation, reference 2.38), providing a Summary Information Sheet (including

a link to the detailed information sheet on Woodside's website), and links to the NOPSEMA consultation brochure and guidelines, and draft policy for managing gender-restricted information. The email requested information on the interests that NYFL and its members may have within the EMBA, information on how NYFL would like to engage, and requested that NYFL provide information to other individuals as required. Woodside asked NYFL to provide feedback by 3 April 2024.

- **(1)** On 6 March 2024, NYFL emailed Woodside a letter about consultation on this EP (SI Report, reference 23.1). The letter stated NYFL:
  - Required advice about:
    - Technical information contained in the EP (an independent expert would be required).
    - An assessment of the potential environmental implications of the proposal (an independent expert would be required).
    - An assessment of the potential impact of the EP on cultural heritage.
  - Was under resourced and sought costs to complete this work.
- On 6 March 2024, Woodside emailed NYFL with a letter setting out the draft terms of a 7-page consultation agreement between NYFL and Woodside (SI Report, reference 23.2). The agreement (among other things) sought NYFL's input on the following:
  - Confirmation of what is sufficient information for NYFL for consultation.
  - Confirmation of what is a reasonable period for consultation.
  - NYFL's preferred method for provision of information.
  - NYFL's preferred method for providing objection or claims.
  - Cost and termination of the agreement.
- Between 14 and 19 March 2024, NYFL emailed Woodside regarding administrative matters relating to the draft consultation agreement (SI Report, references 23.3, 23.4).
- On 5 April 2024, Woodside emailed NYFL to follow-up on consultation information sent to NYFL about this EP and offered to provide further information if required (SI Report, reference 23.5).
- Between 5 April and 12 April 2024, NYFL and Woodside exchanged emails about the draft consultation agreement (SI Report, reference 23.6, 23.7, 23.8, 23.9).
- On 17 April 2024, NYFL emailed Woodside noting it was attending to Sorry Business and as per cultural protocols would require time within the community and engagement would be delayed until appropriate to re-commence (SI Report, reference 23.10).
- Between 10 May and 3 July 2024, Woodside and NYFL exchanged emails about the draft consultation agreement. Woodside offered to meet NYFL however NYFL declined the invitation (SI Report, references 23.11, 23.12, 23.13).

Ongoing Engagement

- On 9 September 2024, Woodside invited NYFL to share stories and receives updates from Woodside at its Monthly Community Luncheon for Traditional Owners on 25 September 2024 (SI Report, reference 23.14).
- On 25 September 2024, Traditional Owner members from NYFL attended Woodside's Monthly Community Luncheon for Traditional Owners. During the luncheon Woodside requested feedback from all attendees about EPs and provided information about the consultation process (SI Report, reference 23.15).
- On 3 October 2024, Woodside emailed NYFL an invitation to share stories and receives updates from Woodside at its Monthly Community Luncheon for Traditional

Owners on 23 October 2024 (SI Report, reference 23.16).

- On 21 October 2024, NYFL emailed Woodside (SI Report, reference 23.17). In the email NYFL stated:
  - **(2)** No formal consultation had taken place between NYFL and Woodside on this EP and others.
  - **(3)** Woodside has provided NYFL with a draft consultation agreement.
  - **(3)** NYFL would progress consultation on this EP and others once the consultation agreement had been formalised.
- On 23 October 2024, Traditional Owner members from NYFL attended Woodside's Monthly Community Lunch for Traditional Owners. During the lunch Woodside requested feedback from all attendees about EPs and provided information about the consultation process (SI Report, reference 23.18).
- On 4 November 2024, Woodside emailed NYFL in response to statements made in NYFL's email on 21 October 2024 (SI Report, reference 23.19). The email:
  - **(2)** Confirmed Woodside had consulted with NYFL via email as this appeared to be NYFL's primary method of communicating with Woodside on EPs and offered to meet as part of ongoing consultation. Woodside also confirmed that consultation had closed for this EP.
  - **(3)** Reiterated that the ongoing negotiation of a consultation framework agreement can and continues to occur in parallel to consultation for EPs.
- On 8 November 2024, NYFL emailed Woodside requesting to meet on 20 November 2024 (SI Report, reference 23:20).
- On 15 November 2024, Woodside and NYFL exchanged emails confirming the invitation to meet on 20 November 2024. Woodside stated it would separately email NYFL about the remaining EPs outlined in the 21 October 2024 correspondence (SI Report, references 23.21, 23.22).
- On 20 November 2024, Woodside met with NYFL. Woodside emailed NYFL a summary of its meeting earlier that day (SI Report, reference 23.23). Matters relevant to this EP included:
  - Administrative matters relating to NYFL's review of the draft consultation agreement.
  - Woodside seeking time to present to the NYFL Board on EPs.
- On 21 November 2024, NYFL advised Woodside about the passing of a Senior Yindjibarndi Elder and founding member of NYFL. The NYFL Board advised that Sorry Business was underway, and the community was commencing a period of mourning (SI Report, reference 23.24).
- On 5 December 2024, Woodside emailed NYFL a response to its letter of 21 October 2024 (SI Report, reference 23.25). In the letter Woodside:
  - Invited NYFL to provide further feedback about this EP no later than 19 December 2024 and that any feedback, opinions and comments provided by that date would be reflected in the EP and considered by NOPSEMA
  - Attached a summary of consultation that had occurred for this EP.
  - Woodside stated:
    - **(2)** It did not agree that consultation had not occurred for this EP and others. Woodside had consulted NYFL in accordance with regulations.
    - **(3)** that discussions about a draft consultation agreement had occurred in parallel to consultation on EPs.
    - NYFL was welcome to state its preferred method of consultation including whether it would like to meet face-to-face.
    - Woodside welcomed the opportunity to speak with Elders, office holders and other interested parties about this activity.
    - Woodside provides various forms of assistance to organisations, Traditional Custodian groups and individuals to support participation in consultation.
    - Woodside manages gender-restricted or other culturally sensitive information carefully and would work with NYFL to understand how it would like its information

to be managed.
- Feedback can continue to be provided during the life of an EP, including after consultation for the EP has closed, during EP assessment, and after an EP has been accepted by NOPSEMA. Woodside continues to receive, assess and respond to claims and objections from relevant persons throughout the life of the EP. Should a claim or objection be received following the acceptance of an EP that Woodside assesses, and which identifies a measure or control that Woodside considers requires implementation or updates to meet the intended outcome of consultation, Woodside will apply its Management of Change and Review process as appropriate.
- NYFL could forward this email and the attached document to members of the NYFL, Traditional Owners and other people and organisations who may be interested.
- NYFL was welcome to call or email Woodside if it would like to discuss consultation for this EP and other EPs further.

- On 6 December 2024, NYFL emailed Woodside acknowledging its correspondence on 5 December 2024. Woodside replied to this acknowledgement (SI Report, references 23.26, 23.27).
- On 4 March 2025, Woodside invited NYFL to share stories and receive updates from Woodside at its Monthly Community Luncheon for Traditional Owners to be held in Roebourne on 5 March 2025 (SI Report, reference 23.28).
- On 5 March 2025, Traditional Owner members from NYFL attended Woodside's Monthly Community Luncheon for Traditional Owners held in Roebourne. During the lunch Woodside requested feedback from all attendees about EPs and provided information about the consultation process (SI Report, reference 23.29).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
NYFL self-identified and advised Woodside they are a relevant person for activities.	**Woodside assessment:** NYFL was created to act as Trustee for the Northwest Shelf Agreement 1998. NYFL's membership is made up of Ngarluma people and Yindjibarndi people, membership is not open to any person who is not accepted as Ngarluma or Yindjibarndi. Woodside has also consulted with Ngarluma and Yindjibarndi Aboriginal Corporations individually. Ngarluma and Yindjibarndi Aboriginal Corporations were appointed by the Federal Court, at the request of the Ngarluma and Yindjibarndi common law native title holders as PBCs to represent the communal interests of the Ngarluma and Yindjibarndi people respectively. Ngarluma and Yindjibarndi Aboriginal Corporations are representative of all Ngarluma and Yindjibarndi people regardless of membership. **Woodside response:** Woodside has responded to NYFL's self-identification and consulted with them as a relevant person.	NYFL has been consulted with in accordance with the methodology described in Section 5 of the EP.
(1) NYFL has stated it is under resourced and requires expert advice about	**(1)** **Woodside assessment:** Woodside has provided NYFL with a draft consultation agreement. This agreement would be an effective mechanism to address	**(1)** Woodside is implementing a program to actively

technical and environmental matters relating to this EP.	resourcing for expert advice as agreed between NYFL and Woodside. Woodside supports reasonable requests for resourcing to support consultation. **Woodside response:** Woodside supports reasonable requests to engage experts. Woodside sought a meeting with NYFL to discuss how Woodside can reasonably ensure NYFL is adequately resourced for consultation.	support Traditional Custodians' capacity for ongoing engagement and consultation on environment plans. This is described further in the Program of Ongoing Engagement with Traditional Custodians, (Appendix G). This includes continued engagement regarding the proposed Framework Agreement which would be applied to ongoing consultation for this activity. Woodside will continue to consult following acceptance of the EP, as set out in Section 7.12 of the EP. The proposed draft consultation agreement may address any reasonable requests for funding.
(2) NYFL stated no formal consultation had taken place on this EP and others.	**Woodside assessment:** Woodside rejects NYFL's assertion that has not been consulted on this EP. Woodside began consulting NYFL on 6 March 2024 and has provided sufficient information, a reasonable period of time, and reasonable opportunity for NYFL to provide feedback. Woodside has clearly communicated to NYFL that consultation for this EP and others has occurred in parallel to negotiations about the draft consultation agreement. Woodside notes that the consultation agreement is not required to undertake and/or consult with NYFL on EPs. **Woodside response:** The information provided by Woodside meets the requirements of regulation 25 of the Environment Regulations for the reasons set out above.	**(2)** Not required
(3) NYFL will progress consultation on this EP and others once a draft consultation agreement provided by Woodside had been formalised	**(3)** **Woodside assessment:** Separate from consultation under Regulation 25 of the Environment Regulations, Woodside is open to engaging with a joint First Nations framework for consultation, however, notes that this is not required to undertake and/or complete consultation in the course of preparing this EP. Consultation has occurred in parallel to discussions about the draft agreement. Sufficient information to allow informed assessment has already been provided by other means. Woodside has an existing engagement framework in place with NYFL which enables regular (quarterly) communication about Woodside activities.	**(3)** Woodside is implementing a program to actively support Traditional Custodians' capacity for ongoing engagement and consultation on environment plans. This is described further in the Program of Ongoing Engagement with Traditional Custodians, (Appendix G). This includes continued engagement regarding the proposed Framework Agreement which would be applied to ongoing consultation for this activity. Woodside will continue to consult

	Woodside Response: Woodside has reiterated to NYFL that consultation has occurred in parallel to discussions about the draft consultation agreement.	following acceptance of the EP, as set out in Section 7.12 of the EP.
Woodside has addressed objections and claims as noted above.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	Woodside has assessed the objections or claims raised by NYFL. No additional measures or controls are required.

Summary Report: Consultation Complete

Woodside has discharged its obligations for consultation under Regulation 25 of the Environment Regulations and consultation with NYFL for the purpose of Regulation 25 is complete. Sufficient information, a reasonable period and reasonable opportunity to provide feedback have been provided, as described in Section 5 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given NYFL sufficient information to allow NYFL to make an informed assessment of the possible consequence of the activity on the functions, interests or activities of NYFL because:

- NYFL was established in order to receive payments relating to the Northwest Shelf Agreement 1998 (not this EP) on behalf of its members.
- NYFL is not assessed as a relevant person under Woodside's methodology. Never-the-less, NYFL self-identified and Woodside has provided NYFL with relevant consultation documents, including NOPSEMA's Consultation Guidelines, Consultation Brochure and Draft Policy for Managing Gender-Restricted Information (informing stakeholders on how consultation is conducted and providing avenues for providing information on sensitive matters) (see 19 July 2023).
- In February 2024, Woodside made the Consultation Information Sheet about this EP publicly available on the Woodside website. The EP was published on the NOPSEMA website in May 2024.
- Woodside provided information to NYFL on 28 August 2023 (when Woodside commenced consulting with NYFL on this EP). Woodside provided NYFL:
  - A Summary Information Sheet developed specifically for First Nations groups and reviewed by a First Nations staff member. This sheet included:
    - An overview of the activity and proposed timing.
    - Maps showing the location and EMBA.
    - A summary of the risks and impacts of the activity.
    - Diagrams.
    - Details about how to provide feedback.
  - The purpose of consultation, and what was being sought by Woodside through consultation including understanding the nature of NYFL's interests and how the activity could impact those interests.
  - That Woodside had undertaken assessments to identify potential impacts and risks to the marine environment and developed mitigation and management measures.
  - Woodside asked NYFL to forward the information to its members.
  - Woodside offered to provide more specific information, maps and images to NYFL if required.
  - Woodside provided contact information for Woodside and NOPSEMA.

Reasonable Period

Woodside allowed NYFL a reasonable period for consultation in the preparation of this EP because:

- Woodside commenced consultation on this EP with NYFL in March 2024 and provided information on the EP on that date. Since then, Woodside and NYFL have engaged in consultation for 14 months, demonstrating a "reasonable period" of consultation.
- A consultation period was communicated to NYFL during Woodside's initial email on 6 March 2024. NYFL was asked to provide feedback by 3 April 2024 in line with Woodside's methodology of a 30-day consultation period. This period enabled Woodside to assess feedback before the EP was submitted.
- Woodside ultimately provided NYFL with two months to consult ahead of preparing the EP and continues to take feedback in relation to the EP.
- Woodside provided a further opportunity for NYFL to provide feedback ahead of resubmitting this EP. Woodside advised NYFL that feedback received by 19 December 2024 would be reflected in the EP and considered by NOPSEMA

Reasonable Opportunity

- Woodside has given NYFL a reasonable opportunity to provide feedback and Woodside's approach to consultation is appropriate and adapted to the nature of the interests of NYFL because:
- NYFL was established in order to receive payments relating to the Northwest Shelf Agreement 1998 (not this EP) on behalf of its members.
- Woodside has consulted NYFL's membership on this EP.
- Woodside asked for NYFL's input into how NYFL would like to engage in consultation. In accordance with previous consultations and communications which have occurred via emails and meetings, Woodside and has consulted in a way that Woodside understands is appropriate for NYFL and First Nations groups.
- Woodside has made information on this EP publicly available for 14 months. This has included publishing advertisements in Indigenous, regional, state and national, newspapers including Indigenous publications the National Indigenous Times (26 February 2024) and the Koori Mail advising of the proposed activities and requesting feedback.
- Woodside ran a targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP.
- Woodside's initial email about this EP on 6 March 2024:
  - Included a general email address and telephone number for Woodside as well as a direct email address and telephone number for a dedicated focal person from the Woodside First Nations Engagement team. It also included contact details for NOPSEMA.
  - Offered for Woodside to speak with NYFL members as well as the NYFL Board/Office holders.
  - Asked NYFL to advise how it would like Woodside to engage and whether NYFL required further information.
  - Throughout the consultation period (and following submission of the EP for assessment), Woodside and NYFL have exchanged multiple emails, and met and have otherwise had direct contact lines to each other during the period.
- Woodside invites NYFL to Quarterly Heritage Meetings and monthly luncheons.
- Woodside and NYFL continue to negotiate a framework consultation agreement. Despite this negotiation going on in the background, Woodside has made it clear that consultation for this EP can and has occurred in parallel with the ongoing negotiations relating to the framework consultation agreement.

- Woodside provided a further opportunity to NYFL to provide feedback ahead of resubmitting this EP. Woodside emailed NYFL on 5 December 2024 and advised that feedback received by 19 December 2024 would be reflected in the EP and considered by NOPSEMA

Outcomes of Consultation

The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- The nature of NYFL's feedback has meant that Woodside has not been required to assess the merits of any claim or objection about the adverse impact of the activity to which this EP relates.
- NYFL was established in order to receive payments on behalf of its members relating to the Northwest Shelf Agreement 1998. That Agreement relates to a number of matters including payment for land use on the Burrup Peninsula by the North West Shelf Joint Venture (not for this EP). NYFL was assessed as not being a relevant person for this EP because NYFL's functions, interests or activities are not assessed as potentially being affected by the activities to be carried out under the EP. NYFL's members have been consulted on this EP. Consultation with NYFL's members has given Woodside the opportunity to receive information and better understand how NYFL's members perceive environmental impacts and risks of the activities under the EP. Those consultations have enabled Woodside to refine or change measures it proposes to address those impacts and risks by taking into account the information acquired from NYFL's members during consultation. In the context of NYFL's role and the consultations undertaken by Woodside for this EP, the purpose of consultation has been achieved despite NYFL not raising any objections or claims about the adverse impact of the activities to which this EP relates. Consultation is complete.
- Woodside engages in ongoing consultation, once an EP has been submitted for assessment as well as throughout the life of an EP. Should feedback be received after the EP has been accepted (including relevant new information on cultural values), it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).

Other First Nations groups

Save our Songlines (SoS) and/or [Individual 1]

SoS and [Individual 1] do not squarely fall within the consultation categories in the current Woodside methodology and are therefore considered in their own category.

SoS is an organisation formed by [Individual 1] who we currently understand is the group's primary spokesperson. The views expressed by SoS are the views expressed by [Individual 1]. In addition, Individual 1 and SOS are together represented by lawyers from the Environment Defenders Office (EDO). For all intents and purposes, communication with [Individual 1] is communication with SoS and that is why Woodside has consulted them as one.

Woodside notes that in its initial consultation email to [Individual 1] via EDO, Woodside stated it was "seeking to understand the nature of the interests that Save Our Songlines (SoS) and its members may have in the environment that may be affected (EMBA) by this activity". EDO acknowledged this email and did not dispute Woodside's reference to both SoS and [Individual 1] in this or any other correspondence from Woodside. Woodside also invited [Individual 1] to advise her preferred method of consultation. [Individual 1] did not raise issues about Woodside communicating with SoS and herself in this manner.

[Individual 1] and SoS have stated an interest in opposing the expansion on the Burrup by Woodside and others. In addition, their stated interests include the protection of Murujuga rock art.

It is noted that [Individual 1] has been a member of Aboriginal corporations who have been separately consulted as relevant persons by Woodside. This is relevant because it confirms that cultural values or interests of those groups have been consulted on and assessed in preparing this EP.

Historical Engagement:

- On 25 July 2023, Woodside met with EDO, SoS, and/or [Individual 1] and/or [Individual 2] about an activity not relevant to this activity (SI Report reference 26.1). During the meeting, SoS and/or [Individual 1] and/or [Individual 2] stated that they are broadly concerned about:
  - **(1)** impact on the whales and other animals.
  - **(2)** the Songlines (unspecified) and the energy lines (unspecified).
- **(3)** On 25 July 2023, EDO on behalf of SoS, and/or [Individual 1] and/or [Individual 2] emailed Woodside in response to another activity not related to this activity (SI Report, reference 26.2) requesting a response to questions relating to the depth of wells, freshwater, migratory patterns of whales, dugongs and turtles, and seagrass distribution.
- **(1,2, 3)** On 27 July 2023, Woodside responded to EDO's email of 25 July 2023 in relation to another activity (SI Report, reference 26.3) providing information in response to the interest SoS, and/or [Individual 1], and/or [Individual 2] had in marine mammals, seagrass, and the meeting of saltwater and freshwater.
- On 13 December 2023, Woodside emailed EDO in relation to another activity, and also requested EDO respond as to who their client was (SI Report, reference 26.4).
- On 18 December 2023, the EDO emailed Woodside, confirming that the EDO was currently acting only for [Individual 1], not [Individual 2] or SoS (SI Report, reference 26.5).

Summary of information provided and record of consultation for this EP:

- On 26 March 2024, Woodside emailed SoS and/or [Individual 1] advising of the proposed activity (Record of Consultation, reference 2.39), providing a Summary Information Sheet (including a link to the detailed information sheet on Woodside's website), and links to the NOPSEMA consultation brochure and guidelines, and draft policy for managing gender-restricted information. The email requested information on the interests that SoS and its members may have within the EMBA, information on how SoS would like to engage, and requested that SoS provide information to other individuals as required. Woodside requested feedback by 26 April 2024.
- On 26 March 2024, EDO on behalf of SoS and/or [Individual 1] emailed Woodside acknowledging the information for this activity and noting they would obtain instructions (SI Report, reference 26.6).
- On 10 April 2024, EDO emailed Woodside about another EP (26.7). Matters relevant to this EP include:
  - **(4)** [Individual 1] intended consulting in written format going forward and would not include culturally sensitive information as they did not trust that this information would not be shared.
- **(5)** On 29 April 2024, EDO emailed Woodside to confirm SoS and/or [Individual 1] would like to consult on this activity and that a written comment would be provided (SI Report, 26.7).
- **(5)** On 2 May 2024, Woodside emailed EDO to advise the consultation period for SoS and/or [Individual 1] would be extended until 9 May 2024 to enable them to provide a written response to the activity (SI Report, reference 26.8).
- On 2 May 2024, EDO on behalf of SoS and/or [Individual 1] emailed Woodside (SI Report, reference 26.9) to clarify they understood 26 April 2024 to be the date to confirm interest in consultation, rather than the end of consultation, and confirmed they would provide a written response as soon as possible.
- On 9 May 2024, SoS and/or [Individual 1] emailed Woodside (SI Report, reference 26.10) with comments relating to this activity and another unrelated activity and noted there was no culturally sensitive information included. The letter outlined [Individual 1] feedback including:

- **(6)** An overview of [Individual 1] function interests and activities including:
    - [Individual 1] connection to Murujuga and cultural responsibilities.
    - [Individual 1] opposition to all industry on Murujuga.
    - That [Individual 1] holds information that is critical for Woodside to understand the impacts of the activity and that [Individual 1] may also have feedback on proposed mitigation measures.
- (7) [Individual 1] concern that the sacred rock art at Murujuga is at risk from emissions from the Pluto and Scarborough facilities
- (8) That [Individual 1] would like Woodside to consider GHG emissions as a potential impact or risk in the EP.
- (9) [Individual 1] is concerned about the cumulative impacts of any industry on Murujuga which:
    - restricts access to Murujuga.
    - affects cultural practices.
    - contributes to cultural genocide by creating irreplaceable, irreversible cultural damage.
    - Affects the environment.
- **(10)** That climate change should be considered as an impact.
- **(11)** That [Individual 1] is concerned about drilling a new well and seabed disturbance and specifically:
    - The disturbance of underwater cultural heritage, what surveys Woodside has conducted and how these aspects will be managed.
    - The impacts of drilling noise and pollution on marine life, songlines, the seabed and the ecosystem.
    - That mitigation measures are not strong enough.
- **(12)** That activities are offshore from culturally significant islands, including Rosemary Island which is a women's island to which [Individual 1] has a major connection and that Rosemary Island:
    - holds a connection to songlines.
    - Is a main breeding ground and habitat for turtles, which are culturally significant.
    - That erosion on the island caused by climate change, vessel traffic and fishing prevent turtles laying eggs and incubating properly.
    - Can only be protected by stopping use of the Pluto facility, and asks how Woodside will protect the island and the species reliant on the island.
- **(13)** That consultation of relevant persons needs to be consistent. Specifically:
    - Offering the same level of support.
    - Consulting in two stages, information provision, then response.
    - Providing assurance that culturally sensitive information will not be shared.
- **(14)** That the environment and cultural values are one, that Dreaming stories come from the animals depicted on the rock art and will live forever, that the connection and songlines are being disrupted.
- **(15)** That there are other individuals that Woodside should speak to about these activities but [Individual 1] is not comfortable identifying these people.

- On 14 May 2024, Woodside emailed SoS and/or [Individual 1] to thank them for their feedback, confirm that Woodside would reply shortly, and request an attachment that was missing from the original email (SI Report, reference 26.11).

- On 16 May 2024, EDO emailed Woodside to attach the Border Affidavit as requested (SI Report, reference 26.12).
- On 29 May 2024, Woodside emailed EDO a response to its 9 May 2024 letter (SI Report, reference 26.13). The letter stated:
  - **(6)** that Woodside acknowledged [Individual 1] was a Mardudhunera person, a Traditional Custodian of Murujuga and opposed to industry at Murujuga
  - **(4)** Woodside does not agree with assertions regarding culturally sensitive information. Woodside has followed protocols.
  - **(7)** the management of emissions under a range of Federal and State legislation and Woodside's support of the monitoring of emissions in relation to rock art.
  - **(8)** the assessment of emissions and the controls in the EP to reduce GHG emissions to ALARP and acceptable levels.
  - **(9)** the commitment to facilitating access to Murujuga to Traditional Custodians.
  - **(10)** the consideration of climate change impacts through the assessment of GHG emissions.
  - **(11)** the consideration of tangible and intangible heritage in the EP.
  - **(12)** that Woodside notes [Individual 1]'s connection to Rosemary Island.
  - **(13)** Woodside's methodology in identifying relevant persons for the purpose of consultation and commitment to engaging with Traditional Custodians through their preferred method of engagement.
  - **(14)** Woodside's efforts to understand and record the nature of the cultural values provided through consultation.
  - **(15)** Woodside's willingness to consult with Traditional Custodians, including those who self-identify as relevant.
- On 7 October 2024, EDO emailed Woodside about an administrative matter relating to email correspondence about EPs (SI Report, reference 26.14).
- **(5)** On 5 December 2024, Woodside emailed [Individual 1] and copied EDO an update about this EP (SI Report, reference 26.15). Woodside Informed [Individual 1] that Woodside would resubmit this EP for further assessment by NOPSEMA.
  - Notified [Individual 1] that consultation for this EP would close on 19 December 2024 and that feedback provided by that date would be reflected in the EP and considered by NOPSEMA.
  - Woodside stated that [Individual 1]
    - Was welcome to state her preferred method of consultation including whether she would like to meet face-to-face or speak over the phone.
    - Could provide feedback during the life of an EP, including after consultation for the EP has closed, during EP assessment, and after an EP has been accepted by NOPSEMA. Woodside continues to receive, assess and respond to claims and objections from relevant persons throughout the life of the EP. Should a claim or objection be received following the acceptance of an EP that Woodside assesses, and which identifies a measure or control that Woodside considers requires implementation or updates to meet the intended outcome of consultation, Woodside will apply its Management of Change and Review process as appropriate.

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
(1) In a previous unrelated EP, cultural features associated with whales were raised.	**(1)** **Woodside Assessment:** Woodside understands that some species hold spiritual and cultural importance to SoS and/or [Individual 1] . **Woodside Response:** During consultation on a previous EP, Woodside discussed controls put in place to manage impacts and risks relating to their	**(1)** Assessment of potential impacts to cultural values are described in section 6 of the EP.

	spiritual and cultural connection to the environment. Woodside has implemented controls to reduce potential risks and impacts to ecological and cultural values to ALARP and to an acceptable level.	
(2) In a previous unrelated EP, it was noted there were cultural features associated with Songlines, dreaming and energy lines.	**(2)** **Woodside Assessment:** Woodside understands that Songlines and energy lines to hold personal spiritual and cultural value individually (rather than communally) to SoS and/or [Individual 1]. Woodside has consistently sought to understand the nature of these values to ensure impacts to these values can be minimised. SoS and/or [Individual 1] has declined to provide further information on these values. **Woodside Response:** In any event, Woodside has sought to include controls that seek to reduce risks and impacts to ALARP and acceptable levels.	**(2)** Woodside has considered SoS's and/or [Individual 1] feedback and updated Section 4.9 to record topics of interest and cultural values, including Songlines and energy lines. These are assessed in Section 6.11 with appropriate controls implemented. At this stage, Woodside has not been provided with specific information on these potential values to enable a more fulsome assessment.
(3) In a previously unrelated EP, an interest in marine mammals, seagrass, and the meeting of freshwater and saltwater was demonstrated.	**(3)** **Woodside Assessment:** SoS and/or [Individual 1] has not expressly confirmed their interests, rather, have raised topics of interest to them during consultation for another activity. Woodside has considered SoS's and/or [Individual 1] topics of interest and shared relevant information in relation to a previous EP, with SoS and/or [Individual 1] relating to these interests, including controls put in place to manage risks and impacts to them. **Woodside Response:** Woodside has updated Section 4.9 to record the interests and assessed them in Section 6 implementing appropriate controls.	**(3)** Woodside has considered topics raised by SoS and/or [Individual 1] and updated Section 4.9 to record these. These are assessed in 6.11 with appropriate controls implemented.
(4) In an unrelated EP, SoS and/or [Individual 1] advised that consultation would occur in written format going forward and would not include culturally sensitive information as they did not trust that this information would not be shared.	**(4)** **Woodside Assessment:** Woodside acknowledges that consultation will occur in written format going forward. **Woodside Response:** Woodside disagrees with assertions regarding culturally sensitive information. Woodside has followed protocols for handling this information as agreed during consultation with SoS [Individual 1].	**(4)** Not required
(5) A representative for SoS and/or [Individual 1] has confirmed they wish to consult on this activity and will do so in	**(5)** **Woodside Assessment:** Woodside understands that SoS and/or [Individual 1] will provide feedback in writing for this activity.	**(5)** Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it

writing.	**Woodside Response:** Woodside extended the consultation period for SoS and/or [Individual 1] until 9 May 2024 to enable them to provide their written response.	will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).
(6) In a letter on 9 May 2024, SoS and/or [Individual 1] advised of cultural responsibilities and a connection to Murujuga and that they held critical information for Woodside.	**(6)** **Woodside Assessment:** SoS and/or [Individual 1] refer to an affidavit filed in September 2023 which articulates the connection and some of the cultural responsibilities. The content of this affidavit has been considered in Section 4.9.4 of this EP. SoS and/or [Individual 1] also refer to other cultural responsibilities, but these are not specified. Woodside has consistently sought to understand the nature of these values to ensure impacts to these values can be minimised. SoS and/or [Individual 1] has declined to provide further information on these values. **Woodside Response:** Woodside has considered the connection and cultural responsibilities articulated in the referenced affidavit in Section 4.9.4**,** and assessed these in Section 6.11 implementing appropriate controls.	**(6)** Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).
(7) In a letter on 9 May 2024, SoS and/or [Individual 1] advised that rock art is at risk from the emissions by the activity.	**(7)** **Woodside Assessment:** The presence of industry on the Burrup Peninsula has generated concerns that emissions may lead to an accelerated weathering of rocks on which rock art is present which may reduce the visibility or destroy the rock art. Research to date on the impacts of emissions on rock art has not been conclusive, and there are currently no set air quality thresholds for the protection of rock art. The WA Government is currently implementing the Murujuga Rock Art Strategy, which plans to develop a long-term framework to guide the management and protection of the rock art located on the Dampier Archipelago and the Burrup Peninsula. Woodside actively supports the implementation of the Murujuga Rock Art Strategy through membership of the Murujuga Rock Art Reference Group and provides funding associated with the Murujuga Rock Art Monitoring Program. **Woodside Response:** Woodside has considered the potential risks to rock art from the activity in Section 6.11.	**(7)** Woodside has considered potential risks to rock art in Section 6.11 with appropriate controls implemented.
(8) In a letter on 9 May 2024, SoS and/or [Individual 1] asked Woodside to	**(8)** **Woodside Assessment:** GHG emissions are considered in Section 6.7.10 of the EP. No new information regarding GHG emissions has been provided in	**(8)** Woodside has addressed the topic raised by SoS and/or [Individual 1] in Section 6.7.10.

consider GHG emissions as a potential impact or risk in the EP.	this letter. **Woodside Response:** Woodside has considered GHG emissions and potential impacts or risks in Section 6.7.10.	
(9) In a letter on 9 May 2024, SoS and/or [Individual 1] listed concerns regarding the cumulative impact of all industry on Murujuga, including restricted access to Murujuga, affected cultural practices, and industry's contribution to cultural genocide by creating irreplaceable, irreversible cultural damage.	**(9)** **Woodside Assessment:** Intangible heritage such as cultural practices and Traditional Custodian access to significant areas are addressed in Section 4.9. of this EP. No additional or new information is provided in this letter. Through the management measures adopted in Section 6 of this EP the activities subject to this EP will avoid any potential irreplaceable, irreversible cultural damage that Woodside has been advised of. **Woodside Response:** Woodside has considered cultural practices and access to country in Section 4.9.	**(9)** Woodside has considered topics raised by SoS and/or [Individual 1] and updated Section 4.9 to record these. These are assessed in 6.11 with appropriate controls implemented.
(10) In a letter on 9 May 2024, SoS and/or [Individual 1] outlined concerns with climate change and asked that climate change be considered as an impact.	**(10)** **Woodside Assessment:** Potential climate change impacts are considered in Section 6.7.10 of the EP. **Woodside Response:** Woodside has considered potential climate change impacts in Section 6.7.10 of the EP.	**(10)** Woodside has considered potential climate change impacts in Section 6.7.10.
(11) In a letter on 9 May 2024, SoS and/or [Individual 1] outlined concerns with drilling and seabed disturbance including the disturbance of underwater cultural heritage, the impacts of drilling noise and pollution, and the strength of mitigation measures. SoS and/or [Individual 1] asked what surveys Woodside has conducted for underwater cultural heritage and how these aspects will be managed.	**(11)** **Woodside Assessment:** Drilling and seabed disturbance is located at approximately 177 m water depth. The ancient landscape, which was exposed to human habitation during the periods of occupation of the Australian continent extends to a depth of 125 m below current sea level. Therefore, no potential for impacts to tangible underwater cultural heritage is anticipated. Intangible heritage including sea country values is considered in Section 4.9.4 of this EP. This letter does not include any additional values of the environment not already addressed. **Woodside Response:** Woodside has considered intangible cultural heritage in Section 4.9.4. Due to the water depth of seabed disturbance, no impacts to tangible cultural heritage are anticipated.	**(11)** Woodside has considered topics raised by SoS and/or [Individual 1] and updated Section 4.9.4 to record these. These are assessed in Section 6.11 with appropriate controls implemented.
(12) In a letter on 9 May 2024, SoS and/or [Individual 1] outlined the significance of offshore islands, including Rosemary	**(12)** **Woodside Assessment:** Rosemary Island is within the EMBA. Rosemary Island provides nesting habitat for turtles. Rosemary Island also has a number of rock art sites.	**(12)** Woodside has updated the EP to capture feedback regarding the significance of Rosemary Island in Section 4.9.4.

Island, and asked how Woodside will protect the island and the species reliant on the island.	**Woodside Response:** Woodside has updated Section 4.9.4 to capture the significance of Rosemary Island. Consideration of risk, impacts and mitigations to Rosemary Island and the receptors associated with the island are addressed in Sections 6.7, 6.8, 6.9 and 6.11.	Assessment of risks and mitigation measures to islands and associated species, including Rosemary Island and turtles are addressed in Section 6.7, 6.8, 6.9, 6.11.
(13) In a letter on 9 May 2024, SoS and/or [Individual 1] advised that consultation should be consistent with all relevant persons.	**(13)** **Woodside Assessment:** Woodside applies its methodology for 'Traditional Custodians and nominated representative corporations' and 'Other non-government groups or organisations' under regulation 25(1)(d) of the Environment Regulations to determine relevant persons for consultation. **Woodside Response:** Woodside consults with all relevant persons for each activity. Woodside has meaningful long-term relationships with relevant Traditional Custodians specifically tailored to provide for effective engagement which is continuous and is not confined to individual EPs, instead covering all EPs and other issues that are relevant at the time of engagement.	**(13)** Woodside outlines its Consultation Approach and assessment of relevant persons in Appendix F.
(14) In a letter on 9 May 2024, SoS and/or [Individual 1] outlined that the environment and cultural values are one, and the connection and songlines are being disrupted.	**(14)** **Woodside Assessment:** Woodside understands that SoS and/or [Individual 1] references to Songlines and energy lines relate to personal spiritual value individually (rather than communally) to SoS and/or [Individual 1] . Woodside has consistently sought to understand the nature of these values to ensure impacts to these values can be minimised. SoS and/or [Individual 1] has declined to provide further information on these values. **Woodside Response:** In any event, Woodside has sought to include controls that seek to reduce risks and impacts to ALARP and acceptable levels.	**(14)** Section 4.9 records topics of interest and cultural values, including Songlines and energy lines. These are assessed in Section 6.11.
(15) In a letter on 9 May 2024, SoS and/or [Individual 1] advised there were other individuals who should be consulted but states that they are not comfortable to identify them.	**(15)** **Woodside Assessment:** Woodside has applied its process for the identification of relevant persons. It is unclear if the other individuals mentioned by SoS and/or [Individual 1] have been identified through this process. Woodside has also advertised publicly to invite comment from relevant persons. **Woodside Response:** Woodside has sought to engage with all of the relevant persons it has identified, or who have self-identified as such for this EP. Woodside welcomes any person who wishes to provide feedback on this EP to do so through the means provided on the consultation factsheet.	**(15)** Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received from additional parties after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).

Woodside has addressed objections and claims as noted above.	Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. Woodside engages in ongoing consultation throughout the life of an EP. Woodside notes that further feedback may be received as part of ongoing consultation. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	Woodside has assessed the objections or claims raised by SoS and/or [Individual 1] . No additional measures or controls are required.

Outcomes of Consultation

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with SoS and/or [Individual 1] for the purpose of regulation 25 is complete. Sufficient information and a reasonable period have been provided, as described in Section 5.5 of the EP. Specifically:

Sufficient Information

Woodside has given SOS and [Individual 1] sufficient information to allow them to make an informed assessment of the possible consequences of the activity on their functions, interests or activities because:

- In February 2024, Woodside made the Consultation Information Sheet about this EP publicly available on the Woodside website. The EP was published on the NOPSEMA website in May 2024.
- On 26 March 2024, Woodside commenced consultation with SoS and/or [Individual 1] on this EP. Woodside provided SoS/[Individual 1]:
  - A Summary Information sheet developed specifically for First Nations groups and reviewed by a First Nations staff member. This sheet included:
    - An overview of the activity and proposed timing.
    - Maps showing the location and EMBA.
    - A summary of the risks and impacts of the activity.
    - Diagrams.
    - Details about how to provide feedback.
  - The purpose of consultation, and what was being sought by Woodside through consultation including understanding the nature of SoS and/or [Individual 1]'s interests and how the activity could impact those interests.
  - That Woodside had undertaken assessments to identify potential impacts and risks to the marine environment and developed mitigation and management measures.
  - Woodside asked SoS and/or [Individual 1] to forward the information to its members.
  - Woodside offered to provide more specific information, maps and images if required.
- SoS and/or [Individual 1] provided Woodside with comments about the activity, demonstrating that they had sufficient information in order to do so.
- Woodside emailed SoS and/or [Individual 1] on 5 December 2024 advising that the EP would be resubmitted. Woodside provided a link to the EP on the NOPSEMA website.

Reasonable Period

Woodside allowed a reasonable period for consultation in the preparation of this EP because:

- Woodside commenced consultation with SoS and/or [Individual 1] in March 2024. Woodside has responded to SoS and/or [Individual 1] over 14 months, demonstrating a “reasonable period” of consultation, where a genuine two-way dialogue has occurred on this activity.
- A clear consultation period was communicated to SoS and/or [Individual 1] during Woodside’s initial email on 26 March 2024. SoS and/or [Individual 1] was asked to provide feedback by 26 2024, in line with Woodside’s methodology of a 30-day consultation period. Woodside extended this period to 9 May 2024 after SoS and/or [Individual 1] expressed an interest in providing a written response to the activity. This period enabled Woodside to assess feedback before the EP was submitted.
- Woodside provided SoS and/or [Individual 1] with two months to consult ahead of preparing the EP and continues to take feedback in relation to the EP.
- Woodside commenced consultation with SoS and/or [Individual 1] in March 2024. Woodside has addressed and responded to SoS and/or [Individual 1’s] queries over 14 months, demonstrating a “reasonable period” of consultation.
- Woodside emailed SoS and/or [Individual 1] on 5 December and invited it to provide further feedback by 19 December 2024 ahead of Woodside resubmitting this EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided and Woodside’s approach to consultation is appropriate and adapted because:

- Woodside asked for SoS and/or [Individual 1]’s input into how SoS and/or [Individual 1] would like to engage in consultation and has consulted in a way that Woodside understands is appropriate for First Nations groups.
- Woodside has made information on this EP publicly available for 14 months. This has included publishing advertisements in Indigenous, regional, state and national, newspapers including Indigenous publications the National Indigenous Times (26 February 2024) and the Koori Mail advising of the proposed activities and requesting feedback.
- Woodside ran a targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP.
- Woodside’s initial email about this EP on 26 March 2024:
  - Included a general email address and telephone number for Woodside as well as a direct email address and telephone number for a dedicated focal person from the Woodside First Nations Engagement team. It also included contact details for NOPSEMA.
  - Offered for Woodside to speak with SoS and/or [Individual 1] further and enquired about SoS and/or [Individual 1]’s preferred method of consultation.
  - Asked if SoS and/or [Individual 1] required further information.
- Woodside provided SoS and/or [Individual 1] with an additional opportunity to provide feedback ahead of resubmitting this EP. Woodside emailed SoS and/or [Individual 1] on 5 December 2025 and requested feedback by 19 December 2024.
- Woodside notes that SoS and/or [Individual 1] is represented by EDO, an organisation that understands and has experience with the EP consultation process.

Outcomes of Consultation

The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

During consultation about other EPs and this EP, SOS and/or [Individual 1] advised:

- Whales have cultural significance - Woodside puts controls in place to manage impacts and risks to whales. These controls are described in Section 6 of the EP.

- Cultural features associated with Songlines, dreaming and energy lines - Woodside has considered this feedback and updated Section 4.9 to record topics of interest and cultural values, including Songlines and energy lines. These are assessed in Section 6.11 with appropriate controls implemented. At this stage, Woodside has not been provided with specific information on these potential values to enable a more fulsome assessment.
- An interest in marine mammals, seagrass and the meeting of freshwater and saltwater - Woodside has updated Section 4.9 to record these. These are assessed in 6.11 with appropriate controls implemented.
- Significance of offshore islands, Including Rosemary Island and the species reliant on the island - Woodside has updated the EP to capture feedback regarding the significance of Rosemary Island in Section 4.9.4. Assessment of risks and mitigation measures to islands and associated species, including Rosemary Island and turtles are addressed in Section 6.8, 6.9, 6.11.
- Woodside engages in ongoing consultation, beyond that required by regulation 25 of the Environment Regulations, throughout the life of an EP. Should feedback be received after the EP has been accepted (including any relevant new information on cultural values), it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of the EP).
- Woodside considers the measures and controls described in this EP address the potential impact from the proposed activity on SoS and/or [Individual 1]'s functions, interests or activities.

Local government and community representative groups or organisations

Shire of Exmouth

Summary of information provided and record of consultation for this EP:

- On 27 February 2024, Woodside emailed Shire of Exmouth advising of the proposed activity (Record of Consultation, reference 2.22), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- On 19 March 2024, as no response had been received, Woodside proactively sent an email reminder to Shire of Exmouth, following up on the proposed activity (Record of Consultation, reference 3.3) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to Shire of Exmouth regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate,	No additional measures or controls are required.

	Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Shire of Exmouth for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given Shire of Exmouth sufficient information to allow Shire of Exmouth to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to Shire of Exmouth on 27 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed Shire of Exmouth a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to Shire of Exmouth advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed Shire of Exmouth 30 days for consultation. For consultation on EPs, 30 days is the usual period for Shire of Exmouth.
- In this context, Woodside allowed Shire of Exmouth a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with Shire of Exmouth is appropriate and adapted to the nature of interests of Shire of Exmouth:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- In the absence of feedback, Woodside proactively sent a follow-up consultation email on 19 March 2024, reminding Shire of Exmouth of the opportunity to provide feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as Shire of Exmouth did not provide feedback for this EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on Shire of Exmouth's functions, interests or activities.

City of Karratha

Summary of information provided and record of consultation for this EP:

- On 27 February 2024, Woodside emailed City of Karratha advising of the proposed activity (Record of Consultation, reference 2.22), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- On 19 March 2024, as no response had been received, Woodside proactively sent an email reminder to City of Karratha, following up on the proposed activity (Record of Consultation, reference 3.3) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to City of Karratha regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.
Summary Report – Consultation Complete		

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with City of Karratha for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given City of Karratha sufficient information to allow City of Karratha to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to City of Karratha on 27 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed City of Karratha a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to City of Karratha advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed City of Karratha 30 days for consultation. For consultation on EPs, 30 days is the usual period for City of Karratha.
- In this context, Woodside allowed City of Karratha a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with City of Karratha is appropriate and adapted to the nature of interests of City of Karratha:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.

- In the absence of feedback, Woodside proactively sent a follow-up consultation email on 19 March 2024, reminding City of Karratha of the opportunity to provide feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as City of Karratha did not provide feedback for this EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on City of Karratha's functions, interests or activities.

Exmouth Community Liaison Group (CLG)

Summary of information provided and record of consultation for this EP:

- On 27 February 2024, Woodside emailed Exmouth CLG advising of the proposed activity (Record of Consultation, reference 2.22), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- On 19 March 2024, as no response had been received, Woodside proactively sent an email reminder Exmouth CLG, following up on the proposed activity (Record of Consultation, reference 3.3) and included a link to the Consultation Information Sheet on Woodside's website.
- On 6 March 2024, Woodside presented to the Exmouth CLG on Woodside activities, including this EP. Woodside presented a slide that listed Environment Plans on which the CLG members had recently been consulted and Environment Plans currently under consultation (SI report, reference 32.1). No feedback was provided on this EP. 12 individuals attended the meeting representing:
  - Exmouth Volunteer Marine Rescue
  - Gascoyne Development Commission
  - Shire of Exmouth
  - PHI Helicopters
  - Exmouth Freight and Logistics
  - Exmouth Chamber of Commerce and Industry
  - Ningaloo Coast World Heritage Advisory Council
  - WA Country Health Service
  - Santos.
- On 27 March 2024, Woodside provided an activity update to Exmouth CLG regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).
- On 2 April 2024, Woodside's presentation was emailed to all Exmouth CLG members, regardless of their attendance at the meeting.
- On 17July 2024, Woodside presented to the Exmouth CLG on Woodside activities, including this EP. Woodside presented a slide listing EPs on which the CLG

members had recently been consulted and EPs currently under consultation (SI report, reference 32.3).

- No feedback was provided on this EP.
- 13 individuals attended the meeting representing:
  - Exmouth Volunteer Marine Rescue
  - Gascoyne Development Commission
  - Shire of Exmouth
  - PHI Helicopters
  - Exmouth Chamber of Commerce and Industry
  - Ningaloo Coast World Heritage Advisory Council / NOPSEMA Community and Environment Reference Group
  - Santos
  - AIMS
  - Department of Health
- No questions were raised by CLG members in attendance at the meeting.

- On 12 November 2024, Woodside presented to the Exmouth CLG on Woodside activities, including this EP. Woodside presented a slide listing EPs on which the CLG members had recently been consulted and EPs currently under consultation (SI report, reference 32.4).
  - 13 individuals attended the meeting representing:
    - Shire of Exmouth
    - Gascoyne Development Commission
    - Exmouth Chamber of Commerce and Industry
    - Ningaloo Coast World Heritage Advisory Council / NOPSEMA Community and Environment Reference Group
    - West Australian Country Health Service
    - Bhagwan Marine
    - PHI Helicopters
    - Exmouth Volunteer Marine Rescue
    - CSIRO
    - Santos.

Summary of Feedback, Objection or Claim	**Assessment of Merits of Feedback, Objection or Claim and Woodside's Response**	**Inclusion in Environment Plan**
No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Exmouth CLG for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given Exmouth CLG sufficient information to allow Exmouth CLG to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to Exmouth CLG on 27 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed Exmouth CLG a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to Exmouth CLG advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed Exmouth CLG 30 days for consultation. For consultation on EPs, 30 days is the usual period for Exmouth CLG.
- In this context, Woodside allowed Exmouth CLG a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with Exmouth CLG is appropriate and adapted to the nature of interests of Exmouth CLG:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.

- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- In the absence of feedback. Woodside proactively sent a follow-up consultation email on 19 March 2024, reminding Exmouth CLG of the opportunity to provide feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as Exmouth CLG did not provide feedback for this EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on Exmouth CLG's functions, interests or activities.

Karratha Community Liaison Group (CLG)

Summary of information provided and record of consultation for this EP:

- On 27 February 2024, Woodside emailed Karratha CLG advising of the proposed activity (Record of Consultation, reference 2.22), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 19 March 2024, as no response had been received, Woodside proactively sent an email reminder Karratha CLG, following up on the proposed activity (Record of Consultation, reference 3.3) and included a link to the Consultation Information Sheet on Woodside's website.
- On 22 March 2024, Woodside presented to the Karratha CLG on Woodside activities, including this EP. Woodside presented slides which listed Environment Plans on which the CLG members had recently been consulted and Environment Plans currently under consultation (SI report, reference 32.1). Woodside also presented on how Woodside consults relevant persons in the course of preparing our EPs and provided information on relevant persons and EMBAs. The slides included a QR and URL to Consultation Activities page of the Woodside website, and upcoming consultation opportunities in Roebourne, Karratha and Dampier from the 22 March to 24 March 2024. No feedback was provided on this EP. Seven Karratha CLG members attended the meeting representing:
  - City of Karratha
  - Dampier Community Association
  - Department of Education
  - Murujuga Aboriginal Corporation
  - Karratha and Districts Chamber of Commerce and Industry
  - Karratha Central Health.
- On 27 March 2024, Woodside provided an activity update to Karratha CLG regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).
- On 21 June 2024, Woodside presented to the Karratha CLG on EP consultation requirements and provided an update on upcoming Woodside activities (SI report, reference 32.5).

- No feedback was provided on this EP.
- Woodside also presented on how Woodside consults relevant persons in the course of preparing EPs and provided information on relevant persons and EMBAs. The slides included a QR code and a URL to the Consultation Activities page of the Woodside website. Copies of the latest edition of *Let's Talk* were provided in hard copy and also sent electronically with the minutes and pack.
- 7 CLG members attended the meeting representing:
  - City of Karratha – Council representatives and staff representatives
  - Karratha Central Health Care
  - Dampier Community Association
  - Pilbara Development Commission
  - Department of Education – staff representatives

- On 20 September 2024, Woodside presented to the Karratha CLG on EP consultation requirements and provided an update on upcoming Woodside activities (SI report, reference 32.6).
  - No feedback was provided on this EP.
  - Woodside also presented on how it consults relevant persons in the course of preparing EPs and provided information on relevant persons and EMBAs. The slides included a QR code and a URL to the Consultation Activities page of the Woodside website. Copies of the latest edition of *Let's Talk* were provided in hard copy and sent electronically with the minutes and pack.
  - 8 CLG members attended the meeting representing:
    - City of Karratha – staff representatives
    - Dampier Community Association
    - Pilbara Development Commission
    - Department of Education – staff representatives
    - Karratha and Districts Chamber of Commerce and Industry
    - Pilbara Ports Authority.
- On 29 November 2024, Woodside presented to the Karratha CLG on EP consultation requirements and provided an update on upcoming Woodside activities, (SI report, reference 32.7).
  - No feedback was provided on this EP.
  - Woodside also presented on how it consults relevant persons in the course of preparing EPs and provided information on relevant persons and EMBAs. The slides included a QR code and a URL to the Consultation Activities page of the Woodside website. Copies of the latest edition of *Let's Talk* were provided in hard copy and sent electronically with the minutes and pack.

Summary of Feedback, Objection or Claim	**Assessment of Merits of Feedback, Objection or Claim and Woodside's Response**	**Inclusion in Environment Plan**
No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has	No additional measures or controls are required.

	been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Karratha CLG for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given Karratha CLG sufficient information to allow Karratha CLG to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to Karratha CLG on 27 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed Karratha CLG a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to Karratha CLG advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed Karratha CLG 30 days for consultation. For consultation on EPs, 30 days is the usual period for Karratha CLG.
- In this context, Woodside allowed Karratha CLG a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with Karratha CLG is appropriate and adapted to the nature of interests of Karratha CLG:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- In the absence of feedback, Woodside proactively sent a follow-up consultation email on 19 March 2024, reminding Karratha CLG of the opportunity to provide feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as Karratha CLG did not provide feedback for this EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on Karratha CLG's functions, interests or activities.

Onslow Chamber of Commerce and Industry (CCI)

Summary of information provided and record of consultation for this EP:

- On 27 February 2024, Woodside emailed Onslow CCI advising of the proposed activity (Record of Consultation, reference 2.22), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- On 19 March 2024, as no response had been received, Woodside proactively sent an email reminder to Onslow CCI, following up on the proposed activity (Record of Consultation, reference 3.3) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to Onslow CCI regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.
Summary Report – Consultation Complete		

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Onslow CCI for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given Onslow CCI sufficient information to allow Onslow CCI to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to Onslow CCI on 27 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed Onslow CCI a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to Onslow CCI advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed Onslow CCI 30 days for consultation. For consultation on EPs, 30 days is the usual period for Onslow CCI.
- In this context, Woodside allowed Onslow CCI a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with Onslow CCI is appropriate and adapted to the nature of interests of Onslow CCI:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside proactively sent a follow-up consultation email on 19 March 2024, reminding Onslow CCI of the opportunity to provide feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as Onslow CCI did not provide feedback for this EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on Onslow CCI's functions, interests or activities.

Shire of Ashburton

Summary of information provided and record of consultation for this EP:

- On 27 February 2024, Woodside emailed Shire of Ashburton advising of the proposed activity (Record of Consultation, reference 2.23), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- On 19 March 2024, as no response had been received, Woodside proactively sent an email reminder to Shire of Ashburton, following up on the proposed activity (Record of Consultation, reference 3.3) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to Shire of Ashburton regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).
- On 28 March 2024, Shire of Ashburton emailed Woodside its standard response letter (SI Report, reference 30.1) and:
  - **(1)** confirmed it has no objections to the activities under this EP.
  - **(2)** the Shire expects that Woodside will identify, manage and mitigate all possible impacts and risks in line with relevant regulatory frameworks.
  - **(3)** the Shire requires Woodside to brief the Shire's Local and District Emergency Management Committees on its planned responses to such events before any activities commence.
  - **(4)** asked that Woodside has communicated with appropriate emergency management agencies at either/or National, State, District and Local levels on potential hazards and risks around the activity; collaboration and/or cooperation on risk mitigation; considered impacted areas response capacity and capability and sustainability of response activities and escalation triggers.
  - **(5)** the Shire anticipates that Woodside has undertaken their own emergency management planning to mitigate risk and recover from a risk related incident, has engaged with external emergency management agencies to ensure emergency management plans are aligned with outcomes to respond and/or recovery from the incident.
  - **(6)** the Shire anticipates that Woodside has engaged with the community regarding what may happen in areas that are affected by the proposed activities.
  - **(7)** asked that Woodside considers the Shire operated Pilbara Regional Waste Management Facility (PRWMF) for its decommissioning, recycling and waste disposal purposes.
  - **(8)** the Shire appreciates the opportunity to comment on the proposed activities and requests that Woodside provide the Shire with further updates as the proposal progresses.

- On 2 April 2024, Woodside responded thanking the Shire of Ashburton for its comments (SI Report, reference 30.2) and noted:
  - **(1)** the Shire raised no objections to the proposed activities.
  - **(2)** Woodside is required to manage environmental impacts and risks to the environment that may be affected (EMBA) by its proposed activities to As Low As Reasonably Practicable (ALARP) and to an acceptable level, as required by the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, through the implementation of the EP. Woodside's proposed EP will be submitted to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA) for assessment and acceptance.
  - **(3)** Woodside confirmed it will provide notifications to relevant stakeholders as required as per its oil spill response arrangements.
  - **(4,5)** Woodside has an Oil Pollution First Strike Plan in place for all EPs which details potential impacts, notifications and response mitigations that may be executed to manage an emergency event.
  - **(6)** Woodside consults relevant persons in the course of preparing an EP, and as per Woodside's ongoing consultation approach, feedback and comments from relevant persons continue to be assessed and responded to, as required, throughout the life of an EP.
  - **(7)** the Shire's interest in ongoing local content opportunities.
  - **(8)** Woodside will continue to provide the Shire with updates on the proposed activities when relevant.

Summary of Feedback, Objection or Claim	**Assessment of Merits of Feedback, Objection or Claim and Woodside's Response**	**Inclusion in Environment Plan**
(1) The Shire confirmed it has no objections to the activities.	**(1)** **Woodside assessment:** Woodside acknowledges the Shire of Ashburton had no objections to the activities covered under this EP. **Woodside response:** Woodside thanked the Shire of Ashburton and acknowledged its feedback.	**(1)** Not required.
(2) Identify, manage and mitigate all possible impacts and risks.	**(2)** **Woodside assessment:** Woodside is required to manage environmental impacts and risks in accordance with the Environment Regulations. **Woodside response:** Woodside confirmed it is required to manage environmental impacts and risks to the environment by the proposed activities to ALARP, as per the Environment Regulations.	**(2)** Existing controls considered sufficient as described in Section 6 of this EP.
(3) Brief the Shire's Local and District Emergency Management Committee.	**(3)**	**(3)** Not required.

	Woodside assessment: Woodside briefed the Shire's Local and District Emergency Management Committee on 21 November 2023. **Woodside response:** Woodside confirmed it will provide notifications to relevant stakeholders as required as per its oil spill response arrangements.	
(4) Communicate with appropriate national and state emergency management agencies.	**(4)** **Woodside assessment:** Woodside had undertaken emergency management planning and consults with relevant emergency management agencies to ensure alignment of its emergency management plans. **Woodside response:** Woodside has an Oil Pollution First Strike Plan in place for this EP which details potential impacts, notifications and response mitigations that may be executed to manage an emergency event.	**(4)** In the course of developing this EP, Woodside has developed oil spill preparedness and response positions (see Appendix H of this EP).
(5) Undertake emergency management planning.	**(5)** **Woodside assessment:** Woodside has considered emergency planning for EPs. **Woodside response:** Woodside develops oil spill preparedness and response positions tailored for individual projects. Woodside consults with the relevant external management agencies to ensure all emergency management plans are aligned with effective outcomes.	**(5)** In the course of developing this EP, Woodside has developed oil spill preparedness and response positions (see Appendix H of this EP).
(6) Engage with the community.	**(6)** **Woodside assessment:** Woodside consults relevant persons in the course of preparing an EP, as required by the Environment Regulations. **Woodside response:** Woodside consults relevant persons in the course of preparing an EP, and as per Woodside's ongoing consultation approach, feedback and comments from relevant persons continue to be assessed and responded to, as required, throughout the life of an EP.	**(6)** Woodside consults relevant persons in the course of developing an EP as described in Section 5.3 of this EP.
(7)	**(7)**	**(7)** Not required.

Consider the PRWMF for future decommissioning works.	**Woodside assessment:** Woodside noted the Shire's interest in ongoing local content opportunities. **Woodside response:** Woodside noted the Shire's interest in ongoing local content opportunities.	
(8) Provide updates as proposal progresses.	**(8)** **Woodside assessment:** Woodside will provide the Shire of Ashburton with updates on the activities. **Woodside response:** Woodside will continue to provide the Shire with updates on the proposed activities when relevant.	**(8)** Woodside engages in ongoing consultation and will provide notifications of significant change, as appropriate, to relevant persons as referenced at Section 7.12 in this EP.
Woodside has addressed objections and claims as noted above.	Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. Woodside engages in ongoing consultation throughout the life of an EP. Woodside notes that further feedback may be received as part of ongoing consultation. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with Shire of Ashburton for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given Shire of Ashburton sufficient information to allow Shire of Ashburton to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since February 2024. Woodside provided this information directly to Shire of Ashburton on 27 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.

  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with regulation 25(4) of the Environment Regulations).
- On 28 March 2024, Shire of Ashburton shared its feedback, claims or objections regarding this activity, indicating the information provided was sufficient to enable Shire of Ashburton to make an informed assessment of the possible consequences of the activity on their functions, interests or activities.
- Woodside provided further information to Shire of Ashburton in its response on 2 April 2024 which addressed Shire of Ashburton's topics of interest in response to feedback from Shire of Ashburton.

Reasonable Period

Woodside allowed Shire of Ashburton a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to Shire of Ashburton advising when consultation closed for the purposes of the preparation of the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period in the preparation of the EP and Woodside allowed Shire of Ashburton with 30 days for consultation. Shire of Ashburton engaged in consultation and provided feedback within this period.
- In this context, Woodside allowed Shire of Ashburton a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with Shire of Ashburton is appropriate and adapted to the nature of interests of Shire of Ashburton:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside considers a reasonable opportunity was provided to Shire of Ashburton as evidenced in their response on 28 March 2024.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- Shire of Ashburton provided feedback or objections or claims about the adverse impact of the activity to which the EP relates. In line with the intended outcome of consultation as set out in Section 5.2 and regulations 24 and 34(g), Woodside has:
  - Responded to feedback from Shire of Ashburton.

- Made no changes or inclusions to the EP as a result of consultation with Shire of Ashburton because appropriate measures are already included in the EP.

- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.

Other non-government groups or organisations

Friends of Australian Rock Art Inc. (FARA)

Summary of information provided and record of consultation for this EP:

- On 27 February 2024, Woodside emailed FARA advising of the proposed activity (Record of Consultation, reference 2.24), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- On 19 March 2024, as no response had been received, Woodside proactively sent an email reminder to FARA, following up on the proposed activity (Record of Consultation, reference 3.3) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to FARA regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).
- On 29 March 2024, FARA emailed a letter to Woodside referencing 19 March 2024 correspondence (Record of Consultation, reference 2.40 and SI Report, reference 39.1) and noted:
  - **(1)** receipt of correspondence on 19 March 2024 regarding this EP with response needed by 29 March 2024.
  - **(2)** its functions, interests and activities including the protection and preservation of rock art and the impacts of industrial development and climate change on this and physical and cultural heritage landscape.
  - **(3)** its current objectives and activities include support of the Murujuga Aboriginal Corporation Cultural Management Plan to protect the cultural heritage landscape and reduce the industrial footprint on Murujuga and secure a World Heritage Listing for the Burrup; and ongoing gas production counters its objectives.
  - **(4)** the gas processed on the Burrup Peninsula is the primary cause of industrial air emissions which harms Murujuga rock art, disrupts the cultural heritage landscape and contributes to climate change.
  - **(5)** Woodside is required to address the indirect consequences of the operations in the EP, according to the Environment Regulations and the EPBC Act Indirect Consequences Policy.
  - **(1,2)** its functions, interests and activities are affected by the indirect consequences, therefore, is a relevant person for this EP.
  - **(1)** Woodside is required to provide sufficient information and a reasonable period for consultation.
  - **(1)** Woodside only provided a 10-day consultation period which does not meet the requirements.
  - **(4,5)** the Consultation Information Sheet does not address the impacts, risks and consequences of processing gas or indirect consequences, nor does it evaluate these.
  - **(6)** it has a list of information required to assess possible consequences of activity related to Pluto Operations EP, including:
    - **(4, 5)** the impacts on Murujuga rock art and what Woodside determines as ALARP and acceptable level of impact.
    - **(7)** how Woodside is meeting its statutory obligations under the WA Aboriginal Heritage Act.

    - **(4)** disclosure of rock art monitoring or studies commissioned by Woodside to investigate the impact of industrial pollution on rock art.
    - **(4)** evidence of Woodside's engagement with peer-reviewed scientific research provided by FARA and consultation with experts tied to this research.
    - **(4)** what actions Woodside will take if scientific monitoring shows industrial pollution, including Pluto gas processing, is damaging rock art.
    - **(4)** if regulatory regimes for Pluto and North West Shelf LNG facilities will include measures that prevent impacts on the Burrup.
    - **(8)** information on climate scenarios expected to occur if Pluto operations continue.
    - **(9)** what Woodside considers to be acceptable climate impact scenarios and measures it will take to ensure impacts are ALARP.
    - **(10)** what other stakeholders with interests similar to FARA have been consulted and how their matters have been considered and addressed.
    - **(11)** how Traditional Owners and Custodians have had opportunities to exercise rights to Free Prior and Informed Consent related to Pluto Operations.
    - **(4,5)** the impact on the Murujuga cultural heritage landscape due to the processing of Pluto gas.
    - **(12)** how FARA's prior concerns and requests have been addressed by Woodside and what changes have been considered.
  - **(4,5)** it needs the information on the impacts that may occur on Murujuga rock art and broader Burrup landscape and what Woodside has determined as ALARP.
  - **(13)** it wants to know how Woodside made determinations and how it will manage operations as required by the Regulations.
  - **(14)** FARA requires additional consultation time to engage qualified experts to review EP and advise it.
  - **(15)** the peer-reviewed scientific reports previously provided to Woodside demonstrate the impact of atmospheric pollution on rock art and are relevant for this EP as Pluto Operations will extend the duration of pollution and potentially increase the intensity.
  - **(16)** it has not received a satisfactory response on information previously provided to Woodside and there is an expectation that it will be addressed in EP and made publicly available to support transparency.
  - **(17)** FARA wants further consultation prior to another EP submission along with the expectation that feedback in this email and previous submissions is included in the public section of the EP.
  - **(1,2)** it looks forward to Woodside providing sufficient information and time for FARA to assess consequences as part of relevant person consultation process.

- On 14 May 2024, Woodside sent an email to thank FARA for consulting on the Pluto Facility Operations EP and provided response to its claims, objections and additional information request (SI Report, reference 39.2).
  - Woodside acknowledged FARA specifically requested information on climate scenarios related to Pluto operations and noted current correspondence is undated and received on 29 March 2024.
  - **(1)** affirmed that initial consultation information and Consultation Information Sheet was sent to FARA on 27 February 2024 with follow-up on 19 March 2024 and activity update on 27 March 2024. Feedback was requested to be provided by 29 March 2024.
  - **(2)** noted FARA's assessment of its functions, interests and activities but also recognised the statement provided is broader than FARA's published statement: "FARA works to protect, preserve and promote Australian rock art in general, and in particular the petroglyphs found in the Dampier Archipelago (including Murujuga/Burrup Peninsula) in the Pilbara region of Western Australia" (FARA website, FARA - Friends of Australian Rock Art - FARA | Friends of Australian Rock Art accessed May 2024).
  - **(3)** noted FARA's statement on its current objectives and activities, and shared that some of the statements appear to be broader than those on FARA's website, some lack specificity and not all have been accurately verified.
  - **(4)** provided that the statutory regime related to offshore emissions includes both State and Commonwealth legislation which is applied to the relevant proponents for onshore processing facilities.
    - atmospheric emissions tied to onshore processing and nearby domestic gas users are managed under requirements of the *WA Environmental Protection Act*

1986, State and Federal Aboriginal Heritage legislation and the Federal EPBC Act.
  - for Pluto LNG Gas Plant, approvals include Ministerial Conditions and associated management plans addressing greenhouse gas emissions, air quality and cultural heritage which are approved by EPA or Minister of Environment on EPA's advice.
  - approvals related to the Pluto LNG Gas Plant and Karratha Gas Plant publicly report compliance against those approvals.
  - approval documents for the aforementioned plants are generally available and existing, so they are not new for this 5 yearly Operations EP review.
  - Woodside is involved with the monitoring of industrial emissions and strategies related to Murujuga rock art and supports the Murujuga Rock Art Strategy through membership of the Murujuga Rock Art Reference Group and funding for Murujuga Rock Art Monitoring Program.
  - it supports the establishment of and coordinated approach for an atmospheric deposition monitoring program under the Strategy and provides data to the effort from the Woodside Atmospheric and Ambient Air Quality Monitoring Programs.
  - expects findings of the Murujuga Rock Art Strategy to be implemented if required by appropriate regulatory measures.
  - there is State and Federal legislation to manage onshore processing facilities, including environment and cultural heritage.
  - noted that climate change impacts cannot be attributed to any one activity or one project, as they are instead the result of global GHG emissions, minus global GHG sinks, that have accumulated in the atmosphere since the industrial revolution started.

- **(5)** Indirect impacts from the petroleum activities program are considered and addressed in the Pluto Operations EP which will be publicly available on NOPSEMA website during assessment.
- **(6)** Noted FARA's request for additional information to assess gas processing activities on its functions, interests or activities.
- **(7)** referred FARA to Woodside website for its approach to Aboriginal cultural heritage management, including the pluto-construction-phase-cultural-heritage-management-plan.pdf (woodside.com).
- **(8)** for climate scenario tied to Pluto Operations, Woodside referred FARA to its Woodside's Climate Transition Action Plan and 2023 Progress Report noting pages 44 and 45 regarding global demand for oil and gas, pages 46 and 47 for the evolving role of natural gas in domestic and international markets and pages 52 and 53 for scenario analysis of Woodside's portfolio.
- **(9)** for acceptable climate impact scenarios, Woodside referred to Climate Transition Action Plan and 2023 Progress Report to provide information on Decarbonisation Strategy (pages 13-41), and specifically page 24 to 25 regarding large scale abatement and the vision for Pluto net zero.
- **(10)** noted undertaking a relevancy assessment for every EP to determine who is a relevant person and provided additional consultation activities including the advertising of the Operations EP and consultation opportunities in The Australian, The West Australian, regional newspapers and Indigenous newspapers as well as a social media campaign across Facebook and Instagram.
- **(11)** confirmed that Woodside consulted with First National relevant persons for Pluto Operations, including Traditional Custodians of Murujuga.
- **(12)** recognised there is previous correspondence between Woodside and FARA and referred FARA to previous responses.
- **(13)** noted that the Operations EP and relevant appendices including relevant person consultation, reports, analyses and modelling, will be public on NOPSEMA website after submission and assessment.
- **(14)** confirmed that feedback can continue to be provided during the life of an EP, including after consultation has closed on the EP, during EP assessment, and after an EP has been accepted by NOPSEMA. Woodside continues to receive, assess and respond to feedback and comments from relevant persons throughout the life of the EP.
- **(15)** noted that emissions associated with Operations EP relate to the existing Pluto LNG Gas Plant approvals and referred back to first reference of **(4)** for review of Ministerial conditions and commitments and assessment of indirect impacts to rock art and cultural heritage values. Research to date on impacts of industrial emissions on rock art is inconclusive and additional research is underway by the Murujuga Aboriginal Corporation and Western Australian Department of Water and Environmental Regulation. Woodside is a member of the Murujuga Rock Art Stakeholder Reference Group and noted it expects findings of Murujuga Rock Art

Strategy to be implemented if required via appropriate regulatory measures. It also provided a link to Woodside's consideration of publications related to Murujuga rock art, referencing section 4, page 311 Appendices - North West Shelf Project Extension Environmental Review Document (woodside.com)
  - **(16)** confirmed peer-reviewed scientific reports related to potential emission impacts on Murujuga's rock art have been considered and referred back to points covered above in first reference to **(4)** and **(5)**. The Operations EP will be made available on NOPSEMA website during assessment.
  - **(17)** noted assumption that reference to another EP was a typo and that FARA was consulted with for the Pluto Facility Operations EP in line with Regulation 25. Per FARA's request, Woodside will publish FARA's feedback in full in the Operations EP.

- On 24 May 2024, Woodside received an email, letter and paper from FARA in relation to this EP and another EP (SI Report, reference 39.3). The letter reiterated points raised in previous letters including:
  - **(1, 2)** FARA is a relevant person and has raised concerns regarding indirect impacts of this EP on Murujuga rock art as a result of LNG processing and gas use on the Burrup Peninsula.
  - **(6)** Woodside has not yet provided sufficient information to FARA to make an informed assessment.
  - **(15)** Attached the April 2024 report entitled The Effects of Acidic Pollution on the Rock Art of Murujuga by Benjamin Smith and the Murujuga Rock Art Conservation Project which contains an analysis of the MRAMP campaign. Combined with other reports and studies it shows that atmospheric emissions are causing conditions which are harmful to rock art and increased emissions will increase harmful levels. FARA looks forward to Woodside's response. A lack of scientific certainty should not prevent the adoption of precautionary avoidance and mitigation measures.
  - FARA reiterates its opposition to the proposed activities.

- **(1, 16)** On 28 May 2024, Woodside emailed FARA thanking it for the new information and stating it would assess it (SI Report, reference 39.4). Furthermore, it stated:
  - FARA has been assessed as being a relevant person for both this EP and another EP. Woodside has consulted with FARA in accordance with section 25 of the Regulations and FARA has been provided with consultation information for both EPs.

- On 12 September 2024, NOPSEMA provided Woodside with correspondence from FARA, sent to NOPSEMA on 1 July 2024, regarding information FARA considered relevant to the NWS Project Extension appeals (SI Report, reference 39.5). Woodside notes the information provided by FARA relates to the NWS Project Extension, however, considered the use of SCR in Section 6.7.11 of the EP. Woodside did not respond to FARA in the context of the Pluto Operations EP, however, Woodside provided a response to FARA in the context of another EP on 25 October 2024.
- On 31 January 2025, Woodside advised FARA it had further assessed the merits of a number of objections and claims raised by FARA (SI Report, reference 39.6). Woodside reiterated that feedback from relevant persons could continue to be provided, including after consultation for the EP had closed and after an EP had been accepted by NOPSEMA. Woodside:
  - **(4, 6)** Provided background on the Department of Water and Environmental Regulation (DWER)-commissioned Ramboll Australia Pty Ltd Study on air emissions in the Murujuga airshed. Ramboll (2021) indicated that NOx loads from industrial sources were estimated to be 13,937 tonnes per year and were forecast to reduce to 12,052 tonnes per year by 2030. Processing of gas from Pluto was not anticipated to cause an increase of NOx within the airshed beyond historical maximum levels and the impact assessment in the EP concludes that indirect atmospheric emissions from the onshore processing of Pluto gas contribute only a minor portion to the overall industrial emission airshed load on the Burrup Peninsula. The EP confirmed that climate science understands climate change to be caused by the net (cumulative) global concentration of GHG in the atmosphere. Noting that climate change was recognised as a global issue, Woodside advised a contextual evaluation of climate change impacts was included in Section 6.7.10 of the EP.

- **(5)** Confirmed the regulations enacted by Parliament that governed the content of the EP were the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth)*. The content of the EP complied with those regulations and in particular references in the Regulations to direct and indirect impacts. Woodside confirmed relevant indirect consequences were addressed and assessed in the EP.
- **(6, 7)** Confirmed it had provided sufficient information in accordance with Regulation 25. In addition, the full EP was publicly available on NOPSEMA's website. Woodside referred FARA to specific sections of the EP which contained further information on indirect impacts.
- **(4, 6)** Advised there was inconclusive evidence of a causal link between industrial air emissions and anthropogenic change to rock art on Murujuga. Nevertheless, there were precautionary measures in place that reduced risk of impact to Murujuga rock art. Woodside provided information on relevant controls in the EP. Woodside also provided information on the NWS Extension Environment Review Document.
- **(5, 6)** Advised the design of onshore processing facilities was outside the scope of the activity described in the EP.
- **(15)** Confirmed it had considered and assessed the scientific studies and other literature provided by FARA during consultation. Woodside provided information on MRAS/MRAMP, including an excerpt from MRAS. Woodside confirmed it continued to monitor the outcomes of MRAMP as part of the implementation strategy of the EP. Woodside also noted the Woodside Atmospheric Deposition Monitoring Program (WADMP) which commenced operations in 2021.
- **(7)** Provided an overview of regulatory frameworks for onshore processing facilities, including updates to the State Government's GHG emissions policy. Woodside confirmed these regulatory frameworks ensured GHG emissions from onshore processing of Pluto gas were managed consistent with Australia's emissions reduction targets and were ALARP and Acceptable.
- **(8, 9)** Confirmed changes in global atmospheric GHG concentration cannot be attributed to any one activity or one project, as they are instead the result of global GHG emissions, minus global GHG sinks, that have accumulated in the atmosphere since the start of the industrial revolution. Woodside does not accept that the Pluto Operations will contribute to the exacerbation of climate change impacts in Western Australia. Regardless, a hypothetical assumption where GHG emissions associated with the Pluto operations are treated as additive is considered in the latest version of the EP, and the amount is de minimis.
- **(10, 11)** Noted further information on Woodside's approach to consultation and engagement, including with First Nations groups, was available in Section 5 of the EP and Appendix F.
- **(12)** Confirmed Woodside reviewed, assessed and responded to FARA's feedback, objections or claims about the adverse impact of the activity to which the EP relates in accordance with the Regulations. Woodside noted the EP had been updated to include information on topics of interest to FARA.
- **(15)** Confirmed it had reviewed, assessed and responded in relation to information provided by FARA.

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
(1) Consultation information received on the 19 March 2024.	**(1)** **Woodside assessment:** Woodside confirms initial consultation information and Consultation Information Sheet was sent to FARA on 27 February 2024 with follow-up on 19 March 2024 and activity update on 27 March 2024. **Woodside response:** Woodside provided FARA with background dates to demonstrate 30-day consultation period was provided. FARA has been provided with	**(1)** FARA has been given sufficient information and a reasonable period in which to make an informed assessment of the possible consequences of the activity on its functions, interests or activities, as described in Section 5.4 of the EP.

	sufficient information and a reasonable period for consultation.	
(2) Dedicated to protection and preservation of rock art and impact caused by industrial development.	**(2)** **Woodside assessment:** Woodside is aware of FARA's work to preserve rock art and physical and cultural heritage landscape but notes the FARA-provided statement is broader than its published statement. **Woodside response:** Woodside noted FARA's functions, interests and activities and issues of concern, but also recognised its statement tied to these is broader than its published statement.	**(2)** Not required.
(3) Supports plan to protect cultural heritage from industry as part of objectives and activities and continued gas processing counters this.	**(3)** **Woodside assessment:** Woodside noted FARA's current objectives and activities, but also recognised some statements are broader than what is covered on FARA's website, some lack specificity and not all have been verified as accurate. **Woodside response:** Woodside notes FARA's statement on its current objectives and activities, but also notes use of broader statements compared to the FARA website and that some statements lack specificity and not all have been verified as accurate.	**(3)** Not required.
(4) Gas processing at Pluto LNG facility harms rock art, cultural heritage landscape and affects climate change.	**(4)** **Woodside assessment:** Research to date on the impacts of emissions on rock art has not been conclusive. Woodside will continue to assess science on this topic and provide information to MRAS. Woodside acknowledges that climate science understands climate change to be caused by the net cumulative global concentration of GHG emissions in the atmosphere, and changes in the global atmospheric GHG concentration cannot be attributed to any one activity or project, including Pluto operations. Woodside's view is that LNG can have a role in displacing higher carbon intensity fuels and lowering carbon intensity of existing	**(4)** Not required.

	energy mixes. Therefore, Woodside does not accept Pluto Operations will contribute to the exacerbation of climate change impacts in Western Australia. Woodside acknowledges its involvement with monitoring of industrial emissions and the Murujuga Rock Art Strategy as a member of the Murujuga Rock Art Reference Group. **Woodside response:** Woodside referenced existing State and Commonwealth legislation that manages atmospheric emissions tied to onshore processing and approvals related to Pluto LNG Gas Plant. It also noted its historic and present work to support the Murujuga Rock Art Strategy and monitor industrial emissions. Woodside confirmed there was no planned increase to the existing disturbance footprint associated with current or future operational activities described within the EP. Noting climate change was a global issue, Woodside confirmed the EP included a contextual evaluation of climate change impacts.	
(5) Indirect consequences of Pluto operations must be addressed in the EP.	**(5)** **Woodside assessment:** Woodside considers and addresses indirect consequences in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023* (Cth) (the Regulations). **Woodside response:** Woodside confirmed the regulations enacted by Parliament that governed the content of the EP were the O*ffshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth)*. Woodside confirmed relevant indirect consequences were addressed and assessed in the EP.	**(5)** Consideration of indirect emissions associated with the activity is described in Section 6.7.10 of the EP.
(6) Requires additional information to assess consequences of Pluto Operations activity, on topics including precautionary principles, pollution control measures and technology, airborne pollution concentrations, long-term physical consequences on rock art, acceptable	**(6)** **Woodside assessment:** Woodside has given FARA sufficient information to make an informed assessment of the adverse impacts of the activity on its functions, interests or activities. Woodside had assessed and responded to FARA's feedback regarding this EP.	**(6)** FARA has been given sufficient information and a reasonable period in which to make an informed assessment of the possible consequences of the activity on its functions, interests or activities, as described in Section 5.4 of the EP. A summary of existing research on Murujuga rock art is set out in Section 4.9.6 of the EP. Section 6.7.11

levels of impact.	**Woodside response:** Woodside provided a response to each information request, including precautionary measures in place to reduce the risk of impact to Murujuga rock art, Woodside's consideration of scientific studies and other evidence, support for MRAS and MRAMP, and regulatory frameworks for onshore processing.	discusses the onshore processing of Pluto gas.
(7) Wants to know how Woodside meets statutory requirements under WA Aboriginal Heritage Act.	**(7)** **Woodside assessment:** Woodside has information about its approach to Aboriginal cultural heritage management on Woodside.com. **Woodside response**. Woodside provided FARA with link to the Cultural Heritage Management Plan for Pluto LNG. Woodside also provided FARA with an overview of regulatory frameworks for onshore processing.	**(7)** Not required.
(8) What are climate scenarios tied to continuing Pluto Operations.	**(8)** **Woodside assessment:** To facilitate a comparison against carbon budgets, a hypothetical assumption where GHG emissions associated with the operations are hypothetically treated as additive is considered in the EP. The contribution is de minimis. **Woodside response:** Woodside set out its view on LNG's role in the energy transition and the de-minimis contribution to carbon budgets of GHG emissions associated with Pluto operations. Woodside referred to its Climate Transition Action Plan and 2023 Progress Report for further information.	**(8)** Comparisons against carbon budgets are set out in Section 6.7.10 of the EP.
(9) What are acceptable climate impact scenarios and measures for ALARP impact.	**(9)** **Woodside assessment:** Woodside acknowledges that climate science understands climate change to be caused by the net cumulative global concentration of GHG emissions in the atmosphere, and changes in the global atmospheric GHG concentration cannot be attributed to any one activity or project, including Pluto operations. To	**(9)** Not required.

	facilitate a comparison against carbon budgets, a hypothetical assumption where GHG emissions associated with the operations are treated as additive is considered in the EP. The contribution is de minimis. **Woodside response:** Woodside confirmed it acknowledged climate science and that climate change was understood to be caused by the net (cumulative) global concentration of GHG emissions in the atmosphere. Woodside set out details of the comparisons against carbon budgets included in the EP. Woodside referred to its Climate Transition Action Plan and 2023 Progress Report to provide information on Decarbonisation Strategy (pages 13-41), and specifically page 24 to 25 regarding large scale abatement and the vision for Pluto net zero.	
(10) Request for information on dealings with similar-interest stakeholders.	**(10)** **Woodside assessment:** Woodside conducts a relevancy assessment for every EP to determine who is a relevant person and has a planned outreach effort to contact relevant persons and organisations. **Woodside response:** Woodside confirmed that beyond directly contracting relevant persons and organisations, including FARA, it advertised this EP and consultation opportunities in The Australian, The West Australian, regional newspapers and Indigenous newspapers and ran a social media campaign across Facebook and Instagram. Matters raised during consultation are addressed in this EP.	**(10)** Assessment of relevant persons is described in Appendix F, Table 1 of the EP.
(11) How Traditional Owners and Custodians exercise rights related to Pluto Operations.	**(11)** **Woodside assessment:** Woodside consults with First Nations relevant persons for all EPs. **Woodside response:** Woodside confirmed it has consulted with First Nations relevant persons for Pluto Operations, including Traditional Custodians of Murujuga and in the broader environment that may be affected by the EP activity to understand their functions, interests or actions. Woodside	**(11)** Consultation with Traditional Custodians of Murujuga is described in Appendix F, Table 2 of the EP.

	also noted that under the *United Nations Declaration on the Rights of Indigenous Persons* that cultural heritage and other communal rights of Indigenous people must be managed through consultation with representative institutions. Direct consultation with individual First Nations persons outside of this process has the potential to undermine the cultural authority of recognised elders and democratically elected representatives. This process of understanding communally held beliefs has recently been confirmed by the Federal Court in the *Munkara v Santos* matter.	
(12) How its past concern and requests have been addressed.	**(12)** **Woodside assessment:** Woodside recognises there is previous correspondence with FARA for reference. Woodside has assessed and responded to feedback, claims and objections from FARA in relation to this EP. **Woodside response:** Woodside referred FARA to its previous responses to FARA's previous correspondence.	**(12)** FARA has been given sufficient information and a reasonable period in which to make an informed assessment of the possible consequences of the activity on its functions, interests or activities, as described in Section 5.4 of the EP.
(13) Requires information on what Woodside considers ALARP and its management.	**(13)** **Woodside assessment:** Woodside has given FARA sufficient information to allow FARA to make an informed assessment of the adverse impacts of the activity on its functions, interests or activities. **Woodside response:** Woodside confirmed the EP was publicly available on the NOPSEMA website. The EP demonstrates that environmental impacts and risks will be reduced to ALARP and Acceptable levels.	**(13)** FARA has been given sufficient information and a reasonable period in which to make an informed assessment of the possible consequences of the activity on its functions, interests or activities, as described in Section 5.4 of the EP.
(14) Requests additional consultation time to engage qualified experts.	**(14)** **Woodside assessment:** Woodside notes that feedback can be provided throughout the life of an EP, including after consultation period has closed. **Woodside response:** Woodside advised that feedback can continue to be provided during the life of an EP, including after consultation has closed on the EP, during EP	**(14)** FARA has been given sufficient information and a reasonable period in which to make an informed assessment of the possible consequences of the activity on its functions, interests or activities, as described in Section 5.4 of the EP. Woodside engages in ongoing consultation with stakeholders, as described in Section 7.10 of the EP.

	assessment, and after an EP has been accepted by NOPSEMA. Woodside continues to receive, assess and respond to feedback and comments from relevant persons throughout the life of the EP. Should feedback be received following the acceptance of an EP that identifies a measure or control that requires implementation or updates to meet the intended outcome of consultation, Woodside will apply its Management of Change and Review process as appropriate.	
(15) Peer-reviewed scientific reports show impact of atmospheric pollution on rock art.	**(15)** **Woodside assessment:** Woodside notes that research to date on industrial emissions impacts on rock art has not been conclusive, but further research is being led by the Murujuga Aboriginal Corporation and Western Australian Department of Water and Environmental Regulation. It expects future findings of the Murujuga Rock Art Strategy will be implemented if required via appropriate regulatory measures. **Woodside response:** Woodside responded that emissions tied to the Operations EP relate to emissions within the scope and duration of existing Pluto LNG Gas Plant approval and the Ministerial conditions and commitments in place are included in point **(4)** above in correspondence summary. It noted that research to date on industrial emissions impacts on rock art has not been conclusive, but further research is being led by the Murujuga Aboriginal Corporation and Western Australian Department of Water and Environmental Regulation. As a member of the Murujuga Rock Art Stakeholder Reference Group, it expects future findings of the Murujuga Rock Art Strategy will be implemented if required via appropriate regulatory measures. For additional information on Woodside's consideration of publications relating to Murujuga rock art, it recommended page 311 Appendices - North West Shelf Project Extension Environmental Review Document	**(15)** Consideration of indirect emissions associated with the activity is described in Section 6.7.10 of the EP.

	(woodside.com)	
(16) Expects a satisfactory response on information provided and wants it addressed publicly in EP.	**(16)** **Woodside assessment:** Woodside noted consideration of peer-reviewed scientific reports related to potential emission impacts on Murujuga's rock art. **Woodside response:** Woodside confirmed that peer-reviewed scientific reports of which it is aware relating to potential emissions impacts on Murujuga's rock art have been considered in Woodside's assessments for the Operations EP. The Operations EP which is currently being prepared and which will be made available on the NOPSEMA website during assessment. It also referred back to first references of points **(4)** and **(5)** in email summary above.	**(16)** Not required.
(17) Expects further consultation and FARA feedback to be included in public section of EP.	**(17)** **Woodside assessment:** Woodside complies with Regulation 25 of the Environment Regulations and consulted FARA in accordance with that. **Woodside response:** For the Operations EP, Woodside has complied with Regulation 25 of the Environment Regulations in its consultation with FARA and Woodside will publish FARA's feedback in the EP.	**(17)** Woodside engages in ongoing consultation with stakeholders as described in Section 7.10 of the EP.
Woodside has addressed objections and claims as noted above.	Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. Woodside engages in ongoing consultation throughout the life of an EP. Woodside notes that further feedback may be received as part of ongoing consultation. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.
Summary Report – Consultation Complete		

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with FARA for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given FARA sufficient information to allow FARA to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since February 2024. Woodside provided this information directly to FARA on 27 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with regulation 25(4) of the Environment Regulations).
- On 29 March 2024, FARA claimed it had not been provided with sufficient information to allow it to make an informed assessment of consequences on its functions, interests or activities. Woodside disagrees with this assertion because FARA responded to Woodside's email with questions specific to the activity indicating the information provided was sufficient to enable FARA to make an informed assessment of the possible consequences of the activity on its functions, interests or activities. FARA shared its feedback, claims and objections based on its understanding of the activities, which Woodside assessed and responded to as demonstrated in the summary of consultation above. FARA continues to reiterate the same or similar topics that Woodside has provided responses to.
- Woodside provided FARA with further detailed information which addressed FARA's specific feedback, objections or claims (see information given on 14 May 2024, 28 May 2024, and 31 January 2025).

Reasonable Period

Woodside allowed FARA a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to FARA advising when consultation closed for the purposes of the preparation of the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period in the preparation of the EP and Woodside allowed FARA with 30 days for consultation. FARA engaged in consultation and provided feedback within this period.
- In this context, Woodside allowed FARA a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with FARA is appropriate and adapted to the nature of interests of FARA:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This is appropriate and adapted to FARA because Woodside notes FARA regularly uses social media as a means to share its views. This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside engaged with FARA in the manner that FARA has consulted in previous consultations, that is, by email.
- Woodside considers a reasonable opportunity was provided to FARA as evidenced in their response on 29 March 2024.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- FARA provided feedback or objections or claims about the adverse impact of the activity to which the EP relates. In line with the intended outcome of consultation as set out in Section 5.2 and Regulations 24 and 34(g), Woodside has:
  - Responded to feedback from FARA and has assessed the merits of any objection or claim about the adverse impact of the proposed activities to which this EP relates.
  - Based on FARA's feedback, assessed the feasibility of SCR in section 6.7.11. of the EP. No new measures were adopted as a result of FARA's feedback.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.

Doctors for the Environment (DEA)

Summary of information provided and record of consultation for this EP:

- On 24 April 2024, during the course of preparing the EP, DEA self-identified by emailing NOPSEMA and including a feedback letter addressed to Woodside regarding this EP (SI Report, reference 41.1) and:
  - **(1)** referred to another EP and Woodside's intention to seek 5-year extension to Pluto Facility Operations EP.
  - **(2)** understood Woodside was undertaking consultation with relevant persons for both EPs under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cth) prior to NOPSEMA assessment.
  - **(2)** considered itself to be a relevant person and Woodside is required to consult it.

    - DEA provided statements related to its interests, functions, activities and resources including:
    - background on DEA as an independent, non-government organisation of medical doctors and students in Australian States and Territories that has a voice in the sphere of environmental health.
    - reference to annual reports that articulate its strategy and impact goals to reducing fossil fuel combustion and cutting global greenhouse gas emissions this decade.

  - resources including health reports, fact sheets and submissions.
  - consultation-relevant fact sheets “How Climate Change Affects Your Health: The Facts, How Climate Change Affects Mental Health in Australia” and “Asthma and Indoor Gas Appliances.”
  - submissions including the Senate Inquiry Duty of Care Intergenerational Equity Bill and Protecting the Spirit of Sea Country Bill 2023.
  - support of phasing-out gas in households and policies and programs to phase out use of Gas in Australia.
  - Support of global emissions reduction aligned with the Paris Agreement with DEA arguments found in its Future Gas Strategy consultation paper.
- **(3)** noted that Woodside is required by the environment regulations to provide relevant persons with “sufficient information” to assess the possible consequences of the activities on its functions, interests or activities and provide “reasonable period” for consultation.
- **(4)** understands a range of different pathways and energy scenarios may be considered to align with globally agreed temperature goals and each has different levels of certainty, risk profiles and public health outcomes, so DEA supports position of the United Nations, IEA and other authorities that there should be no new fossil fuel resource developments that are not already under production. It considers that Woodside projects are not consistent with findings and wants more information to understand and evaluate health implications.
- **(5)** noted the consultation helps the proponent and environment in improving an EP’s content and it looks forward to receiving more information and opportunity to comment.
- **(3, 5)** noted that consultation required under regulation 11A of the Environment Regulations, a proponent is required to provide DEA with “sufficient information” to make an informed assessment and provide a “reasonable period” for consultation.
- **(6)** referenced NOPSEMA’s “Guidance Note: Environment Plan content requirements” dated September 2020 (EP Content Guidance) and “Guideline: Consultation in the course of preparing an environment plan” dated 12 May 2023 (Consultation Guideline) state that consultation in relation to any EP for development activities should assist the proponent to understand the external context, define “acceptable levels" of environmental impact and risk, and inform appropriate control measures.
- **(7)** did not feel that Woodside’s published consultation material for another EP or this EP provided “sufficient information” as it did not address indirect impacts related to greenhouse gas emissions, climate change impacts and health impacts associated with gas usage. Nor did it sufficiently address local air pollution impacts from Woodside’s gas processing facilities.
- **(7)** cited Woodside’s estimate of total lifecycle emissions from the development – 878m tonnes – and that indirect consequences on climate change and health impacts of air pollution from fuel combustion are significant.
- **(2)** described itself as an environmental organisation and provided background on how its functions, interests and activities are directed:
  - protecting the natural environment so that human health may be protected
  - understanding the intimate relationship between health of the environment and human health
  - drawing attention to health impacts of global warming from GHG emissions, air pollution from fossil fuel combustion as well as direct health impacts associated with use of gas in household and industrial settings.
- **(8)** believed its interests and objective would be impacted by the Operation EP in at least the following ways:
  - health impacts in Australia and elsewhere as a consequence of climate change
  - health impacts for workers and the local community as a result of Woodside’s LNG processing operations
  - health and wellbeing impacts for Aboriginal peoples who experience impacts to cultural heritage and Sea Country as a result of Woodside’s gas processing operations and climate change and ocean acidification more generally
  - health and wellbeing impacts associated with the use of gas in domestic and commercial settings, both in Western Australia and elsewhere where the gas is

exported
  - health considerations arising from carbon pollution mitigation options such as the use of offsets, carbon capture and storage, direct mitigation, or other abatement methods
  - impacts and implications for healthcare professionals and health care systems arising from the health impacts mentioned above.
- **(4, 5, 6)** noted that regulation 11A of the Environment Regulations requires proponents to provide DEA with sufficient information to make informed assessment of the project and possible negative consequences to the above interests and activities.
- noted indirect impacts from GHG emissions from another activity and climate change and air pollution from burning fossil fuels were not considered or provided.
- **(9)** noted that climate change impacts, including from Scope 3 emissions that will result from another activity, fall under the scope of indirect consequences which must be assessed in accord with the approved NOPSEMA Program under the EPBC Act, and separately, as part of the broader environment that must be considered by NOPSEMA in accordance with the Environment Regulations.
- **(3,4, 7)** considered that Woodside has not provided DEA with sufficient information to make an informed assessment of consequences on its functions, interests and activities.
- **(10)** provided examples of information DEA requires to make an assessment including:

  - Woodside's analysis of impacts
  - Woodside's analysis of impacts including independent health impact assessments, baseline health studies or other analysis including:
  - health impacts from use of gas produced by Australian and overseas projects
  - health impacts arising from climate impacts that are attributable to emissions from these projects
  - health impacts from climate change and other effects
  - identification of groups or communities disproportionately affected by impacts
  - health and wellbeing effects of both direct and indirect impacts of the projects to sea country and cultural heritage
  - health and wellbeing impacts for the local community and others who may be exposed to, or impacted by airborne emissions and other effects of Woodside's gas processing and export facilities, or other infrastructure associated with the projects
  - health impact on workers involved in the construction and production phase of the projects and the gas processing facilities over the period they will be utilised for these projects
  - Information regarding mitigation measures
  - Information about what mitigation measures are proposed (if any) by Woodside to address impacts that have been identified, including what effects these mitigation measures are likely to have, how they will be implemented
  - Details the implementation strategy and monitoring, recording and reporting arrangements in relation to the described indirect and direct environmental impacts and risks of the activities, including how they will be reviewed and evaluated.
  - Details on how the proposed mitigation measures and implementation strategy will be subject to enforceable regulatory requirements or otherwise regulated.
  - Information about what other mitigation options have been considered by Woodside (if any) but are not proposed for implementation.
  - Information regarding Woodside's evaluation and selection process for mitigation measures, including how decisions have been made and what criteria have been applied to the consideration by Woodside of what mitigation measures will be implemented.
  - Information to demonstrate how the chosen mitigation measures will achieve the required outcome of 'as low as reasonably practicable and acceptable' residual impacts.
  - Information on residual impacts and risks
  - Information to specify what residual health risks, impacts and outcomes Woodside believes will occur as a result of the projects after the application of proposed

mitigation measures
  - Details of what residual impacts Woodside considers to be acceptable, in the context of the regulatory requirement for 'as low as reasonably practicable and acceptable'
  - Information on relevant person consultation in relation to health impacts and effects
  - What efforts Woodside has made to identify and consult with persons or organisations who may be impacted by health effects of the activities as relevant persons under the regulations.
  - What relevant persons Woodside has consulted with who may be impacted by health effects of the activities and what concerns or issues have been raised in the process of such consultation to date.
- **(3, 4 ,7, 10)** shared why the above information is needed for DEA to make an informed assessment as it wants to respond in an evidenced-based manner and direct its activities to better protect the health of communities from such impacts and prepare the health sector for climate change impacts.
- **(3, 4, 7, 10)** requested the above information as part of consultation and it should include reports, analyses, assessments, modelling and/or other documents used by Woodside.
- **(11)** noted that Woodside has made general statements related to its Climate Transaction Action Plan and 2023 Progress Report (the Report) and given majority of this project's emissions will be from Scope 3 emissions which the Report sets only a 5 Mtpa abatement target. It does not describe the health outcomes or impacts from its proposed activities.
- **(3)** noted Regulation 11A of the Environment Regulations requires a "reasonable period" for consultation.
- **(3, 5, 7)** noted Woodside has not provided "sufficient information" to DEA and further time will be needed to review information when provided.
- **(3)** referenced EP Content Guidance note that specifies consultation time should be based on complexity and volume of information provided and practicalities of DEA's available personnel and resources. After receiving requested information, it can determine the length of time needed for consultation. It noted that the 30 day period for public exhibition of certain EPs specified under Regulation 11B(1)(a) of the Environment Regulations is unlikely to be sufficient for the purposes of consultation under Regulation 11A. This is because the consultation envisaged by Regulation 11A is required to be more rigorous than public exhibitions.
- **(3)** noted the EP Content Guidance and Consultation Guidelines state that under Regulation 11A, consultation should demonstrate two-way communication, transparency, collaboration and inclusiveness. It continued that Regulation 16(b) requires proponents to provide feedback to DEA on its comments.
- **(12)** reiterated that any EP for the project should not be accepted until the requirements of Regulation 11A are met, including consultation requirements with DEA identified in this document.
- **(3,4,5,7,12)** noted it looked forward to receiving more information so consultation can commence in accordance with Regulation 11A of the Environment Regulations.

- On 14 May 2024, Woodside responded to DEA's email from 24 April 2024 (SI Report, reference 41.2) and:
  - **(1)** noted receipt of DEA's letter which related to this EP and another EP.
  - **(2)** Woodside consulted DEA for the other EP starting in August 2023. Consultation for this EP closed on 29 March 2024. Woodside outlined its EP feedback process and Management of Change and Review process. Based on feedback for the Pluto Operations EP, DEA has been assessed as being a relevant person for the Pluto Operations EP.
  - **(3)** confirmed it consults relevant persons during EP preparation in accordance with Regulation 25 of the Environment Regulations.
  - **(2)** noted DEA's statements and document reference but makes no comment as to the factual accuracy or otherwise of these documents.
  - **(4)** referred DEA to Section 4.2 Global demand for oil and gas (on pages 44 and 45) of Woodside's Climate Transition Action Plan and 2023 Progress Report available at Woodside's Climate Transition Action Plan and 2023 Progress Report. Woodside referred DEA to publicly available information and noted that more

granular detail relating to GHG emissions will be set out and assessed in the respective EPs. GHG emissions will be estimated using the National Greenhouse and Energy Reporting (NGER) Measurement Determination 2008 and other industry standard database. The EP will assess Direct Emissions (Scope 1) and Indirect Emissions, aligned with the definitions of the GHG Protocol Corporate Standard and the National Greenhouse and Energy Reporting Regulations 2008 (Cth).

- **(5)** provided background on consultation activities including advertisements in The Australian, The West Australian, regional newspapers and Indigenous newspapers between 26 – 28 February 2024, a social media campaign across Facebook and Instagram in February 2024, community events with subject matter experts and information and tailored roadshow in the Pilbara during March and April 2024. The Pluto Operations EP consultation information sheet was published 26 February 2024.
- **(6)** confirmed it refers to NOPSEMA's guidance materials when undertaking consultation.
- **(7)** noted that GHG information for another EP is already publicly published. The statutory regime relating to onshore emissions includes various State and Commonwealth legislation which manages potential impacts and risks to environment and cultural features, and legislation is applied to the relevant proponents for the onshore processing facilities.
- **(9)** recommended review of Section 3.1 Climate strategy (on page 14), Section 3.5 Scope 3 emissions (on page 32 and 33) and Section 3.6 Scope 3 targets (on pages 34 - 40) of Woodside's Climate Transition Action Plan and 2023 Progress Report available at Woodside's Climate Transition Action Plan and 2023 Progress Report. The EPs will assess both direct and indirect impacts and risks associated with the Petroleum Activities Program (PAP), having regard to the nature and scale of the proposed PAP. Direct and indirect emissions with the potential to result in climate change impacts will be considered.
- **(10)** noted that emissions associated with onshore gas processing are subject to a range of legislative requirements including those which consider and manage potential to impact on human health (for example Part IV environmental impact assessment and associated air quality monitoring management (refer to summary point **(5)** above), as well as broader World Health Organisation requirements and National Environment Protection Measure limits and specific health and safety related regulations.). Woodside does not provide drafts of EPs while in development or under assessment for a number of reasons, including the potential for content to change. Allowing access to publicly available versions enables stakeholders to access and comment on the same information, assists with version control and removes potential for confusion. The EP will be made publicly available on NOPSEMA's website once it has been submitted and is under assessment.
- **(11)** noted that climate change impacts cannot be attributed to any one activity or one project, as they are instead the result of global GHG emissions, minus global GHG sinks, that have accumulated in the atmosphere since the industrial revolution started. Although the direct and indirect GHG emissions associated with Scarborough and Pluto cannot be linked to climate change impacts to the environment, a contextual evaluation of climate change impacts will be provided in the EPs. Encouraged DEA to read Woodside's suite of climate disclosures including Woodside's Climate Report 2021, Climate Report 2022 and Climate Transition Action Plan and 2023 Progress Report.
- **(12)** Woodside disagreed with the assertion that the Project should not be accepted as Woodside had engaged in consultation with DEA in accordance with Regulation 25.

- On 12 June 2024, DEA emailed Woodside in response to Woodside's letter dated 14 May 2024 (SI Report, reference 41.3). DEA:
  - **(1)** Welcomed Woodside's acknowledgement that DEA is a relevant person for this EP and another Woodside EP.
  - **(3)** Did not consider that information provided to date was sufficient in terms of consultation, in particular regarding climate and health impacts. DEA stated that consultation requirements of the Regulations have not been met.
  - **(13)** Further stated that given the limited information provided by Woodside, and DEA's voluntary capacity, the information in the letter should not be taken to reflect DEA's complete position or complete submissions on the proposal and that DEA reserved the right to make further submissions as capacity and information became available.

- **(14)** Claimed that as well as climate change harming human health:
    - Oil and gas developments result in direct health harms from pollution including cancer, reproductive harms, impairment of normal human growth and development, birth defects, respiratory and cardiovascular disease and deaths as well as interference with the body's communication system of hormones regulating growth, behaviour, metabolism and reproductive function; and
    - The destruction of sites of spiritual significance to First Nations people by fossil fuel developments compounds psychosocial harms.
- **(15)** Advised that any emissions produced from now will need to be removed from the atmosphere at a later date. At a minimum:
    - Woodside's assessment of climate impacts associated with these projects should consider impact on global emissions over at least a 100 year period and preferably longer;
    - Woodside must show how it will cause carbon drawdown (CDR) to remove all emissions that will be produced by the projects from the atmosphere in the long term, and enforceable measures must be imposed by the regulator to ensure this takes place.
- **(16)** Claimed Woodside's CTAP and 2023 Progress Report (and climate plans in general) could not be relied upon as a basis for assessment of the acceptability of carbon pollution or climate change impacts of the proposed activities because:
    - The plans and targets are unenforceable;
    - The CTAP and 2023 Progress Report amounts to greenwash because it does not address numerous requirements of the UN standards and ISO Guidelines for Net Zero;
    - The plans have repeatedly been rejected as insufficient by a majority of Woodside's shareholders.
- **(17)** Asserted that reliance on the Federal safeguarding mechanism as a means to align with Australian national emissions goals is inappropriate because of:
    - Australia's national emission reduction goals and legislated carbon emissions budget are not aligned with the temperature goals of the Paris Agreement;
    - Ongoing project emissions beyond 2030 reduction targets;
    - Emissions that will result from these projects in other countries outside of Australia;
    - Potential use of low integrity undisclosed offsets.
- **(18)** Claimed that if comparisons to Australia's emissions reduction targets and budget are to be used, then the total emissions from the proposed activities (not just domestic emissions) should be compared with Australia's abatement efforts and policies.
- **(19)** Stated it did not accept the argument that the total emissions from the proposals are an insignificant contribution to the global carbon budget and therefore should not be considered unacceptable as if this were true, Australia's entire national abatement efforts to 2030, including abatement from all sources, is also insignificant.
- **(20)** Stated that Woodside must adhere to the UN and ISO's guidelines in relation to its proposed activities as part of any assessment on the impacts on the climate and on DEA's activities and interests under the Regulations.
- **(21)** Stated that it looked forward to Woodside providing further information to address DEA's concerns and demonstrating that the impacts of the proposed activities will be managed to a level that is acceptable to DEA.
- **(22)** Stated that Woodside had not provided information to DEA to show that its net zero plans for the proposed activities complied with the regulations, and that Woodside's abatement activities and net zero plans amounted to greenwash.
- **(23)** Stated the Pluto GGAP could be considered an example of greenwash as it did not adhere to the UN and ISO standards, and that, in any case, the Western

Australian EPA had formally advised the WA Minister for Environment that the plan was no longer adequate.

- On 4 July 2024, Woodside emailed DEA (SI Report, reference 41.4). Woodside advised that it continued to assess and respond to feedback throughout the life of an EP, and that Woodside was available to meet with DEA over the next month. Woodside also acknowledged receipt of DEA's letter dated 12 June 2024 and advised it would be responding shortly.
- On 9 July 2024, Woodside responded to DEA's letter dated 12 June 2024 (SI Report, reference 41.5). Woodside:
  - **(1)** noted DEA's comments regarding relevant person status.
  - **(3)** noted further information on emissions will be included in the revised EP and reiterated that in accordance with regulation 25 of the Environment Regulations, Woodside's consultation process provided relevant persons with sufficient information to allow them to make an informed assessment of the possible consequences of the proposed activity on their functions, interests or activities. Woodside assesses any objections or claims received and adopts appropriate measures so that the activity is carried out in a manner whereby environmental impacts and risks are reduced to as low as reasonably practicable (ALARP).
  - Noted that DEA's public position is that all new coal, oil and gas projects should be banned, and provided public statements from DEA that indicate that is it fundamentally opposed to fossil fuels. Woodside also noted connections between DEA and other NGOs who have campaigns against Woodside.
  - **(4)** advised that in terms of climate and health impacts associated with this EP, climate change impacts are the result of global GHGs and cannot be attributed to any one activity or project. Emissions associated with the projects are negligible in the context of existing and future anticipated global GHG emissions. In addition, gas can play a role towards the energy transition.
  - Directed DEA to the IPCC's Sixth Assessment Report (AR6) in 2023 and Woodside's approach to climate change (Section 5.3 'Managing Physical Risk' and Section 6.3 'A Just Transition' of Woodside's Climate Transition Action Plan (CTAP) and 2023 Progress Report) for information on GHG emissions in a global and Australian context.
  - **(13)** Noted that, based on DEA's website, DEA's members cite a significant volume of studies, scientific research and videos to inform its position on human impacts from climate change demonstrating that DEA has access to information, and capacity and understanding of that information. Woodside also noted that a number of DEA's members attended Woodside's 2024 AGM.
  - **(14)** Reiterated that climate change impacts are the result of global GHG emissions and cannot be attributed to any one project.
  - Gas can play a role in the energy transition.
  - Stated that the proposed petroleum activities were not anticipated to result in the destruction of sites of spiritual significance to First Nations people.
  - **(15)** Noted DEA's comments regarding the need for emissions produced from now on needing to be removed at a later date, and advised DEA that additional information was also available within Woodside's CTAP and 2023 Progress Report regarding decarbonisation technology development and the role of removal credits over time in support of our net zero aspiration (pages 28 and 29).
  - **(16, 17)** Stated it does not agree with DEA's position that the Federal Safeguarding Mechanism is misaligned with the goals of the Paris Agreement and that scope 3 international emissions should be considered against Australia's targets, as they are subject (where relevant) to customer nations' Paris NDCs
  - **(18)** Advised that emissions arising from the consumption of Scarborough gas along with other feed sources in customer markets will be considered under domestic and international emissions control frameworks. Anticipated customers of gas from the Scarborough Project are in countries that have ratified the Paris Agreement. Under the Paris Agreement and global GHG accounting conventions, each country is responsible for accounting for, reporting and reducing emissions that physically occur in its jurisdiction.
  - **(19)** Stated it did not accept the position that if the emissions associated with the project are insignificant, so too are Australia's national abatement efforts.
  - **(20)** Stated it does not agree with DEA's position that ISO net zero guidelines must be applied to the proposed activities. Section 2.3.6 of the EP defines criteria for

demonstration of acceptability.
  - **(21)** Stated it does not agree with DEA's position that impacts of the proposed activity must be acceptable to DEA, referring to the purpose of consultation and that acceptability is determined by NOPSEMA under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).
  - **(21)** Advised the acceptability of the proposed activities will be determined by NOPSEMA pursuant to the OPGGS (E) Regulations.

- On 10 July 2024, DEA thanked Woodside for the clarification and for Woodside's complete, considered and prompt response to DEA's request (SI Report, reference 41.6).
- On 31 January 2025, Woodside emailed DEA to advise that Woodside had further assessed the merits of a number of objections or claims raised by DEA (SI Report, reference 41.7). Woodside noted that feedback from relevant persons could continue to be provided including after consultation for the EP had closed, during EP assessment and after an EP had been accepted by NOPSEMA. Woodside:
  - **(3, 5, 8, 13)** Confirmed Woodside had given DEA sufficient information in accordance with the regulations, including information regarding climate and health. For example, as set out in the EP, Woodside understands climate change to be caused by the net (cumulative) global concentration of GHG in the atmosphere. However, changes in global atmospheric GHG concentration cannot be attributed to any one activity or one project. Woodside set out its view on LNG's role in the energy transition and that Woodside did not accept that the Pluto Operations would contribute to the exacerbation of climate impacts in Western Australia. Woodside advised that, regardless, a hypothetical assumption where GHG emissions associated with the activity were treated as additive had been considered in the latest version of the EP and the contribution to carbon budgets was de minimis. For reference, Woodside provided a summary of the contextual evaluation of climate changes impacts included in the EP.
  - **(2)** Noted the additional documents mentioned by DEA included information relevant to DEA's topics of interest and were further examples of sufficient information given to DEA.
  - **(8, 14)** Confirmed the EP included a section entitled "Potential impacts to human health" and that in response to feedback, an EPO that considered human health had been added to the EP. Woodside advised the EP noted that the AR6-WGII contained information about projected impacts to health and wellbeing for the Australasian region. Woodside advised impacts on human health can not be specifically be attributed to GHG emissions associated with the activities under this EP.
  - **(23)** Did not agree with DEA's assertion regarding greenwashing and noted the seriousness of the allegation. Woodside advised the UN standards mentioned were not intended to apply as requirements of a facility operator's management plans for a specific activity.
  - **(23)** For clarification, provided an update from the latest version of the EP regarding regulatory frameworks for onshore hydrocarbon processing, including updates on the WA State Government's GHG emissions policy, assessment of the North West Shelf Project Extension Proposal, and the EPA's environmental factor guideline.
  - **(15)** Noted the potential impacts of GHG emissions associated with the operations and carbon budgets estimated to achieve the goals of the Paris Agreement were assessed in the EP. Woodside advised removal of GHG from the atmosphere at a later date was outside the scope of the activity under the EP, and Woodside did not comment on technology or projects that may be utilised between 2050 and 2100 for carbon drawdown. Woodside confirmed GHG emissions associated with Pluto had been assessed and were ALARP and acceptable.
  - **(16)** Noted the CTAP provided broad business context and internal plans and targets. Woodside further noted DEA made a serious allegation regarding greenwashing which Woodside understood to be an allegation Woodside had engaged in misleading or deceptive conduct. Woodside does not agree. Woodside confirmed it was otherwise aware of the UN High Level Expert Group on Net Zero Integrity Matters as well as a range of other forums, public dialogues and reports regarding purported greenwashing. Woodside confirmed it had recently participated in the Australian Senate Inquiry into Greenwashing and as per its statements at the Inquiry, Woodside took great care with its statements especially in relation to climate to change, so these statements were accurate and not misleading.
  - **(17)** Confirmed the Federal SGM implemented the Australian Government's policy for reducing emissions at Australian industrial facilities, including the Pluto offshore

facility and Woodside's onshore gas processing plants. Woodside confirmed avoiding and reducing GHG emissions was its priority, however offsetting emissions allowed Woodside to reduce net emissions while asset and technology plans were matured and implemented. Woodside set out further information on its carbon business and position on carbon credits.

- **(19)** Confirmed the contribution of GHG emissions associated with the Pluto activity to net global GHG concentrations was de minimis, and that it was inappropriate to compare total emissions of Scarborough and Pluto operations over their lifetime to a shorter-term Australian emission reduction goal. Woodside confirmed it did not comment on the significance of Australia's emission reduction targets.
- **(20)** In addition to information set out in its previous response regarding the UN High Level Expert Group on Net Zero Integrity Matters, Woodside set out responses to each of the examples of what non-state actors must include in net zero policies as suggested by DEA.
- **(22)** Disagreed with DEA's characterisation and referred DEA to previous responses on the topic of alleged greenwashing.

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
(1) Referred to another EP and Pluto Operations EP.	**(1)** **Woodside Assessment:** Acknowledged DEA's reference to another EP and Pluto Operations EP and that it had previously responded to issues raised by DEA on another EP. **Woodside Response:** Noted that DEA letter related to another EP and Pluto Operations EP.	**(1)** Not required.
(2) Understood Woodside is consulting on both EPs and that DEA considered itself to be a relevant person. DEA provided statements relating to its functions, interests and activities.	**(2)** **Woodside Assessment:** Woodside reviewed previous consultation with DEA for another EP and that consultation closed on Pluto Operations EP on 29 March 2024. Woodside acknowledges DEA's statements and document references regarding its functions, interests or activities but makes no comment as to the factual accuracy or otherwise of these documents. **Woodside Response:** Woodside noted previous consultation with DEA took place for another EP and that consultation closed on Pluto Operations EP on 29 March 2024. It also noted that consultation continues during the life of an EP and has a Management of Change and Review process in place should any feedback be received after EP acceptance identifies a measure or control that requires implementation or updates to meet intended outcome of	**(2)** Assessment of relevant persons is described in Appendix F, Table 1 of the EP.

	consultation. Based on feedback for this EP, DEA has been assessed as being a relevant person.	
(3) Woodside must provide relevant persons with sufficient information and reasonable period for consultation, and concerns raised by DEA so far have been inadequately addressed.	**(3)** **Woodside Assessment:** Woodside consults relevant persons in accordance with Regulation 25 of the Environment Regulations and assessed DEA as a relevant person for this EP after receiving feedback. Woodside has addressed concerns raised by DEA via direct responses provided on 14 May 2024, 9 July 2024 and 29 January 2025. **Woodside Response:** Woodside confirmed it consults relevant persons in accordance with Regulation 25 of the Environment Regulations to provide sufficient information and a reasonable period allowing them to make an informed assessment on their functions, interests or activities. Woodside assessed DEA as a relevant person for this EP after receiving feedback.	**(3)** DEA has been given sufficient information and a reasonable period in which to make an informed assessment of the possible consequences of the activity on its functions, interests or activities, as described in Section 5.4 of the EP.
(4) Supports position of no development of new fossil fuel resources.	**(4)** **Woodside Assessment:** Woodside recognises there is global demand for oil and gas and natural gas. **Woodside Response:** Woodside referred DEA to Section 4.2 Global demand for oil and gas (on pages 44 and 45) of Woodside's Climate Transition Action Plan and 2023 Progress Report available at Woodside's Climate Transition Action Plan and 2023 Progress Report. It noted that more granular detail relating to GHG emissions will be set out and assessed in the EP.	**(4)** Not required.

(5) Wants further information and opportunity to comment.	**(5)** **Woodside Assessment:** Woodside had consultation efforts in place including newspaper advertising campaign, social media campaign, community events and a tailored roadshow to support consulting relevant persons in the course of preparing this EP. **Woodside Response:** Woodside provided sufficient information and reasonable period of time for relevant persons to make an informed assessment of the proposed activities. Consultation activities included advertisements in The Australian, The West Australian, regional newspapers and Indigenous newspapers between 26 – 28 February 2024, a social media campaign across Facebook and Instagram in February 2024, community events with subject matter experts and information and tailored roadshow in the Pilbara during March and April 2024. The Pluto Operations EP consultation information sheet was published 26 February 2024.	**(5)** DEA has been given sufficient information and a reasonable period in which to make an informed assessment of the possible consequences of the activity on its functions, interests or activities, as described in Section 5.4 of the EP.
(6) Noted usage of NOPSEMA guidance materials to support consultation.	**(6)** **Woodside Assessment:** Woodside refers to NOPSEMA's guidance materials. **Woodside Response:** Woodside confirmed it refers to NOPSEMA's guidance material for its consultation methodology.	**(6)** Woodside's consultation methodology is described in Section 5 of the EP.
(7) Consultation materials do not address indirect impacts of GHG emissions, climate change impacts and health impacts.	**(7)** **Woodside Assessment:** Woodside noted information related to these concerns is available across a number of mostly publicly available sources; Commonwealth and State legislation which manages potential environment and culture features impacts and risks; Ministerial Conditions and associated management plans which address GHG emissions, air quality and cultural heritage and are approved by EPA or Minister for Environment; and generally publicly available approval documents for Pluto LNG and Karratha	**(7)** Not required.

	Gas Plant which are not new as they've been in place for existing operations. State and Federal legislation also manages the physical presence of onshore processing facilities, including in relation to environment and cultural heritage. For anthropogenic climate change, Woodside noted that climate change impacts cannot be attributed to any one activity or one project, as they are instead the result of global GHG emissions, minus global GHG sinks, that have accumulated in the atmosphere since the industrial revolution started. **Woodside Response:** Woodside referenced Commonwealth and State legislation which manages potential environment and culture features impacts and risks that is applied to onshore processing facilities. Atmospheric emissions tied to onshore processing, including the Pluto LNG and Karratha Gas Plant, are managed under the *WA Environmental Protection Act 1986,* State and Federal Aboriginal Heritage Legislation and the Federal EPBC Act. Pluto LNG is subject to approvals including relevant Ministerial Conditions and associated management plans (mostly publicly available) which address GHG emissions, air quality and cultural heritage and are approved by EPA or Minister for Environment. Approval documents for Pluto LNG and Karratha Gas Plant are generally publicly available and are not new as it has been in place for existing operations. State and Federal legislation also manages the physical presence of onshore processing facilities, including in relation to environment and cultural heritage. For anthropogenic climate change, Woodside noted that climate change impacts cannot be attributed to any one activity or one project, as they are instead the result of global GHG emissions, minus global GHG sinks, that have accumulated in the atmosphere since the industrial revolution started.	
(8) Concerns about health and wellbeing impacts of	**(8)** **Woodside Assessment:** Woodside does not consider that	**(8)** Potential impacts on human health are considered in

climate change and GHG emissions.	impacts on human health can be attributed to GHG emissions associated with the operations. Woodside has conducted an impact assessment of GHG emissions from the Pluto operations and measures to reduce emissions have been undertaken. The EP demonstrates that environmental impacts and risks will be reduced to ALARP and acceptable levels. **Woodside Response:** Woodside advised it does not consider that impacts on human health can be attributed to GHG emissions associated with the operations. Woodside noted in the EP that the AR6-WGII contained information about projected impacts to health and wellbeing for the Australasian region. An EPO that considers health has also been included in section 6.7.11 of the EP. This section of the EP considers human health impacts from the release of atmospheric emissions from the Pluto project and the risk is assessed as Negligible.	sections 6.7.10 and 6.7.11 of the EP.
(9) Climate change impacts, including those resulting from Scope 3 emissions, must be assessed in accordance with approved NOPSEMA program.	**(9)** **Woodside Assessment:** Woodside acknowledges climate science that states climate change is understood to be caused by the net cumulative global concentration of GHG in the atmosphere and changes in GHG concentration could not be attributed to any one activity or project. Therefore, Woodside does not accept the operations will contribute to the exacerbation of climate change impacts in Western Australia. **Woodside Response:** Woodside confirmed its view was that LNG could have a role in the energy transition, however, to facilitate a comparison against carbon budgets, a hypothetical assumption had been used in the EP where GHG emissions associated with the operations were hypothetically treated as additive, and the contribution was de minimis. Woodside confirmed climate change was recognised as a global issue, and, for reference, a contextual evaluation of climate change impacts was set out	**(9)** A contextual evaluation of climate change impacts is included in Section 6.7.10 of the EP.

	in detail in the EP. Woodside provided a list of relevant projections for climate change in Australia.	
(10) Provided list of needed information to make assessment.	**(10)** **Woodside Assessment:** Woodside has given DEA sufficient information in accordance with Regulation 25. In addition to the publicly available five-year revision of the EP and Woodside's previous responses, Woodside acknowledges there are publicly available documents to provide DEA with information it is seeking and noted the legislative requirements as well as broader requirements including those of the World Health Organisation that onshore gas processing is subject to. **Woodside Response:** Woodside confirmed the five-year revision of the EP was publicly available on NOPSEMA's website. Woodside noted that emissions associated with onshore gas processing were subject to a range of legislative requirements including those which consider and manage potential to impact on human health.	**(10)** Not required.
(11) Woodside only makes general statements around health, safety and environment.	**(11)** **Woodside Assessment:** Woodside notes that it has a suite of climate disclosures available for DEA to read and that climate change impacts cannot be attributed to any one activity or one project, as they are instead the result of global GHG emissions, minus global GHG sinks, that have accumulated in the atmosphere since the industrial revolution started. **Woodside Response:** Woodside responded that climate change impacts cannot be attributed to any one activity or one project, as they are instead the result of global GHG emissions, minus global GHG sinks, that have accumulated in the atmosphere since the industrial revolution started. Although the direct and indirect GHG emissions associated with Scarborough and Pluto cannot be linked to climate change impacts to the environment, a contextual evaluation	**(11)** GHG emissions are considered in Section 6.7.10 of the EP.

	of climate change impacts will be provided in the EPs. It encouraged DEA to read Woodside's suite of climate disclosures including Woodside's Climate Report 2021, Climate Report 2022 and Climate Transition Action Plan and 2023 Progress Report.	
(12) EP should not be accepted until Regulation 25 requirements are met.	**(12)** **Woodside Assessment:** Woodside disagrees with this assertion. Woodside has consulted DEA in accordance with Regulation 25. **Woodside Response:** Woodside responded that it disagreed with this assertion and that DEA had engaged in consultation with Woodside in accordance with Regulation 25.	**(12)** Not required.
(13) Due to the limited information provided by Woodside, and DEA's voluntary capacity, the information in DEA's consultation responses should not be taken to reflect its complete position or complete submissions on this EP. DEA reserves the right to make further submissions as capacity and information become available.	**(13)** **Woodside assessment:** Woodside has provided DEA with sufficient information. Woodside does not accept DEA's comments regarding capacity as its members appear to have had at their disposal a significant amount of information and DEA members also attended Woodside's AGM. **Woodside response:** Based on DEA's website, its members cite a significant volume of studies, scientific research and videos which demonstrate that DEA has access to information, and capacity and understanding of the information. A number of DEA members also attended Woodside's 2024 Annual General Meeting.	**(13)** Not required.
(14) As well as climate change harming human health: Oil and gas developments result in direct health harms from pollution including cancer, reproductive and human growth harms, disease and deaths etc; The destruction of sites of spiritual significance to First Nations people by fossil fuel developments	**(14)** **Woodside assessment:** Climate change impacts cannot be attributed to any one project and proposed activities are not anticipated to result in the destruction of sites of spiritual significance to First Nations people. **Woodside response:** Climate change impacts are the result of global GHG emissions and cannot be attributed to any one project.	**(14)** Potential impacts of climate change are described in Section 6.7.10 of the EP, and potential impacts of atmospheric emissions are assessed in Section 6.7.11 of the EP. Potential impacts on cultural features and heritage values are assessed in Section 4.9 of the EP.

compounds psychosocial harms.	Gas can play a role in the energy transition. The proposed petroleum activities for this EP are not anticipated to result in the destruction of sites of spiritual significance to First Nations people.	
(15) Any emissions produced from now will need to be removed from the atmosphere at a later date. At a minimum: Woodside's assessment of climate impacts associated with these projects should consider impact on global emissions over at least a 100-year period and preferably longer; Woodside must show how it will cause carbon drawdown (CDR) to remove all emissions that will be produced by the projects from the atmosphere in the long term, and enforceable measures must be imposed by the regulator to ensure this takes place.	**(15)** **Woodside assessment:** Woodside does not agree with DEA's assertions. The impacts of GHG emissions associated with the operations and carbon budgets estimated to achieve the goals of the Paris Agreement are assessed in the EP **Woodside response:** Woodside advised removal of GHG from the atmosphere at a later date, and technology or projects that may be utilised between 2050 and 2100 for carbon drawdown, were outside the scope of this EP. Woodside advised the additional information was available in Woodside's CTAP and 2023 Progress Report, and the impact of GHG emissions associated with the operations and the demonstration of ALARP and Acceptability were set out in the EP.	**(15)** GHG emissions are considered in Section 6.7.10 of the EP.
(16) The CTAP and 2023 Progress Report (and climate plans in general) cannot be relied upon as a basis for assessment of the acceptability of carbon pollution or climate change impacts of the proposed activities because: The plans and targets are unenforceable; The Report amounts to greenwash because it does not address numerous requirements of the UN standards and ISO Guidelines for Net Zero; The plans have repeatedly been rejected by Woodside's shareholders.	**(16)** **Woodside assessment:** Woodside does not agree with DEA's position. Woodside's Climate Transition Action Plan and 2023 Progress Report provides business context and internal plans and targets – it is not enforceable by NOPSEMA. Commitments required to meet the OPGGS(E)R are contained in the Scarborough Operations EP - enforceable by NOPSEMA. **Woodside response:** Woodside advised it was targeting a reduction of net equity Scope 1 and 2 GHG emissions of 15% by 2025 and 30% by 2030, with an aspiration of net zero by 2050 or sooner; referred DEA to section 3.3 of Woodside's CTAP and 2023 Progress Report; and confirmed it does not agree with DEA's claim regarding greenwash.	**(16)** Not required.

(17) Reliance on the Federal SGM as a means to align with Australian national emissions goals is inappropriate because of: Australia's national emission reduction goals and legislated carbon emissions budget are not aligned with the temperature goals of the Paris Agreement; Ongoing project emissions beyond 2030 reduction targets; Emissions that will result from these projects in other countries outside of Australia; Potential use of low integrity undisclosed offsets.	**(17)** **Woodside assessment:** Woodside does not agree with DEA's position. The Safeguard Mechanism is the Australian Government's policy for reducing emissions at Australia's largest industrial facilities. **Woodside response:** Woodside provided information on its approach to climate strategy and carbon offsets. Woodside noted emissions associated with anticipated third-party consumption of Scarborough gas outside Australia were subject (where relevant) to the relevant customer nations' Paris NDCs.	**(17)** Information on the SGM is set out in Section 6.7.10 of the EP.
(18) If comparisons to Australia's emissions reduction targets and budget are to be used, then the total emissions from the proposed activities (not just domestic emissions) should be compared with Australia's abatement efforts and policies.	**(18)** **Woodside's assessment:** Woodside does not agree with DEA's comments. Emissions arising from the consumption of Pluto along with other feed sources in customer markets will be considered under domestic and international emissions control frameworks. **Woodside's response:** Woodside advised anticipated customers of gas from Pluto were in countries that had ratified the Paris Agreement. Under the Paris Agreement and global GHG accounting conventions, each country is responsible for accounting for, reporting and reducing emissions that physically occur in its jurisdiction.	**(18)** Not required
(19) DEA does not accept the argument that the total emissions from the proposals (i.e. this EP and another Woodside EP) is an insignificant contribution to the global carbon budget and therefore should not be considered unacceptable as, if this were true, Australia's entire national abatement efforts to 2030, including abatement from all sources, is also insignificant.	**(19)** **Woodside assessment:** Woodside does not agree with DEA's comments as while Woodside acknowledges climate change is understood to be caused by the net (cumulative) global concentration of GHG in the atmosphere, changes in global atmospheric GHG concentration cannot be attributed to any one project. **Woodside response:** Woodside confirmed the contribution of GHG emissions associated with the Pluto activity to net global GHG concentrations was de minimis, and it was not	**(19)** Not required

	appropriate to conflate emissions associated with the project's lifecycle, including those originating internationally, with Australia's abatement efforts or targets.	
(20) Woodside must adhere to the UN's and the ISO's guidelines in relation to its proposed activities as part of any assessment on the impacts on the climate and on DEA's activities and interests under the Regulations.	**(20)** **Woodside assessment:** Woodside does not agree with DEA's position. There are no regulatory requirements to apply the frameworks mentioned by DEA. **Woodside response:** Woodside acknowledged DEA's comments but does not agree with DEA's position and referred DEA to Section 2.3.6 of the EP which defines criteria for demonstration of acceptability.	**(20)** Section 2.3.6 of the EP defines criteria for demonstration of acceptability.
(21) Woodside should provide further information to address DEA's concerns and demonstrate that the impacts of the proposed activities will be managed to a level that is acceptable to DEA.	**(21)** **Woodside assessment:** Woodside is required to manage impacts of the proposed activities in accordance with the OPGGS (Environment) Regulations and determined by NOPSEMA. **Woodside response:** The acceptability of the proposed activities will be determined by NOPSEMA pursuant to the OPGGS (Environment) Regulations.	**(21)** Section 2.3.6 of the EP defines criteria for demonstration of acceptability.
(22) Claims Woodside had not provided information that shows its net zero plans were compliant and its abatement activities and net zero plans amounted to greenwash.	**(22)** **Woodside assessment:** Woodside does not agree with DEA's characterisation and notes DEA makes a serious allegation towards Woodside. Woodside does not claim to be net zero but has an aspiration for net zero net equity emissions by 2050. **Woodside response:** Woodside confirmed it carefully considered and verified its statements. Woodside provided DEA with a link to the fact checker on Woodside's website, as well as information on the recent Australian Senate Inquiry into Greenwashing and Woodside's corporate emissions reduction targets.	**(22)** Not required.
(23)	**(23)**	**(23)**

Claims the Pluto GGAP is an example of greenwash and the EPA had informed the WA Minister for Environment that the plan was no longer adequate.	**Woodside assessment:** Woodside does not agree with DEA's position. The guidelines mentioned are not intended to apply as requirements of a facility operator's management plans for a specific activity. GHG emissions associated with onshore hydrocarbon processing are regulated under both Commonwealth and State legislation. **Woodside response:** Woodside provided an overview of regulatory frameworks for onshore processing, including updates on the WA Government's GHG policy and the EPA's environmental factors guideline. Woodside noted amendments were anticipated to Ministerial Statement 1208 to align with conditions of other major projects.	Not required.
Woodside has addressed objections and claims as noted above.	Woodside engages in ongoing consultation throughout the life of an EP. Woodside notes that further feedback may be received as part of ongoing consultation. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	Woodside considers the measures and controls in the EP are appropriate.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with FARA for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given DEA sufficient information to allow DEA to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since February 2024. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.

  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with regulation 25(4) of the Environment Regulations).
- On 24 April 2024, DEA self-identified for this EP.
- Woodside provided DEA with further detailed information which addressed DEA's specific feedback, objections or claims (see information given on 14 May 2024, 9 July 2024, and 31 January 2025.

Reasonable Period

Woodside allowed DEA a reasonable period for consultation in the preparation of this EP because:

- Consultation for this EP commended 13 months ago in February 2024.
- DEA self identified for this EP on 24 April 2024.
- In this context, Woodside allowed DEA a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with DEA is appropriate and adapted to the nature of interests of DEA:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This is appropriate and adapted to DEA because Woodside notes DEA regularly uses social media as a means to share its views. This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside engaged with DEA in the manner that DEA has consulted in previous consultations, that is, by email.
- Woodside considers a reasonable opportunity was provided to DEA as evidenced by the self-identification on 24 April 2024.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- DEA provided feedback or objections or claims about the adverse impact of the activity to which the EP relates. In line with the intended outcome of consultation as set out in Section 5.2 and regulations 24 and 34(g), Woodside has:
  - Responded to feedback from DEA and has assessed the merits of any objection or claim about the adverse impact of the proposed activities to which this EP relates.
  - In response to feedback, an EPO that considered human health had been added to the EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.

Telstra

Summary of information provided and record of consultation for this EP:

- On 27 February 2024, Woodside emailed Telstra advising of the proposed activity (Record of Consultation, reference 2.25), provided a Consultation Information Sheet, a map of the Submarine Communications Cables and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- On 12 March 2024, Telstra emailed Woodside requesting to be contacted regarding an email received (SI Report, reference 10.1).
- On 12 March 2024, Woodside asked Telstra to confirm which activity its email related to (SI Report, reference 10.2).
- On 13 March 2024, Telstra confirmed contacting Woodside in relation to this EP (SI Report, reference 10.3).
- On 13 March 2024, Woodside enquired about Telstra's request (SI Report, reference 10.4).
- **(1)** On 14 March 2024, Telstra requested to be contacted to understand the impact of the activities on its network (SI Report, reference 10.5).
- **(1)** On 25 March 2024, Woodside advised the North West Shelf cable operated by Telstra is in the vicinity of the operational area and the new activities are located approximately 12km from the nearest cable (SI Report, reference 10.6). A map of the Submarine Communications Cables was attached, as previously provided to Telstra.
- **(2)** On 2 April 2024, Telstra forwarded its Duty of Care brochure and requested Woodside contact Telstra should the network be impacted by the activities (SI Report, reference 10.7).
- **(2)** On 3 April 2024, Woodside confirmed it will contact Telstra should the network be impacted by the activities covered under this EP (SI Report, reference 10.8).
- On 27 March 2024, Woodside provided an activity update to Telstra regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.5).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
(1) Impact of activities on Telstra's network.	**(1)** **Woodside assessment:** Woodside reviewed the map of the Submarine Communications Cables to provide a detailed response. **Woodside response:** Woodside provided another copy of the map and advised the North West Shelf cable operated by Telstra is in the vicinity of the operational area and the new activities are located approximately 12km from the nearest cable.	**(1)** Not required.

(2) Telstra requested to be notified.	**(2)** **Woodside assessment:** Woodside will provide notifications to relevant stakeholders as outlined in Table 7-6 of this EP. **Woodside response:** Woodside confirmed it will contact Telstra should the network be impacted by the activities.	**(2)** Woodside will provide notification of significant change, as appropriate, to Telstra, as referenced in Table 7-6 of the EP.
While feedback has been received, there were no objections or claims.	Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under Regulation 24. Woodside engages in ongoing consultation throughout the life of an EP. Woodside notes that further feedback may be received as part of ongoing consultation. Should further feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with Telstra for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient information

Woodside has given Telstra sufficient information to allow Telstra to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to Telstra on 27 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.

  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with regulation 25(4) of the Environment Regulations).
- On 14 March 2024, Telstra consulted and shared its feedback, claims or objections regarding this activity, indicating the information provided was sufficient to enable Telstra to make an informed assessment of the possible consequences of the activity on its functions, interests or activities.
- In addition to the information provided in the Consultation Information Sheet, Woodside provided Telstra with a map of submarine cables and further information in response to Telstra's feedback (email of 25 March 2024).

Reasonable Period

Woodside allowed Telstra a reasonable period for consultation in the preparation of this EP because:

- Consultation for this EP commended 13 months ago in February 2024.
- A consultation period was stated in the initial correspondence to Telstra advising of consultation as well as when consultation closed for the purposes of the preparation of the EP. This enabled Woodside to assess feedback before EP submission.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed Telstra 30 days for consultation.
- In this context, Woodside allowed Telstra a reasonable period for consultation in preparation of the EP as evidenced by its response on 14 March 2024.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with Telstra is appropriate and adapted to the nature of interests of Telstra:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside considers a reasonable opportunity was provided to Telstra as evidenced by its response on 14 March 2024.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- Telstra provided feedback but no objections or claims. In line with the intended outcome of consultation as set out in Section 5.2 and regulations 24 and 34(g), Woodside has:
  - Responded to feedback from Telstra.
  - Made no changes or inclusions to the EP as a result of consultation with Telstra because appropriate measures are already included in the EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.

Vocus

Summary of information provided and record of consultation for this EP:

- On 27 February 2024, Woodside emailed Vocus advising of the proposed activity (Record of Consultation, reference 2.25), provided a Consultation Information Sheet, a map of the Submarine Communications Cables and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 19 March 2024, as no response had been received, Woodside proactively sent an email reminder to Vocus, following up on the proposed activity (Record of Consultation, reference 3.3) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to Vocus regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Vocus for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given Vocus sufficient information to allow Vocus to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to Vocus on 27 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.

- Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed Vocus a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to Vocus advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed Vocus 30 days for consultation. For consultation on EPs, 30 days is the usual period for Vocus.
- In this context, Woodside allowed Vocus a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with Vocus is appropriate and adapted to the nature of interests of Vocus:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- In the absence of feedback. Woodside proactively sent a follow-up consultation email on 19 March 2024, reminding Vocus of the opportunity to provide feedback.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as Vocus did not provide feedback for this EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on Vocus' functions, interests or activities.

Research institutes and local conservation groups or organisations

Cape Conservation Group (CCG)

Summary of information provided and record of consultation for this EP:

- On 27 February 2024, Woodside emailed CCG advising of the proposed activity (Record of Consultation, reference 2.26), provided a Consultation Information Sheet,

and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*

- On 19 March 2024, as no response had been received, Woodside proactively sent an email reminder to CCG, following up on the proposed activity (Record of Consultation, reference 3.3) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to CCG regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with CCG for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given CCG sufficient information to allow CCG to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to CCG on 27 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed CCG a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to CCG advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.
- Woodside's methodology allows a 30-day consultation period and Woodside allowed CCG 30 days for consultation. For consultation on EPs, 30 days is the usual period for CCG.
- In this context, Woodside allowed CCG a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with CCG is appropriate and adapted to the nature of interests of CCG:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This is appropriate and adapted to CCG because Woodside notes CCG regularly uses social media as a means to share its views. This allowed for broad awareness of the activity under the EP and also of consultation.
- In the absence of feedback, Woodside proactively sent a follow-up consultation email on 19 March 2024, reminding CCG of the opportunity to provide feedback.
- Woodside acknowledges CCG is a member of the Exmouth CLG, which was consulted for the preparation of this EP.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as CCG did not provide feedback for this EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on CCG's functions, interests or activities.

Protect Ningaloo

Summary of information provided and record of consultation for this EP:

- On 27 February 2024, Woodside emailed Protect Ningaloo advising of the proposed activity (Record of Consultation, reference 2.26), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 19 March 2024, as no response had been received, Woodside proactively sent an email reminder to Protect Ningaloo, following up on the proposed activity (Record of Consultation, reference 3.3) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to Protect Ningaloo regarding wells location coordinates and included an updated Consultation Information

Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objection or claim about the adverse impact of the activity received despite follow-up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Protect Ningaloo for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 5.4 of the EP and further summarised in the Consultation Approach above. Specifically:

Sufficient Information

Woodside has given Protect Ningaloo sufficient information to allow Protect Ningaloo to make an informed assessment of the possible consequences of the activity on its functions, interests and activities because:

- The Consultation Information Sheet for this EP has been publicly available on the Woodside website since Friday 23 February 2024. Woodside provided this information to Protect Ningaloo on 27 February 2024, marking the commencement of consultation on this EP. The Consultation Information Sheet included:
  - The purpose of consultation and set out what was being sought through consultation.
  - A summary of the activity description, location of the activity, timeframe of the activity, receiving environment, impacts and risks associated with the PAP, and proposed mitigation and management measures.
  - A timeframe for consultation and the provision of feedback.
  - A link to NOPSEMA's brochure Consultation on offshore petroleum environment plans.
  - Advice that relevant persons can request that particular information provided during consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period

Woodside allowed Protect Ningaloo a reasonable period for consultation in the preparation of this EP because:

- A consultation period was stated in the initial correspondence to Protect Ningaloo advising of consultation as well as when consultation would close for the purposes of preparing the EP. This enabled Woodside to assess feedback before EP submission.
- Consultation for this EP commended 13 months ago in February 2024.

- Woodside's methodology allows a 30-day consultation period and Woodside allowed Protect Ningaloo 30 days for consultation. For consultation on EPs, 30 days is the usual period for Protect Ningaloo.
- In this context, Woodside allowed Protect Ningaloo a reasonable period for consultation in preparation of the EP.

Reasonable Opportunity

A reasonable opportunity to provide feedback has been provided because Woodside's approach to consultation with Protect Ningaloo is appropriate and adapted to the nature of interests of Protect Ningaloo:

- Woodside published advertisements in 6 national, state, and relevant local newspapers (see Consultation Activities). This allowed for broad awareness of the activity under the EP and also of consultation.
- Woodside ran 1 targeted social media campaign (see Consultation Activities). This is appropriate and adapted to Protect Ningaloo because Woodside notes Protect Ningaloo regularly uses social media as a means to share its views. This allowed for broad awareness of the activity under the EP and also of consultation.
- In the absence of feedback. Woodside proactively sent a follow-up consultation email on 19 March 2024, reminding Protect Ningaloo of the opportunity to provide feedback.
- Protect Ningaloo is a joint project of the CCG, CCWA and AMCS which was consulted for the preparation of this EP.

Outcomes of Consultation

Woodside has assessed the merits of each objection or claim (if any) about the adverse impact of the activity to which the EP relates, as required under regulation 24. The measures (if any) that Woodside has adopted or proposes to adopt because of the consultation are appropriate because:

- No additional measures were considered as a result of consultation as Protect Ningaloo did not provide feedback for this EP.
- Woodside will continue to accept and assess feedback throughout the life of the EP and apply its Management of Change and Revision process when applicable.
- The measures and controls described in this EP address the potential impact from the proposed activity on Protect Ningaloo's functions, interests or activities.

Table 3: Engagement Report with Persons and Organisations Assessed as Not Relevant

Commonwealth commercial fisheries and representative bodies

Australian Southern Bluefin Tuna Industry Association (ASBTIA)

Summary of information provided and record of consultation for this EP:

- On 26 February 2024, Woodside emailed ASBTIA advising of the proposed activity (Record of Consultation, reference 2.14), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- On 18 March 2024, Woodside sent an email reminder to ASBTIA, following up on the proposed activity (Record of Consultation, reference 3.2) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to ASBTIA regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objections or claims received despite follow up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

While ASBTIA is not a relevant person under regulation 25 of the Environment Regulations, Woodside considers it has still provided sufficient information and a reasonable period outside of regulatory requirements for ASBTIA to provide feedback during the consultation process.

Tuna Australia

Summary of information provided and record of consultation for this EP:

- On 27 February 2024, Woodside emailed Tuna Australia advising of the proposed activity (Record of Consultation, reference 2.14), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- On 28 February 2024, Tuna Australia emailed Woodside (SI Report, reference 11.1) and:

- **(1)** provided its industry position statement.
- **(2)** requested a service agreement to assist Woodside meeting its consultation requirements. **(2)** The consultation regulations do not require Woodside to enter into service agreements in order to engage in consultation or for an EP to be complete.

- **(1)** On 3 April 2024, Woodside thanked Tuna Australia for providing its position statement and provided an activity update regarding wells location coordinates and included an updated Consultation Information Sheet (SI Report, reference 11.2).

Summary of Feedback, Objection or Claim	**Assessment of Merits of Feedback, Objection or Claim and Woodside's Response**	**Inclusion in Environment Plan**
(1) Provided its industry position statement.	**(1)** **Woodside assessment:** Woodside previously received and reviewed the position statement. **Woodside response:** Woodside thanked Tuna Australia for sending its position statement.	**(1)** Not required.
(2) Recommended entering into a Service Agreement to support consultation.	**(2)** **Woodside assessment:** The Environment Regulations do not require the entry into a fee for service agreement in order to meet Environment Plan consultation requirements. **Woodside response:** Woodside responded to Tuna Australia during consultation on another EP. Woodside respects that, for a relevant person, consultation is voluntary. Woodside advised Tuna Australia the level of feedback provided by an organisation, if any, was at the person or organisation's discretion, and Woodside was open to suggestions from Tuna Australia on ways to improve efficiency and simplicity for feedback.	**(2)** Not required.
Woodside has addressed objections and claims as noted above.	Woodside engages in ongoing consultation throughout the life of an EP. Woodside notes that further feedback may be received as part of ongoing consultation. Should further feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

While Tuna Australia is not a relevant person under regulation 25 of the Environment Regulations, Woodside considers it has still provided sufficient information and a reasonable period outside of regulatory requirements for Tuna Australia to provide feedback during the consultation process.

Other non-government groups or organisations

350 Australia (350A)

Summary of information provided and record of consultation for this EP:

- On 27 February 2024, Woodside emailed 350A advising of the proposed activity (Record of Consultation, reference 2.24), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 19 March 2024, Woodside sent an email reminder to 350A, following up on the proposed activity (Record of Consultation, reference 3.3) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to 350A regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).
- **(1)** On 28 March 2024, 350A emailed Woodside stating it had not been consulted adequately on the Scarborough Offshore Facility and Trunkline (Operations) EP (SI Report, reference 29.1).
- **(1)** On 2 April 2024, Woodside responded to 350A seeking clarification as to whether it was providing feedback on this EP as it had already consulted 350A on the Scarborough Operations EP (SI Report, reference 29.2).
- On 10 May 2024, Woodside emailed 350A to advise consultation for this EP has closed (SI Report, reference 29.3).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
(1) 350A stated it has not been consulted adequately on Scarborough Offshore Facility and Trunkline (Operations) EP.	**(1)** **Woodside assessment:** The activities covered under the Scarborough Offshore Facility and Trunkline (Operations) EP are not relevant for this EP. Woodside consulted 350A for the Scarborough Offshore Facility and Trunkline (Operations) EP separately. **Woodside response:** Woodside sought clarification from 350A on which EP the feedback relates to.	**(1)** Not required.
Woodside has addressed objections and claims as noted above.	Woodside engages in ongoing consultation throughout the life of an EP. Woodside notes that further feedback may be received as part of ongoing consultation. Should further feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.
Summary Report – Consultation Complete		
While 350A is not a relevant person under regulation 25 of the Environment Regulations, Woodside considers it has still provided sufficient information and a reasonable		

period outside of regulatory requirements for 350A to provide feedback during the consultation process.

Australian Conservation Foundation (ACF)

Summary of information provided and record of consultation for this EP:

- On 27 February 2024, Woodside emailed ACF advising of the proposed activity (Record of Consultation, reference 2.24), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 19 March 2024, Woodside sent an email reminder to ACF, following up on the proposed activity (Record of Consultation, reference 3.3) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to ACF regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objections or claims received despite follow up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

While ACF is not a relevant person under regulation 25 of the Environment Regulations, Woodside considers it has still provided sufficient information and a reasonable period outside of regulatory requirements for ACF to provide feedback during the consultation process.

Australian Marine Conservation Society (AMCS)

Summary of information provided and record of consultation for this EP:

- On 27 February 2024, Woodside emailed AMCS advising of the proposed activity (Record of Consultation, reference 2.24), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- On 19 March 2024, Woodside sent an email reminder to AMCS, following up on the proposed activity (Record of Consultation, reference 3.3) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to AMCS regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objections or claims received despite follow up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.
Summary Report – Consultation Complete		
While AMCS is not a relevant person under regulation 25 of the Environment Regulations, Woodside considers it has still provided sufficient information and a reasonable period outside of regulatory requirements for AMCS to provide feedback during the consultation process.		

Conservation Council of Western Australia (CCWA)

Summary of information provided and record of consultation for this EP:

- On 27 February 2024, Woodside emailed CCWA advising of the proposed activity (Record of Consultation, reference 2.24), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- On 19 March 2024, Woodside sent an email reminder to CCWA, following up on the proposed activity (Record of Consultation, reference 3.3) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to CCWA regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objections or claims received despite follow up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.
Summary Report – Consultation Complete		
While CCWA is not a relevant person under regulation 25 of the Environment Regulations, Woodside considers it has still provided sufficient information and a reasonable period outside of regulatory requirements for CCWA to provide feedback during the consultation process.		

Greenpeace Australia Pacific (GAP)

Summary of information provided and record of consultation for this EP:

- On 27 February 2024, Woodside emailed GAP advising of the proposed activity (Record of Consultation, reference 2.24), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 19 March 2024, Woodside sent an email reminder to GAP, following up on the proposed activity (Record of Consultation, reference 3.3) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to GAP regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objections or claims received despite follow up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

While GAP is not a relevant person under regulation 25 of the Environment Regulations, Woodside considers it has still provided sufficient information and a reasonable period outside of regulatory requirements for GAP to provide feedback during the consultation process.

Australasian Centre for Corporate Responsibility (ACCR)

Summary of information provided and record of consultation for this EP:

- On 27 February 2024, Woodside emailed ACCR advising of the proposed activity (Record of Consultation, reference 2.24), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 19 March 2024, Woodside sent an email reminder to ACCR, following up on the proposed activity (Record of Consultation, reference 3.3) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to ACCR regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objections or claims received despite follow up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete
While ACCR is not a relevant person under regulation 25 of the Environment Regulations, Woodside considers it has still provided sufficient information and a reasonable period outside of regulatory requirements for ACCR to provide feedback during the consultation process.

Market Forces

Summary of information provided and record of consultation for this EP:

- On 27 February 2024, Woodside emailed Market Forces advising of the proposed activity (Record of Consultation, reference 2.24), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 19 March 2024, Woodside sent an email reminder to Market Forces, following up on the proposed activity (Record of Consultation, reference 3.3) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to Market Forces regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objections or claims received despite follow up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete
While Market Forces is not a relevant person under regulation 25 of the Environment Regulations, Woodside considers it has still provided sufficient information and a reasonable period outside of regulatory requirements for Market Forces to provide feedback during the consultation process.

Research institutes and local conservation groups or organisations

University of Western Australia (UWA)

Summary of information provided and record of consultation for this EP:

- On 27 February 2024, Woodside emailed UWA advising of the proposed activity (Record of Consultation, reference 2.26), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 19 March 2024, Woodside sent an email reminder to UWA, following up on the proposed activity (Record of Consultation, reference 3.3) and included a link to the

Consultation Information Sheet on Woodside's website.

- On 27 March 2024, Woodside provided an activity update to UWA regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objections or claims received despite follow up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

While UWA is not a relevant person under regulation 25 of the Environment Regulations, Woodside considers it has still provided sufficient information and a reasonable period outside of regulatory requirements for UWA to provide feedback during the consultation process.

Curtin University

Summary of information provided and record of consultation for this EP:

- On 27 February 2024, Woodside emailed Curtin University advising of the proposed activity (Record of Consultation, reference 2.26), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 19 March 2024, Woodside sent an email reminder to Curtin University, following up on the proposed activity (Record of Consultation, reference 3.3) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to Curtin University regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objections or claims received despite follow up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

While Curtin University is not a relevant person under regulation 25 of the Environment Regulations, Woodside considers it has still provided sufficient information and a reasonable period outside of regulatory requirements for Curtin University to provide feedback during the consultation process.

Edith Cowan University (ECU)

Summary of information provided and record of consultation for this EP:

- On 27 February 2024, Woodside emailed ECU advising of the proposed activity (Record of Consultation, reference 2.26), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 19 March 2024, Woodside sent an email reminder to ECU, following up on the proposed activity (Record of Consultation, reference 3.3) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to ECU regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objections or claims received despite follow up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.

Summary Report – Consultation Complete

While ECU is not a relevant person under regulation 25 of the Environment Regulations, Woodside considers it has still provided sufficient information and a reasonable period outside of regulatory requirements for ECU to provide feedback during the consultation process.

Murdoch University

Summary of information provided and record of consultation for this EP:

- On 27 February 2024, Woodside emailed Murdoch University advising of the proposed activity (Record of Consultation, reference 2.26), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- On 19 March 2024, Woodside sent an email reminder to Murdoch University, following up on the proposed activity (Record of Consultation, reference 3.3) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to Murdoch University regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objections or claims received despite follow up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and,	No additional measures or controls are required.

	where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	
Summary Report – Consultation Complete		
While Murdoch University is not a relevant person under regulation 25 of the Environment Regulations, Woodside considers it has still provided sufficient information and a reasonable period outside of regulatory requirements for Murdoch University to provide feedback during the consultation process.		

Western Australian Marine Science Institution (WAMSI)

Summary of information provided and record of consultation for this EP:

- On 18 March 2024, Woodside emailed WAMSI advising of the proposed activity (Record of Consultation, reference 2.26), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 2 April 2024, Woodside sent an email reminder to WAMSI, following up on the proposed activity and provided an activity update regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.8).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objections or claims received despite follow up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.
Summary Report – Consultation Complete		
While WAMSI is not a relevant person under regulation 25 of the Environment Regulations, Woodside considers it has still provided sufficient information and a reasonable period outside of regulatory requirements for WAMSI to provide feedback during the consultation process.		

Commonwealth Scientific and Industrial Research Organisation (CSIRO)

Summary of information provided and record of consultation for this EP:

- On 27 February 2024, Woodside emailed CSIRO advising of the proposed activity (Record of Consultation, reference 2.26), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- On 19 March 2024, Woodside sent an email reminder to CSIRO, following up on the proposed activity (Record of Consultation, reference 3.3) and included a link to the Consultation Information Sheet on Woodside's website.
- On 27 March 2024, Woodside provided an activity update to CSIRO regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.6).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
No feedback, objections or claims received despite follow up.	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	No additional measures or controls are required.
Summary Report – Consultation Complete		
While CSIRO is not a relevant person under regulation 25 of the Environment Regulations, Woodside considers it has still provided sufficient information and a reasonable period outside of regulatory requirements for CSIRO to provide feedback during the consultation process.		

Australian Institute of Marine Science (AIMS)

Summary of information provided and record of consultation for this EP:

- On 27 February 2024, Woodside emailed AIMS advising of the proposed activity (Record of Consultation, reference 2.26), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- On 8 March 2024, AIMS emailed Woodside (SI Report, reference 4.1) and:
  - **(1)** confirmed it has no operations occurring in the area.
  - **(2)** requested to be informed if the activity location changes.
- **(1,2)** On 12 March 2024, Woodside thanked AIMS for its feedback and confirmed it will provide AIMS with updates (SI Report, reference 4.2).
- On 27 March 2024, Woodside provided an activity update to AIMS regarding wells location coordinates and included an updated Consultation Information Sheet (Record of Consultation, reference 3.5).
- **(1)** On 8 April 2024, AIMS emailed Woodside and confirmed the activities will not disrupt AIMS operations (SI Report, reference 4.3).
- **(1)** On 9 April 2024, Woodside thanked AIMS for reviewing the information (SI Report, reference 4.4).

Summary of Feedback, Objection or Claim	Assessment of Merits of Feedback, Objection or Claim and Woodside's Response	Inclusion in Environment Plan
(1) AIMS confirmed the activities will not disrupt its operations.	**(1)** **Woodside assessment:** Woodside noted AIMS feedback. **Woodside response:** Woodside thanked AIMS for confirming it has no operations in the area.	**(1)** Not required.
(2)	**(2)**	**(2)**

AIMS requested to be notified.	**Woodside assessment:** Woodside will provide notifications to relevant stakeholders as outlined in Table 7-6 of this EP. **Woodside response:** Woodside confirmed it will contact AIMS should the activity location change.	Woodside will provide notification of significant change, as appropriate, to AIMS, as referenced in Table 7-6 of the EP.
While feedback has been received, there were no objections or claims.	Woodside engages in ongoing consultation throughout the life of an EP. Woodside notes that further feedback may be received as part of ongoing consultation. Should further feedback be received after the EP has been accepted, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.3.2 of this EP).	Woodside considers the measures and controls in the EP are appropriate.
Summary Report – Consultation Complete		
While AIMS is not a relevant person under regulation 25 of the Environment Regulations, Woodside considers it has still provided sufficient information and a reasonable period outside of regulatory requirements for AIMS to provide feedback during the consultation process.		

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1. INFORMATION SHEETS

1.1 Consultation Information Sheet

Woodside Energy

CONSULTATION

INFORMATION SHEET

February 2024

PLUTO FACILITY OPERATIONS ENVIRONMENT PLAN

CARNARVON BASIN, NORTH-WEST AUSTRALIA

Woodside consults relevant persons in the course of preparing an environment plan (EP) to notify them, obtain their input and to assist Woodside to confirm current measures or identify additional measures, if any, that could be taken to lessen or avoid potential adverse effects of the proposed activity on the environment. This is the intended outcome of consultation.

Woodside's aim is to ensure the activity is carried out in a manner that is consistent with the principles of ecologically sustainable development (ESD), by which the environmental impacts and risks of the activity are reduced to as low as reasonably practicable (ALARP) and of an acceptable level. Woodside wants relevant persons whose functions, interests or activities may be affected by the proposed activity to have the opportunity to provide feedback on our proposed activity, in accordance with the intended outcome of consultation.

Overview

Woodside will submit a five-year revision of the Operations EP for the Pluto Facility (Pluto) located in Commonwealth waters, in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023* (Cth) (regulations). The Operations EP currently covers the operation of a fixed platform (Pluto) and subsea infrastructure connected to the Pluto, Xena and Pyxis reservoirs. The Operations EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Xena-03 well into the existing Pluto production systems.

Location and Operations

The Pluto platform and associated subsea infrastructure is located in Production Licenses WA-1-IL and WA-34-L. The export pipeline and flowline are within Pipeline Licenses WA-17-PL and WA 16 PL, respectively (see **Figure 1**).

The Xena-03 well is located in Production Licence WA 34 L, around 15km from the Pluto Platform and around 190km west north-west of Dampier. The Xena-03 well will be located around 2 km from the existing Xena-02 well and tied back to the existing Pluto production systems.

The Pluto facility commenced production in 2012. The facility produces wet gas and condensate, which is transported for processing at the onshore Pluto LNG Plant via a 180km long export pipeline. The Pluto platform is a not-normally-manned facility, with remote operation from a fixed operator console at the Pluto onshore Central Control Room (CCR), which is constantly manned.

Installation of a water handling module on the platform is underway to enable the processing and discharge of produced water at the platform. Wet gas will be processed through the water handling module and transported onshore, with treated water discharged overboard.

Table 1 summarises the activities, which will be managed under the Operations EP.

Proposed Activity Overview – Production / Operations

The production scope includes the following activities to be undertaken during the next five-year period:

- Routine production
- Routine inspection, monitoring, maintenance and repair (IMMR) activities
- Commissioning and operation of the water handling module
- Non-routine and unplanned activities and incidents associated with the above.

Future decommissioning of infrastructure will be subject to separate future EPs.

Production

Production commenced from the Pluto facility in 2012 and is currently expected to continue until at least 2031. Production is planned to commence from the Xena-03 well around Q3 2025.

Inspection

Inspection of infrastructure is the process of physical verification and assessment of subsea components to detect changes compared to its installed state. Typical site inspection activities include visual surveys via a remotely operated vehicle, side scan sonar surveillance, cathodic protection measurements and ultrasonic pipe condition checks.

Monitoring

Monitoring is the surveillance of the physical and chemical environment around subsea infrastructure. Monitoring activities may include process composition, corrosion probes, corrosion mitigation checks, and metocean and geological monitoring.

Maintenance

Maintenance of infrastructure is required at regular and/or planned intervals to maintain performance reliability and prevent deterioration or failure of equipment. Maintenance activities may include cycling of valves and leak pressure testing.

Repair

Repair activities are those required when a subsea system or component is degraded or damaged as defined by design codes.

Vessels

Operations support vessels will be used to undertake IMMR of subsea infrastructure. The vessel size and type will be dependent on the work scope. The vessels will not anchor during IMMR activities unless there is an unexpected event or an emergency. An Accommodation Support Vessel (ASV) may be required for short periods (typically less than 1 month) to support planned maintenance campaigns, shutdown maintenance or major projects.

Proposed Activity Overview – Drilling and Tie-Back

The scope for this EP includes drilling, completion, subsea installation (including minor changes to existing infrastructure) along with commissioning activities to bring in gas from the Xena-03 well to the Pluto platform. This includes directly installing infrastructure from the installation vessel in the relevant location.

Other contingent activities that Woodside may need to perform include well abandonment, re-spud, side-track, well suspension, well intervention, wireline logging, leaving wellhead assembly in situ, sediment mobilisation and relocation, venting, well test/unload and emergency disconnect sequence.

Drilling, subsea installation and commissioning activities

Woodside plans to drill one new well in the Xena field (Xena-03) and to install an associated wellhead and Xmas tree. Xena-03 will be connected to the existing Pyxis Hub subsea infrastructure. The well will be located at approximately 177 m water depth. Other activities include:

- Pre-commissioning and cold-commissioning (non-hydrocarbon) activities associated with subsea infrastructure including leak testing of the flexibles, subsea control systems verification and function-testing of valves to verify the production system and electric and hydraulic flying leads are ready for entry into the commissioning phase; and
- Well start-up and commissioning (initial start-up) of the Xena 03 well involving slow and gradual build up to maximum well gas production rates and then well performance testing such as Multi-Rate Testing, simulated emergency shut down (ESD) of the well followed by Pressure Build-Up Testing.

Drilling activities are currently anticipated to commence around Q2 2025, subsea installation and commissioning activities are currently anticipated around Q3 2025.

The timing and duration of the proposed activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.

Project vessels

Activities will be completed using a range of vessels. Operations will use support vessels to undertake inspection, monitor, maintenance and repair of subsea infrastructure. The vessel size and type will be dependent on the work scope.

The proposed Xena-03 drilling and tie-back will be performed using a moored, dynamically positioned (DP) or hybrid (DP/moored) mobile offshore drilling unit (MODU). During the subsea installation campaign, a construction/primary installation vessel will perform installation activities.

The project will be supported by other vessels, such as general support vessels, cargo vessels, anchor handling vessels and multiservice construction vessels during drilling activities. Support vessels will be used to transport equipment and materials between the MODU/installation vessel and port.

Drilling operations for the production well are currently expected to take around 60 days to complete.

Installation of subsea infrastructure and pre-commissioning is anticipated to commence when the relevant new production well has been drilled and is expected to have a cumulative duration of about three weeks. Drilling and installation of subsea infrastructure may be performed over multiple campaigns.

The support and installation vessels will operate on DP and will not anchor/moor on the seabed. It is anticipated vessels will operate 24 hours per day for the duration of drilling and tie-back activities.

Communications with mariners

The location of Pluto is marked on nautical charts and the platform is surrounded by a 500 m radius petroleum safety zone (PSZ). A 4 km radius Operational Area will be applied around the Xena-03 drill centre.

A temporary 500 m safety exclusion zone will apply around the MODU and subsea installation vessel to manage vessel movements.

Commercial fishers and other marine users are permitted to use the Operational Area but should take care when entering and remain clear of the safety exclusion zones. The wells will continue to be marked on navigational charts.

Assessment

Woodside has undertaken an assessment to identify potential risks to the marine environment and relevant persons, considering timing, duration, location and potential impacts arising from the planned activities. Mitigation and management measures will be implemented and are summarised in **Table 3.** Further details will be provided in the EP.

In preparing the EP, Woodside's intent is to minimise environmental and social impacts associated with the proposed activities. Woodside is seeking any interest or comments you may have to inform Woodside's decision making.

Joint Venture

Woodside Burrup Ltd is the Titleholder for this activity on behalf of the Pluto LNG joint venture partners, Tokyo Gas Pluto Pty Ltd and Kansai Electric Power Australia Pty Ltd.

We welcome your feedback by 29 March 2024.

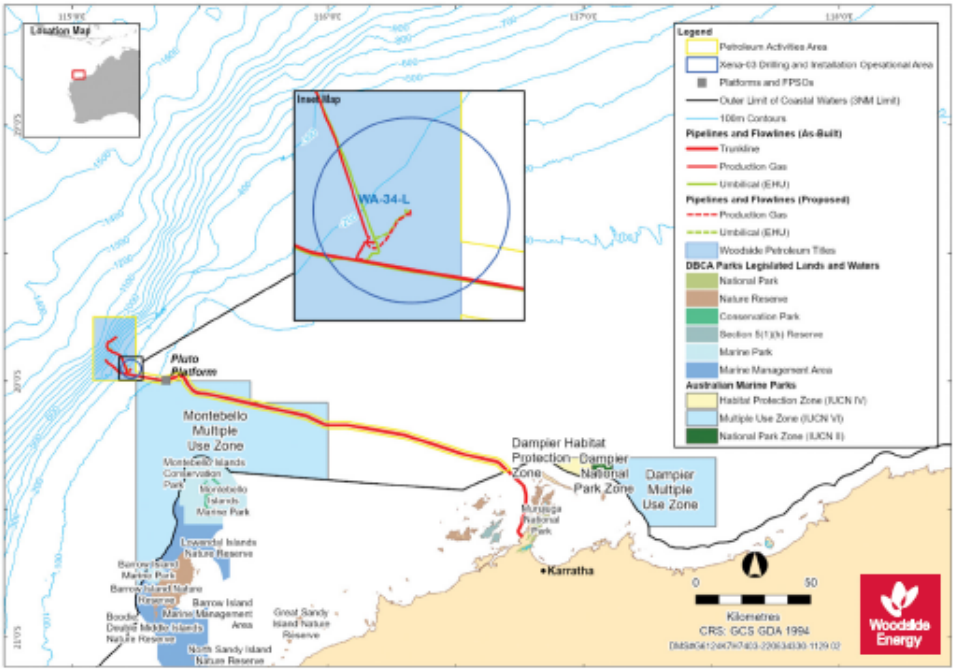

Figure 1. Pluto Facility and Operational Areas.

Table 1. Activity summary

Pluto Operations Facility Environment Plan	
Facility type	• Fixed platform, processing equipment, pipelines
Production License Areas	• WA-1-IL, WA-34-L
Pipeline Licenses	• WA-16-PL, WA-17-PL
Approximate water depth	• ~80–960 m
Activities Summary	Routine Operations: • routine production • routine IMMR of the platform and associated subsea infrastructure including pigging of the flowlines and pipeline • well unloading and clean-up • installation and use of the water handling unit • non-routine and unplanned activities and incidents associated with the above • supporting activities associated with the activities (e.g. vessel operations, helicopter transfers, etc.) Xena-03 Drilling and Tie-back: • drill one new well (Xena-03) in the Xena field • tie back to the existing Pyxis Hub infrastructure and remotely operated Pluto platform • pre-commissioning and commissioning activities
Infrastructure	• Platform, wells, Xmas trees, umbilicals, spools, jumpers, manifolds, flowlines, riser, chemical supply lines and the export pipeline (see **Table 2** for their approximate location)
Vessels	• MODU type could be Moored, Dynamically Positioned (DP) or hybrid moored/DP (required for Xena-03 drilling activity) • Primary Installation Vessel (required for Xena-03 subsea installation activity) • Vessel for routine IMMR and Xmas tree installation, isolation testing or contingent activities • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and other general supply/support vessels appropriate to the nature of petroleum activities

Pluto Operations Facility Environment Plan	
Key dates	Routine Operations: • Ongoing
Approximate duration of Xena-03 Drilling and Tie-back	• Drilling: Activities are currently anticipated to take around 60 days to complete • Subsea installation: Activities are currently anticipated to have a cumulative duration of around three weeks (including mobilisation, demobilisation and contingency) • Timing and duration of activities is subject to change due to project schedule requirements, MODU/vessel availability, unforeseen circumstances and weather constraints
Operational Areas and Exclusion zones	The Operational Area for Routine Operations comprises: • The platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the platform • The export pipeline (PITL) and associated 6-inch chemical supply line covered by Pipeline Licence WA-17-PL and a 1500 m corridor either side of the pipeline • Pluto, Xena and Pyxis subsea facilities (including wells, production and pigging manifolds, production jumpers, spools, flowlines and flexible jumpers) and an area within 1500 m around the subsea infrastructure Xena-03 Drilling and Tie-Back: • The Operational Area includes a radius of 4000 m from the Xena-03 well to allow vessels to undertake drilling activities • Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements • An interactive map showing the location of the proposed activities will be available on the Woodside website and will be updated throughout the proposed activities
Distance to nearest town	• ~ 160 km north-west of Dampier
Distance to nearest marine park/ nature reserve	• The Operational Area overlaps the Montebello Australian Marine Park Multiple Use Zone (IUCN category VI)

Table 2. Approximate locations of key infrastructure related to the Pluto Facility Operations Petroleum Activities Program

Structure	Approximate Water Depth (m)	Latitude	Longitude	Petroleum Titles
Existing infrastructure				
Platform	-	19°54'49.23614"	115°7'54.46587"	WA-1-IL
Existing subsea infrastructure				
PYA manifold	-844 m	19°52'46.2896"S	115°09'00.0179"E	WA-34-L
XNA manifold	-182 m	19°5.7'52.6141"S	115°12'54.6816"E	
Pluto A and B flowlines	-	-	-	WA-16-PL
Export pipeline (Commonwealth)	-	-	-	WA-17-PL
Existing wells				
PLA01ST1 well	-830 m	19°54'48.23107"	115°7'54.75273"	WA-34-L
PLA02 well	-830 m	19°54'48.56705"	115°7'55.78025"	
PLA03ST1 well	-830 m	19°54'48.70289"	115°7'56.32877"	
PLA04 well	-830 m	19°54'48.69494"	115°7'55.57246"	
PLA05 well	-830 m	19°54'49.23614"	115°7'54.46587"	
PLA06 well	-830 m	19°54'48.25708"	115°7'54.13355"	
PLA07 well	-830 m	19°54'48.96"	115°07'55.2"	
PLA08 well	-820 m	19°54'42.003"	115°08'02.424" E	
PYA01 well	-985 m	19°49'34.18078"	115°10'52.96514"	
PL-PYA02 well	-862 m	19°52'11.83574"	115°8'18.55154"	
XNA01 well	-180 m	19°58'13.56660"	115°12'46.17465"	
XNA02 well	-180 m	19°49'34.18078"	115°10'52.96514"	
Proposed well and infrastructure				
XNA03	-177 m	19° 54' 42.003"S	115°08'02.424"E	WA-34-L
Xena tie-in	-	19° 58' 15.25052"	115°12 '45.46775"	

Environment That May Be Affected (EMBA)

The environment that may be affected (EMBA) is the largest spatial extent where Pluto Facility Operations (including Xena-03 drilling and tie-back activities) could potentially have an environmental consequence (direct or indirect). The broadest extent of the EMBA takes into consideration planned and unplanned activities. For this EP, the EMBA has been developed by combining numerous modelling outputs based on highly unlikely releases of hydrocarbons to the environment. For this EP, the modelling scenarios that inform the EMBA are a loss of well integrity, loss of pipeline integrity or a vessel collision. The EMBA is depicted in **Figure 2**.

The EMBA does not represent the extent of the predicted impact of the highly unlikely unplanned release of hydrocarbons. Rather, the EMBA represents the merged area of many possible paths that a highly unlikely hydrocarbon release could travel, depending on the weather and ocean conditions at the time of the release. This means that in the highly unlikely event that a hydrocarbon release does occur, the whole EMBA will not be affected. The specific and minimal part of the EMBA that is affected will only be known at the time of the release.

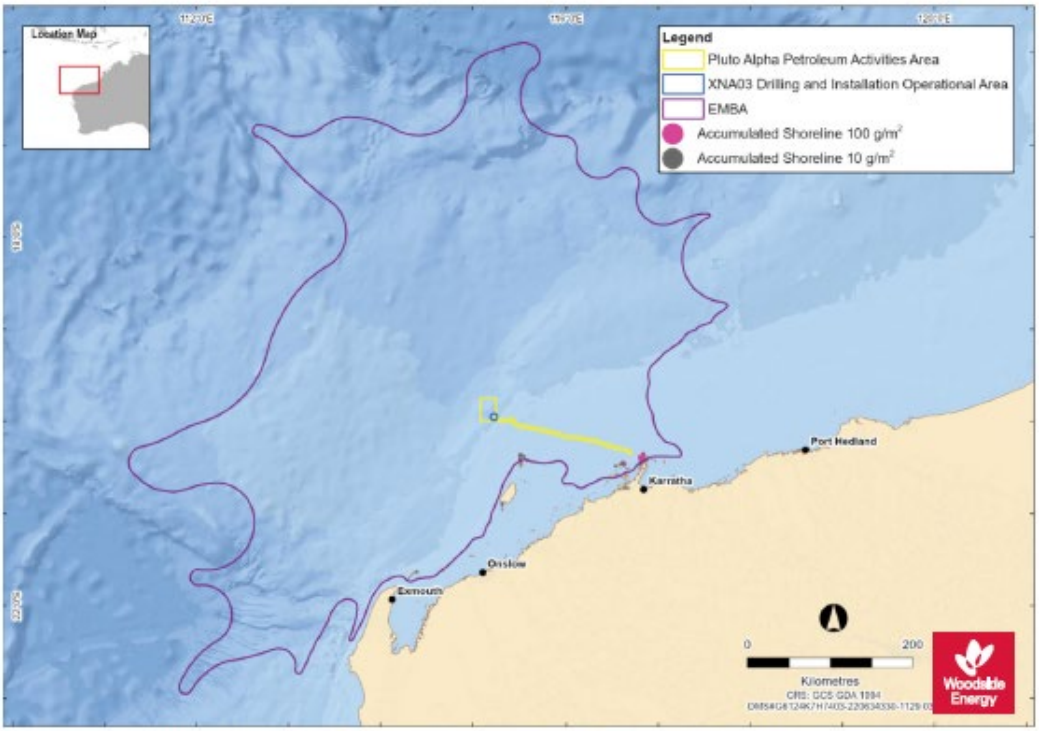

Figure 2: Environment that May Be Affected by the Pluto Facility Operations Petroleum Activities Program including Xena-03 drilling and tie-back

Mitigation and Management Measures

Woodside has undertaken an assessment to identify potential impacts and risks to the environment arising from the proposed activities considering timing, duration, location. Mitigation and management measures for proposed activities are outlined in **Table 3**. Further details will be provided in the EP.

Table 3. Summary of key risks and/or impacts and management measures associated with Pluto Facility Operations, including Xena-03 drilling and tie-back.

Potential Impact/ Risk	Description of Source of Potential Impact/Risk	Description of Potential Impacts/Risks	Preliminary Draft Mitigation and/or Management Measure
Planned Activities (Routine and Non-routine)			

Physical Presence: Interaction with Other Marine Users	**Operations**
	Presence of the Pluto facility, subsea infrastructure and routine IMMR activities excluding and/or displacing other users from the Petroleum Safety Zone (PSZ) and Operational Area respectively.
	
	Drilling and Tie-back Activities
	Physical presence of anchor system, mobile offshore drilling unit (MODU), support vessels, anchor handling vessels, installation vessels, and associated safety exclusion zones.
		Operations
		Potential isolated social impact resulting from interaction with other sea users such as:
		• Commercial fisheries
		• Tourism and recreation
		• Commercial vessels/ shipping
		
		Drilling and Tie-back Activities
		Temporary displacement of commercial fishing activities.
			• Implement a 500 m PSZ around the platform.
			• Establish a 500 m safety exclusion zone around MODU and the installation vessel which is communicated to marine users
			• Notifying the Australian Hydrographic Office (AHO) of location of permanent new infrastructure to enable update of maritime charts
			• Continued consultation relating to the Petroleum Activities Program
			• Implement Pluto's collision prevention system to alert marine vessels of the facility location which reduces the likelihood of adverse interaction with other marine users
			• Other controls include:
			  • Activity support vessel on standby as required (during drilling)
			  • Notice to Mariners
			  • Notify Australian Maritime Safety Authority (AMSA)
			  • Activity support vessel surveillance

Physical Presence: Disturbance to Seabed	**Operations** Presence of Pluto facility and subsea infrastructure modifying marine habitats. Subsea operations, IMMR activities resulting in disturbance to seabed. **Drilling and Tie-back Activities** Disturbance to seabed during drilling operations. Disturbance to seabed during subsea installation.	**Operations** Localised modification of seabed habitat (formation of artificial reef) within Operational Area. Potential minor, localised modification of seabed habitat within the Operational Areas. **Drilling and Tie-back Activities** Loss or damage to benthic habitats and communities.	• Monitoring and maintenance of subsea infrastructure to manage scour and flowline movement within integrity envelope • Monitoring and maintenance of redundant infrastructure in accordance with the IMMR process • Vessels used for IMMR will not anchor under routine operations • Reasonable attempt(s) at removal of wellhead will be undertaken in the event of a re-spud • Positioning technology used to place seabed infrastructure within the design footprint to reduce seabed disturbance • Project-specific Basis of Well Design, which includes an assessment of seabed sensitivity • Wet parked items will be tracked and removed from the seabed • Pre-lay survey undertaken prior to installation of flowlines
Routine Acoustic Emissions: Generation of Noise during Routine Operations	Noise generated from operational activities from: • facility and associated infrastructure • vessels • helicopters • IMMR activities • Positioning equipment	Localised behavioural impacts to marine fauna around vessels and Pluto platform.	• Comply with regulatory requirements for interactions with marine fauna to prevent adverse interactions

Potential Impact/ Risk	Description of Source of Potential Impact/Risk	Description of Potential Impacts/Risks	Preliminary Draft Mitigation and/or Management Measure
Acoustic Emissions: Generation of Noise during Tie-back Activities	Noise during Tie-back Activities generated from: • drilling, (hybrid MODU and DP) • vessels and helicopters • positioning equipment	Potential impacts to marine mammals, reptiles and fish, varying from behavioural responses to physiological impact (TTS).	• Comply with regulatory requirements for interactions with marine fauna to prevent adverse interactions • Implement adaptive management procedures as required

Routine and Non-Routine Discharges: Discharge of Hydrocarbons and Chemicals	**Operations**
	Discharge of subsea control fluids.
	Potential non-routine hydraulic fluid discharge.
	Discharge of hydrocarbons remaining in subsea pipelines/ flowlines and equipment as a result of subsea intervention works.
	Discharge of chemicals remaining in subsea infrastructure and equipment or the use of chemicals for subsea IMMR activities.
	Discharge of minor fugitive hydrocarbon from subsea equipment.
	Drilling and Tie-back Activities
	Discharge of flexible jumper and flying leads precommissioning fluids to the marine environment.
	Discharge of minor fugitive hydrocarbon from subsea equipment.
		Operations
		Potential slight short-term, localised decrease in water quality at release location during IMMR activities.
		Drilling and Tie-back Activities
		Potential short-term impacts on marine biota.
		Potential slight short-term, localised decrease in water quality at release location during installation activities.
			• Marine discharges managed according to regulatory requirements
			• Chemicals selected with the lowest reasonably practicable environmental impacts and risks subject to technical constraints and approved through the Woodside chemical assessment process
			• Flushing and isolation of subsea infrastructure where practicable during IMMR disconnection activities to reduce releases to the environment
			• Monitoring subsea control fluid use, investigating material discrepancies to identify potential integrity failures
			• Other controls include:
			  • Chemical Selection and Assessment
			  • Development and application of robust procedures

Routine and Non-Routine Discharges: Produced Water (PW)	Discharge of PW during routine and non-routine operations.	Potential minor, short term impact to water quality, marine sediments and marine biota.	• Marine discharges managed according to regulatory requirements • Online monitoring and procedural controls in place for PW discharge • Chemicals selected with the lowest reasonably practicable environmental impacts and risks subject to technical constraints and approved through the Woodside chemical assessment process. Woodside internal guidance and procedures are adhered to • Implement adaptive monitoring and management
Routine and Non-Routine Marine Wastewater Discharges: Discharge of Sewage, Putrescible Waste, Grey Water, Bilge Water, Drain Water, Cooling Water and Brine	**Operations** Discharge of sewage, grey water and putrescible waste from the platform and support vessels to the marine environment. Discharge of deck, bilge and drain water from the platform and support vessels to the marine environment. Discharge brine and cooling water from platform and support vessels to the marine environment. **Drilling and Tie-back Activities** Routine offshore discharge from MODU and vessels of sewage, grey water, waste, bilge water and deck drainage.	**Operations** Potential slight, localised increase in water temperature, salinity and short-term water quality changes around discharge location. **Drilling and Tie-back Activities** Potential slight, localised increase in water temperature, salinity and short-term water quality changes around discharge location.	• Marine discharges managed according to regulatory requirements • Chemicals selected with the lowest reasonably practicable environmental impacts and risks subject to technical constraints and approved through the Woodside chemical assessment process • Where there is the potential for loss of primary containment of oil and chemicals on the platform, MODU or vessels, bunding or closed drainage systems are in place to contain spills

Potential Impact/ Risk	Description of Source of Potential Impact/Risk	Description of Potential Impacts/Risks	Preliminary Draft Mitigation and/or Management Measure
Routine and Non-routine Atmospheric Emissions	**Operations** Operational fuel combustion, flaring and fugitive emissions. Operational emissions associated with energy generation, onshore processing of Pluto gas, third party transportation, regassification and combustion by end users. **Drilling and Tie-back Activities** Contingent venting of gas during drilling (e.g. well kick). Vessel and helicopter emissions.	Potential slight short-term, localised air quality changes, limited to the airshed local to the facility.	• Comply with legislative and regulatory requirements for marine air pollution and emissions reporting • Robust well control procedures to minimise risk of well kick during drilling • Maintain flare to maximise efficiency of combustion
Routine Light Emissions: Light Emissions from the Platform and Project Vessels	**Operations** Light emissions from facility, MODU and support vessels. Light emissions from facility during flaring. **Drilling and Tie-back Activities** Light emissions during drilling including flaring, from support vessels, primary installation vessel as well as subsea vehicles.	Negligible, localised potential for behavioural disturbance of species near Pluto platform and vessels including fish, marine reptiles and seabirds.	• Lighting limited to the minimum required for navigational and safety requirements, except for emergency events • Well unloading acceptance criteria that define the well objectives will be established, minimising light from flaring • Implementation of a Seabird Management Plan

Routine and Non-Routine Discharges: Drill Cuttings, Drilling Fluids and Well Removal Fluids during drilling and tie-back activities	Routine discharge of water-based muds (WBM) drill cuttings to the seabed and the marine environment.
	Non-routine discharge of treated non-water-based muds (NWBM) drill cuttings to the marine environment.
	Non-routine discharge of wash water from mud pits and vessel tank wash fluids during drilling and tie-back.
	Routine discharge of well clean-out fluids during drilling and tie-back.
	Non-routine discharge of well annular fluids during drilling and tie-back.
	Non-routine discharge of WBM and cement cuttings to the marine environment during drilling out of a cement plug.
	Non-routine discharge of grit and flocculant during removal of well infrastructure.
		Potential impacts to marine biota, as well as localised reduction in water quality with potential effects on both water quality and benthic communities.	• Chemicals selected with the lowest reasonably practicable environmental impacts and risks subject to technical constraints and approved through the Woodside chemical assessment process
			• NWBM base oils selected based on expected toxicity
			• NWBM will be used where written justification process has been followed and bulk NWBM will be retained for disposal onshore or maintained on rig for re-use
			• Fluids contaminated with hydrocarbons will be treated to meet specified discharge limits prior to discharge or contained. If discharge specifications are not met the fluid will be returned to shore
			• Drill cuttings returned to the MODU will be discharged below the water line to reduce carriage and dispersion to other areas
			• Other controls include:
			  ◦ Restrict overboard discharge of NWBM
			  ◦ Measure oil content in displacement, brine, workover or intervention fluids, pit and tank wash
			  ◦ Permit to Work system
			  ◦ Solid Control Equipment
			  ◦ Woodside Engineering Standard for Rig Equipment

Potential Impact/ Risk	Description of Source of Potential Impact/Risk	Description of Potential Impacts/Risks	Preliminary Draft Mitigation and/or Management Measure
Routine and Non-Routine Discharges: Cement, Cementing Fluids, Subsea Well Fluids, Unused Bulk Product and Subsea Chemicals during drilling and tie-back activities	Routine discharge of cement and cementing fluids, to the seabed and the marine environment during drilling and tie-back. Routine discharge of subsea well fluids (inc. blow-out preventer (BOP)) and well construction activity control fluids) during drilling and tie-back. Non-routine discharge of unused bulk products during drilling and tie-back.	Potential impacts to marine biota, as well as localised reduction in water quality with potential effects on both water quality and benthic communities.	• Chemicals selected with the lowest reasonably practicable environmental impacts and risks subject to technical constraints and approved through the Woodside chemical assessment process • Fluids contaminated with hydrocarbons will be treated to meet specified discharge limits prior to discharge or contained. If discharge specifications are not met, fluids will be returned to shore • During well unloading and completion activities, if produced water is not flared, it will be processed through a water treatment package prior to discharge to the environment • Options for use of excess bulk cement, bentonite or barite will be managed and only discharged to the marine environment as a last option
Unplanned Events (Accidents / Incidents) – Routine Operations (i.e. no drilling or subsea installation activities)			
Unplanned Hydrocarbon Release: Loss of Well Containment	Release of hydrocarbons resulting from loss of subsea well containment.	Potential significant impacts to the marine environment: • Long-term impacts to sensitive nearshore areas of offshore islands and coastal shorelines • Disruption to marine fauna, including protected species • Potential medium-term interference with or displacement of other sea users	**Preventing loss of well control** • Well operated in compliance with the accepted well operation management plan (WOMP) including implementation of barriers to prevent a loss of well control • Checks completed during well operations to establish a minimum acceptable standard of well integrity **Spill response arrangements** • Arrangements supporting the Oil Pollution Emergency Plan (OPEP) will be tested to ensure the OPEP can be implemented as planned • Emergency response activities would be implemented in line with the OPEP
Unplanned Hydrocarbon Release: Pipeline and Riser Loss of Containment	Release of hydrocarbons resulting from loss of export pipeline containment. Release of hydrocarbons resulting from loss of containment of subsea flowlines and infrastructure.	Potential significant impacts to the marine environment: • Long-term impacts to sensitive nearshore areas of offshore islands and coastal shorelines • Disruption to marine fauna, including protected species • Potential medium-term interference with or displacement of other sea users	**Preventing loss of pipeline and riser containment** • The pipeline, flowline and riser design include a range of measures that specifically aid in minimising the risk of external damage • Maintain well integrity to contain reservoir fluids within the well envelope to avoid an incident • Maintain emergency shutdown (ESD) system and critical external and internal communication systems to facilitate prevention and response to accidents and emergencies **Spill response arrangements** • Arrangements supporting the OPEP will be tested to ensure the OPEP can be implemented as planned • Emergency response activities would be implemented in line with the OPEP
Unplanned Hydrocarbon Release: Loss of Structural Integrity	Surface or subsea release from flowline, pipeline and riser to the marine environment and atmosphere. Hydrocarbon release from topsides equipment to the marine environment and atmosphere.	Potential significant impacts to the marine environment: • Long-term impacts to sensitive nearshore areas of offshore islands and coastal shorelines • Disruption to marine fauna, including protected species • Potential medium-term interference with or displacement of other sea users	**Preventing loss of structural integrity** • Maintain structural integrity to ensure availability of critical systems during a major accident or environment event and prevent structural failures from contributing to escalation • Maintain control of ignition sources and passive fire protection to prevent loss of structural integrity • Maintain topsides hydrocarbon-containing infrastructure integrity **Spill response arrangements** • Arrangements supporting the OPEP will be tested to ensure the OPEP can be implemented as planned • Emergency response activities would be implemented in line with the OPEP

Potential Impact/ Risk	Description of Source of Potential Impact/Risk	Description of Potential Impacts/Risks	Preliminary Draft Mitigation and/or Management Measure
Unplanned Hydrocarbon Release: Loss of Structural Integrity	A loss of marine vessel separation between a vessel and the platform may result in a loss of hydrocarbon containment from the Pluto facility and/or the release of fuel from the vessel.	Potential significant impacts to the marine environment: • Long-term impacts to sensitive nearshore areas of offshore islands and coastal shorelines • Disruption to marine fauna, including protected species • Potential medium-term interference with or displacement of other sea users	**Preventing loss of marine vessel separation** • Maintaining collision warning systems and navigational aids to alert facility of a potential collision with a vessel, and to alert vessels so that they may avoid collisions with the facility **Spill response arrangements** • Arrangements supporting the OPEP will be tested to ensure the OPEP can be implemented as planned • Emergency response activities would be implemented in line with the OPEP
Unplanned Hydrocarbon Release: Topsides Loss of Containment	Hydrocarbon release from topsides process equipment o the marine environment and atmosphere.	Potential moderate short-term impacts to the marine environment: • Disruption to marine fauna, including protected species and/or impacts to water quality	**Preventing topsides loss of containment** • Wells drilled in compliance with the accepted WOMP including implementation of barriers to prevent a loss of well control • Checks completed during well operations to establish a minimum acceptable standard of well integrity • An approved Source Control Emergency Response Plan will be prepared prior to drilling each well including feasibility and specific considerations for relief well • Subsea BOP specification, installation and testing compliant with internal Woodside Standards and international requirements **Spill response arrangements** • Arrangements supporting the OPEP will be tested to ensure the OPEP can be implemented as planned • Emergency response activities would be implemented in line with the OPEP are raised for unplanned releases within event reporting system
Unplanned Hydrocarbon Release: Loss of Control of Suspended Load from Platform	Surface or subsea release from flowline, pipeline and riser to the marine environment and atmosphere. Hydrocarbon release from topsides equipment to the marine environment and atmosphere.	Potential significant impacts to the marine environment: • Long-term impacts to sensitive nearshore areas of offshore islands and coastal shorelines • Disruption to marine fauna, including protected species • Potential medium-term interference with or displacement of other sea users	**Preventing loss of control of suspended load** • Maintain platform lifting equipment to prevent failure or dropped/swinging loads that could result in an incident
Unplanned Events (Accidents / Incidents) – Drilling and subsea installation			
Unplanned Hydrocarbon Release: Loss of Well Integrity During Drilling Operations	Loss of hydrocarbons to marine environment due to loss of well containment.	Potential significant impacts to the marine environment: • Long-term impacts to sensitive nearshore areas of offshore islands and coastal shorelines • Disruption to marine fauna, including protected species • Potential medium-term interference with or displacement of other sea users	**Preventing loss of well control** • Wells drilled in compliance with the accepted WOMP including implementation of barriers to prevent a loss of well control • An approved Source Control Emergency Response Plan will be prepared prior to drilling each well including feasibility and specific considerations for relief well • Subsea BOP specification, installation and testing compliant with internal Woodside Standards and international requirements **Spill response arrangements** • Arrangements supporting the OPEP will be tested to ensure the OPEP can be implemented as planned • Emergency response activities would be implemented in line with the OPEP

Potential Impact/ Risk	Description of Source of Potential Impact/Risk	Description of Potential Impacts/Risks	Preliminary Draft Mitigation and/or Management Measure

Unplanned Hydrocarbon Release: Vessel Collision	Loss of hydrocarbons to marine environment due to a vessel collision (e.g. project vessels or other marine users).	Potential minor, short-term impact on marine species, habitats and protected areas.	**Preventing vessel collision**
			• Comply with regulatory requirements for the prevention of vessel collisions and safety and emergency arrangements
			• Establish temporary safety exclusion zones around vessels which are communicated to marine users to reduce the likelihood of collision
			• Other controls include:
			  • Activity support vessel on standby as required (during drilling)
			  • Notice to Mariners
			  • Notify Australian Maritime Safety Authority (AMSA)
			Spill response arrangements
			• Arrangements supporting the OPEP will be tested to ensure the OPEP can be implemented as planned
			• Emergency response activities would be implemented in line with the OPEP

Unplanned Discharges: Release of Hydrocarbons During Bunkering, Transfer, Storage and Use	Accidental discharge of marine diesel to the marine environment during bunkering, transfer, storage or use on the facility, MODU or vessels.	Potential slight, short-term local impacts to marine species and habitats.	**Preventing unplanned hydrocarbon release due to bunkering** • Comply with regulatory requirements for the prevention of marine pollution • Liquid chemical and fuel storage areas bunded or secondarily contained when they are not being handled or temporarily moved • Appropriate bunkering equipment kept and maintained • Compliance with Contractor procedures for the management of bunkering/helicopter operations to reduce the likelihood and potential severity of a spill **Spill response arrangements** • Maintain and locate spill kits in proximity to hydrocarbon storage and deck areas for use to contain and recover deck spills • Arrangements supporting the OPEP will be tested to ensure the OPEP can be implemented as planned • Emergency response activities would be implemented in line with the OPEP • Incident reports are raised for unplanned releases within event reporting system
Unplanned Discharges: Deck and Subsea Spills	Accidental discharge of hydrocarbons/ chemicals from MODU, installation vessel and project vessels deck activities and equipment, from subsea ROV hydraulic leaks. Unplanned release of chemicals or hydraulic fluid due to failure of subsea equipment.	No lasting effect, localised impact to the marine environment.	• Comply with regulatory requirements for the prevention of marine pollution • Liquid chemical and fuel storage areas are bunded or secondarily contained when they are not being handled/moved temporarily • Spill kits positioned in high-risk locations around vessels and the MODU (near potential spill points such as transfer stations) • Chemicals selected with the lowest reasonably practicable environmental impacts and risks subject to technical constraints and approved through the Woodside chemical assessment process • Installation vessels have self-containing hydraulic oil drip tray management system • Woodside Engineering Standard for Rig Equipment (incl third party equipment such as ROVs) **Spill response arrangements** • First strike plan • Shipboard Oil Pollution Emergency Plan (SOPEP)

Potential Impact/ Risk	Description of Source of Potential Impact/Risk	Description of Potential Impacts/Risks	Preliminary Draft Mitigation and/or Management Measure

Unplanned Discharge: Drilling/ Project Fluids	Accidental discharge of project fluids (WBM/NWBM/ base oil) and cement to marine environment due to failure of slip joint packers, bulk transfer hose/fitting, emergency disconnect system or from drilling and installation operations.	Potential slight, short-term local impacts to marine species and habitats.	• Chemicals selected with the lowest reasonably practicable environmental impacts and risks subject to technical constraints and approved through the Woodside chemical assessment process
			• Marine riser's telescopic joint to be comprised of a minimum of two packers (one hydraulic and one pneumatic) and pressure tested
			• No overboard disposal of bulk NWBM
			• Compliance with Contractor procedures for the transfer and management of drilling fluids to reduce the likelihood and severity of a spill
			• Other controls include:
			  • Oil % content in displacement, brine, workover or intervention fluids, pit and tank wash
			  • PTW system
			  • Solid Control Equipment

Unplanned Discharges: Loss of Hazardous and Non-Hazardous Waste	Incorrect disposal or accidental discharge of non hazardous and hazardous waste to the marine environment.	No lasting effect, localised impact to the marine environment.	• Comply with regulatory requirements for the prevention of marine pollution and handling of hazardous wastes • Implement Waste Management Plan, which provides for safe handling and transportation, segregation and storage and appropriate classification of waste generated • Solid waste/equipment dropped to the marine environment will be recovered where safe and practicable to do so • Where retrieval is not reasonably practicable and/ or safe, material items (property) lost to the marine environment will undergo an impact assessment and will be added to the inventory for the title • Incident reports are raised for unplanned releases within event reporting system
Physical Presence: Seabed disturbance from dropped objects or loss of station keeping leading to anchor drag	Dropped objects resulting in the disturbance of benthic habitat. Loss of station keeping of the MODU leading to anchor drag and the disturbance of benthic habitat. Dropped objects over live infrastructure. Dropped objects during vessel transfers or installation activities.	Potential slight, short-term local impacts to marine species and habitats.	• MODU/installation vessel inductions include control measures for dropped object prevention • Equipment dropped to the marine environment will be recovered where safe and practicable to do so • Where retrieval is not reasonably practicable and/ or safe, material items (property) lost to the marine environment will undergo an impact assessment and will be added to the inventory for the title • Implement project-specific mooring design, with sufficient capability, testing and inspection
Physical Presence: Interactions with Marine Fauna	Physical presence of project/ support vessels resulting in collision with marine fauna.	Potential injury or death of marine fauna (single animal), including protected species.	• Comply with regulatory requirements for interactions with marine fauna to reduce the likelihood of a collision occurring
Physical Presence: Introduction of Invasive Marine Species (IMS)	Invasive species in vessel ballast tanks or on vessels/ submersible equipment.	Potential introduction of IMS possibly resulting in an alteration of the localised environment and potential reduction in native species through predation, competition or interspecies breeding.	• Ballast water and biofouling will be managed according to regulatory requirements, including the Australian Ballast Water Management Requirements, and the Australian Biofouling Management Requirements, as applicable • Woodside's IMS risk assessment process will be applied to project vessels and immersible equipment entering the Operational Area

Feedback

Woodside consults relevant persons in the course of preparing Environment Plans to notify them of the activity and to obtain relevant feedback to inform its planning for proposed petroleum activities in the region.

If you would like to comment on the proposed activities outlined in this information sheet, or would like additional information, please contact Woodside before **29 March 2024** via:

E: Feedback@woodside.com.au

Toll free: 1800 442 977

You can subscribe on our website to receive Consultation Information Sheets for proposed activities:

http://www.woodside.com/what-we-do/consultation-activities

Please note that stakeholder feedback will be communicated to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) as required under legislation. Woodside will communicate material changes to the proposed activity to affected stakeholders as they arise.

Please note that your feedback and our response will be included in our Environment Plan for the proposed activity, which will be submitted to the NOPSEMA for acceptance in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023* (Cth) and to support other regulatory processes associated with the planned activities (which may or may not be confidential).

Please let us know if you request that particular information that you provide in the consultation not be published. If so, we will make your request known to NOPSEMA so that the information is not included when the EP is published on NOPSEMA's website.

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Woodside Energy

1.2 Summary Information Sheet

Woodside Energy

CONSULTATION

SUMMARY INFORMATION SHEET

Februrary 2024

PLUTO FACILITY OPERATIONS ENVIRONMENT PLAN

CARNARVON BASIN, NORTH-WEST AUSTRALIA

When preparing an environment plan (EP), Woodside needs to notify relevant persons and obtain their input. This helps confirm current measures or identify additional measures that may need to be taken to lessen or avoid potential adverse effects of the proposed activity on the environment. Woodside wants to give relevant persons whose functions, interests or activities may be affected by the proposed activity the opportunity to identify themselves and provide feedback on our proposed activity.

This summary information sheet provides a high-level overview of the Pluto Facility Operations environment plan. Further details, including an assessment of the potential impacts and risks to the environment, as well as mitigation and management measures, are available within the Pluto Facility Operations Environment Plan Consultation Information Sheet (February 2024) which can be found at:

http://www.woodside.com/what-we-do/consultation-activities

Overview

Woodside plans to submit a five-year revision of the Operations EP for the Pluto Facility. Operations commenced in 2012.

The Pluto platform is located in 80 m water depth, and the associated subsea infrastructure is located in water depths ranging from ~80 m to 960 m, in Commonwealth waters around 160 km north-west of Dampier, Western Australia. The facility produces wet gas and condensate from the Pluto, Xena and Pyxis reservoirs. The gas and condensate are transported for processing at the onshore liquefied natural gas (LNG) Plant via a 180 km long export pipeline.

The Pluto platform is a not-normally-manned facility, with remote operation from the Pluto onshore Central Control Room.

The Pluto Facility Operations EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Xena-03 well into the existing Pluto production systems.

A map showing the location of the activities is provided below.

Work Method

Key features of the Pluto Facilities include:

- A fixed platform with five decks, separated by two major vertical trusses. The platform has a pedestal crane, a flare boom, helideck and accommodation facilities. A water handling module is currently being installed to enable overboard discharge of treated produced water.
- The export pipeline and associated 6-inch chemical supply line, extending from the offshore platform to the onshore LNG Plant.
- Subsea infrastructure connecting wells at the Pluto, Xena and Pyxis reservoirs to the platform via production and pigging manifolds, production jumpers, spools, flowlines and flexible jumpers.

Summary of key activities includes:

- Routine production
- Routine inspection, monitoring, maintenance and repair (IMMR) of the platform and associated subsea infrastructure.
- Commissioning and operation of the water handling unit
- Non-routine and unplanned activities and incidents associated with the above
- The Xena-03 Drilling and Tie-Back project, which includes:
  - drilling one new well (Xena-03) in the Xena field
  - tie back to the existing Pyxis Hub infrastructure and remotely operated Pluto platform
  - pre-commissioning and commissioning activities.

During normal operations, vessels will typically be limited to supply/support vessels and IMMR vessels. It is anticipated vessels will operate 24 hours per day for the duration of activities.

The Xena-03 Drilling and Tie-Back project is anticipated to commence with drilling in Q2 2025 and installation in Q3 2025.

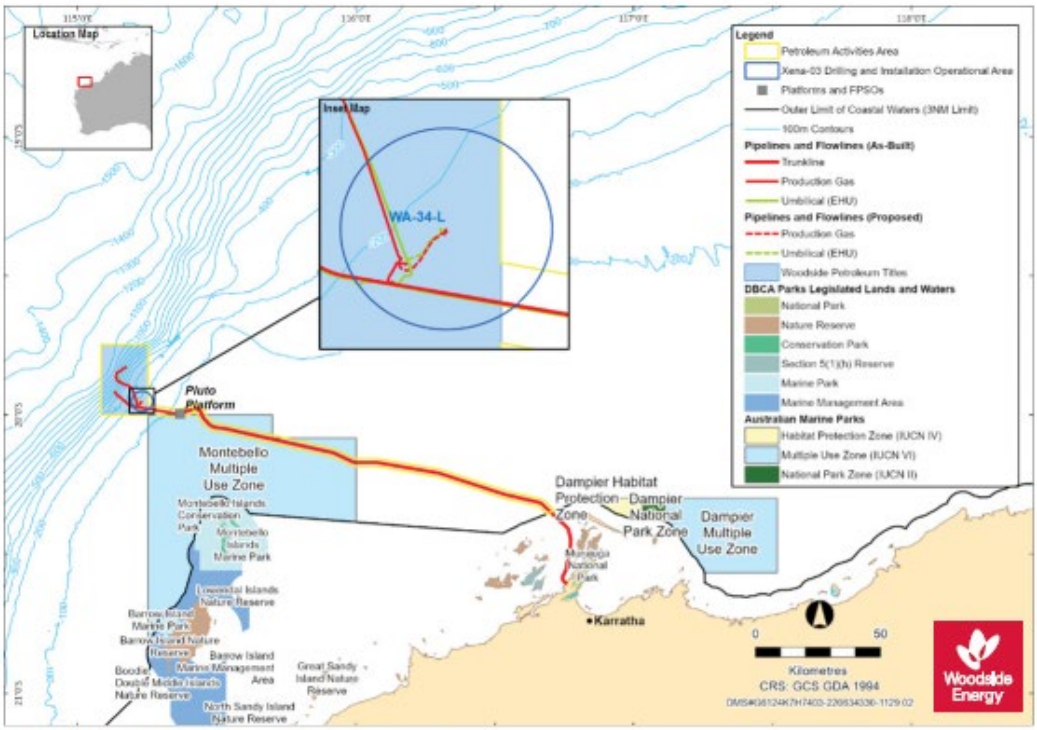

Figure 1 Pluto Facility Operational Area and Drilling Operational Area.

Environment That May Be Affected (EMBA)

The environment that may be affected (EMBA) is the largest spatial extent where Pluto Facility Operations (including Xena-03 drilling and tie-back activities) could potentially have an environmental consequence (direct or indirect). The broadest extent of the EMBA takes into consideration planned and unplanned activities. For this EP, the EMBA has been developed by combining numerous modelling outputs based on highly unlikely releases of hydrocarbons to the environment. For this EP, the modelling scenarios that inform the EMBA are a loss of well integrity, loss of pipeline integrity or a vessel collision. The EMBA is depicted in **Figure 2**.

The EMBA does not represent the extent of the predicted impact of the highly unlikely unplanned release of hydrocarbons. Rather, the EMBA represents the merged area of many possible paths that a highly unlikely hydrocarbon release could travel, depending on the weather and ocean conditions at the time of the release. This means that in the highly unlikely event that a hydrocarbon release does occur, the whole EMBA will not be affected. The specific and minimal part of the EMBA that is affected will only be known at the time of the release.

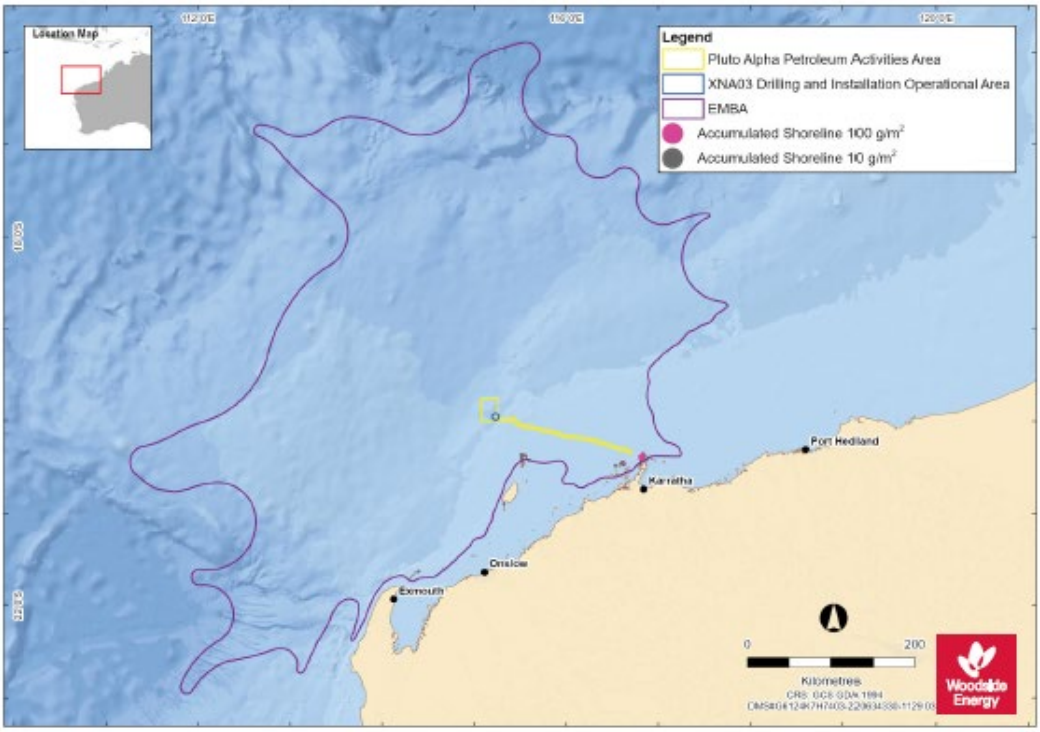

Figure 2. Environment that May Be Affected (EMBA) by the Pluto Facility operations Petroleum Activities Program including Xena-03 drilling and tie-back.

Feedback

Woodside consults relevant persons in the course of preparing Environment Plans to notify them of the activity and to obtain relevant feedback to inform its planning for proposed petroleum activities in the region.

If you would like to comment on the proposed activities outlined in this information sheet, or would like additional information, please contact Woodside before **29 March 2024** via:

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Toll free: 1800 442 977

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Please note that stakeholder feedback will be communicated to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) as required under legislation. Woodside will communicate any material changes to the proposed activity to affected stakeholders as they arise.

Please note that your feedback and our response will be included in our Environment Plan for the proposed activities, which will be submitted to NOPSEMA for acceptance in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth)* and support other regulatory processes associated with the planned activities (which may or may not be confidential).

Please let us know if you request that particular information that you provide in the consultation not be published. If so, we will make your request known to NOPSEMA so that the information is not included when the EP is published on NOPSEMA's website.

1.3 Updated Consultation Information Sheet

Woodside Energy

CONSULTATION

INFORMATION SHEET

February 2024

PLUTO FACILITY OPERATIONS ENVIRONMENT PLAN

CARNARVON BASIN, NORTH-WEST AUSTRALIA

Woodside consults relevant persons in the course of preparing an environment plan (EP) to notify them, obtain their input and to assist Woodside to confirm current measures or identify additional measures, if any, that could be taken to lessen or avoid potential adverse effects of the proposed activity on the environment. This is the intended outcome of consultation.

Woodside's aim is to ensure the activity is carried out in a manner that is consistent with the principles of ecologically sustainable development (ESD), by which the environmental impacts and risks of the activity are reduced to as low as reasonably practicable (ALARP) and of an acceptable level. Woodside wants relevant persons whose functions, interests or activities may be affected by the proposed activity to have the opportunity to provide feedback on our proposed activity, in accordance with the intended outcome of consultation.

Overview

Woodside will submit a five-year revision of the Operations EP for the Pluto Facility (Pluto) located in Commonwealth waters, in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023* (Cth) (regulations). The Operations EP currently covers the operation of a fixed platform (Pluto) and subsea infrastructure connected to the Pluto, Xena and Pyxis reservoirs. The Operations EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Xena-03 well into the existing Pluto production systems.

Location and Operations

The Pluto platform and associated subsea infrastructure is located in Production Licenses WA-1-IL and WA-34-L. The export pipeline and flowline are within Pipeline Licenses WA-17-PL and WA 16 PL, respectively (see **Figure 1**).

The Xena-03 well is located in Production Licence WA 34 L, around 15km from the Pluto Platform and around 190km west north-west of Dampier. The Xena-03 well will be located around 2 km from the existing Xena-02 well and tied back to the existing Pluto production systems.

The Pluto facility commenced production in 2012. The facility produces wet gas and condensate, which is transported for processing at the onshore Pluto LNG Plant via a 180km long export pipeline. The Pluto platform is a not-normally-manned facility, with remote operation from a fixed operator console at the Pluto onshore Central Control Room (CCR), which is constantly manned.

Installation of a water handling module on the platform is underway to enable the processing and discharge of produced water at the platform. Wet gas will be processed through the water handling module and transported onshore, with treated water discharged overboard.

Table 1 summarises the activities, which will be managed under the Operations EP.

Proposed Activity Overview – Production / Operations

The production scope includes the following activities to be undertaken during the next five-year period:

- Routine production
- Routine inspection, monitoring, maintenance and repair (IMMR) activities
- Commissioning and operation of the water handling module
- Non-routine and unplanned activities and incidents associated with the above.

Future decommissioning of infrastructure will be subject to separate future EPs.

Production

Production commenced from the Pluto facility in 2012 and is currently expected to continue until at least 2031. Production is planned to commence from the Xena-03 well around Q3 2025.

Inspection

Inspection of infrastructure is the process of physical verification and assessment of subsea components to detect changes compared to its installed state. Typical site inspection activities include visual surveys via a remotely operated vehicle, side scan sonar surveillance, cathodic protection measurements and ultrasonic pipe condition checks.

Monitoring

Monitoring is the surveillance of the physical and chemical environment around subsea infrastructure. Monitoring activities may include process composition, corrosion probes, corrosion mitigation checks, and metocean and geological monitoring.

Maintenance

Maintenance of infrastructure is required at regular and/or planned intervals to maintain performance reliability and prevent deterioration or failure of equipment. Maintenance activities may include cycling of valves and leak pressure testing.

Repair

Repair activities are those required when a subsea system or component is degraded or damaged as defined by design codes.

Vessels

Operations support vessels will be used to undertake IMMR of subsea infrastructure. The vessel size and type will be dependent on the work scope. The vessels will not anchor during IMMR activities unless there is an unexpected event or an emergency. An Accommodation Support Vessel (ASV) may be required for short periods (typically less than 1 month) to support planned maintenance campaigns, shutdown maintenance or major projects.

Proposed Activity Overview – Drilling and Tie-Back

The scope for this EP includes drilling, completion, subsea installation (including minor changes to existing infrastructure) along with commissioning activities to bring in gas from the Xena-03 well to the Pluto platform. This includes directly installing infrastructure from the installation vessel in the relevant location.

Other contingent activities that Woodside may need to perform include well abandonment, re-spud, side-track, well suspension, well intervention, wireline logging, leaving wellhead assembly in situ, sediment mobilisation and relocation, venting, well test/unload and emergency disconnect sequence.

Drilling, subsea installation and commissioning activities

Woodside plans to drill one new well in the Xena field (Xena-03) and to install an associated wellhead and Xmas tree. Xena-03 will be connected to the existing Pyxis Hub subsea infrastructure. The well will be located at approximately 177 m water depth. Other activities include:

- Pre-commissioning and cold-commissioning (non-hydrocarbon) activities associated with subsea infrastructure including leak testing of the flexibles, subsea control systems verification and function-testing of valves to verify the production system and electric and hydraulic flying leads are ready for entry into the commissioning phase; and
- Well start-up and commissioning (initial start-up) of the Xena 03 well involving slow and gradual build up to maximum well gas production rates and then well performance testing such as Multi-Rate Testing, simulated emergency shut down (ESD) of the well followed by Pressure Build-Up Testing.

Drilling activities are currently anticipated to commence around Q2 2025, subsea installation and commissioning activities are currently anticipated around Q3 2025.

The timing and duration of the proposed activities is subject to approvals, project schedule requirements, vessel availability, weather or unforeseen circumstances.

Project vessels

Activities will be completed using a range of vessels. Operations will use support vessels to undertake inspection, monitor, maintenance and repair of subsea infrastructure. The vessel size and type will be dependent on the work scope.

The proposed Xena-03 drilling and tie-back will be performed using a moored, dynamically positioned (DP) or hybrid (DP/moored) mobile offshore drilling unit (MODU). During the subsea installation campaign, a construction/primary installation vessel will perform installation activities.

The project will be supported by other vessels, such as general support vessels, cargo vessels, anchor handling vessels and multiservice construction vessels during drilling activities. Support vessels will be used to transport equipment and materials between the MODU/installation vessel and port.

Drilling operations for the production well are currently expected to take around 60 days to complete.

Installation of subsea infrastructure and pre-commissioning is anticipated to commence when the relevant new production well has been drilled and is expected to have a cumulative duration of about three weeks. Drilling and installation of subsea infrastructure may be performed over multiple campaigns.

The support and installation vessels will operate on DP and will not anchor/moor on the seabed. It is anticipated vessels will operate 24 hours per day for the duration of drilling and tie-back activities.

Communications with mariners

The location of Pluto is marked on nautical charts and the platform is surrounded by a 500 m radius petroleum safety zone (PSZ). A 4 km radius Operational Area will be applied around the Xena-03 drill centre.

A temporary 500 m safety exclusion zone will apply around the MODU and subsea installation vessel to manage vessel movements.

Commercial fishers and other marine users are permitted to use the Operational Area but should take care when entering and remain clear of the safety exclusion zones. The wells will continue to be marked on navigational charts.

Assessment

Woodside has undertaken an assessment to identify potential risks to the marine environment and relevant persons, considering timing, duration, location and potential impacts arising from the planned activities. Mitigation and management measures will be implemented and are summarised in **Table 3.** Further details will be provided in the EP.

In preparing the EP, Woodside's intent is to minimise environmental and social impacts associated with the proposed activities. Woodside is seeking any interest or comments you may have to inform Woodside's decision making.

Joint Venture

Woodside Burrup Ltd is the Titleholder for this activity on behalf of the Pluto LNG joint venture partners, Tokyo Gas Pluto Pty Ltd and Kansai Electric Power Australia Pty Ltd.

We welcome your feedback by 29 March 2024.

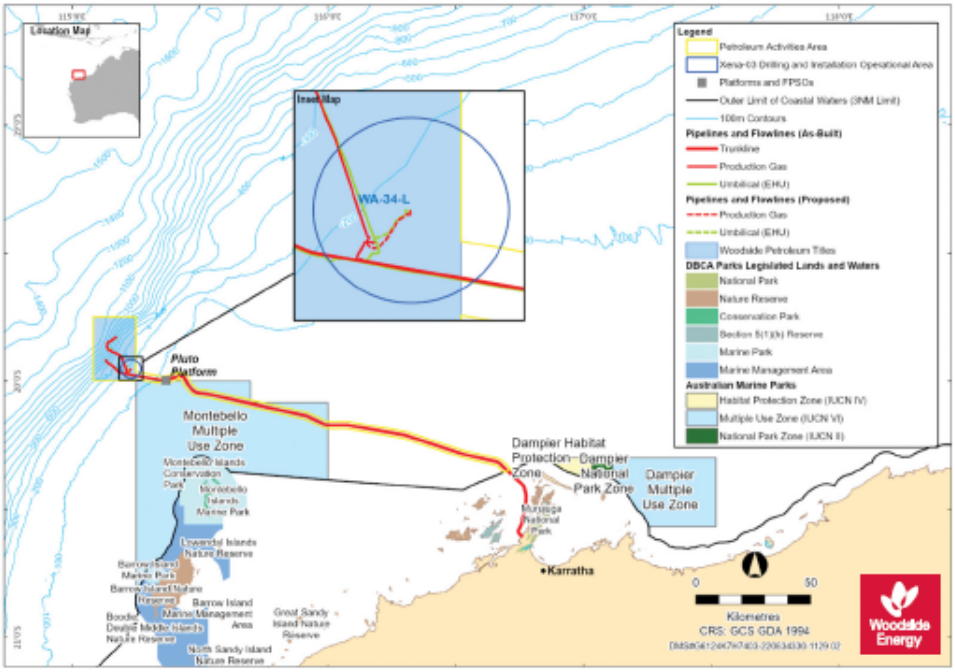


Figure 1. Pluto Facility and Operational Areas.

Table 1. Activity summary

Pluto Operations Facility Environment Plan	
Facility type	• Fixed platform, processing equipment, pipelines
Production License Areas	• WA-1-IL, WA-34-L
Pipeline Licenses	• WA-16-PL, WA-17-PL
Approximate water depth	• ~80–960 m
Activities Summary	Routine Operations: • routine production • routine IMMR of the platform and associated subsea infrastructure including pigging of the flowlines and pipeline • well unloading and clean-up • installation and use of the water handling unit • non-routine and unplanned activities and incidents associated with the above • supporting activities associated with the activities (e.g. vessel operations, helicopter transfers, etc.) Xena-03 Drilling and Tie-back: • drill one new well (Xena-03) in the Xena field • tie back to the existing Pyxis Hub infrastructure and remotely operated Pluto platform • pre-commissioning and commissioning activities
Infrastructure	• Platform, wells, Xmas trees, umbilicals, spools, jumpers, manifolds, flowlines, riser, chemical supply lines and the export pipeline (see **Table 2** for their approximate location)
Vessels	• MODU type could be Moored, Dynamically Positioned (DP) or hybrid moored/DP (required for Xena-03 drilling activity) • Primary Installation Vessel (required for Xena-03 subsea installation activity) • Vessel for routine IMMR and Xmas tree installation, isolation testing or contingent activities • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and other general supply/support vessels appropriate to the nature of petroleum activities

Pluto Operations Facility Environment Plan	
Key dates	Routine Operations: • Ongoing
Approximate duration of Xena-03 Drilling and Tie-back	• Drilling: Activities are currently anticipated to take around 60 days to complete • Subsea installation: Activities are currently anticipated to have a cumulative duration of around three weeks (including mobilisation, demobilisation and contingency) • Timing and duration of activities is subject to change due to project schedule requirements, MODU/vessel availability, unforeseen circumstances and weather constraints
Operational Areas and Exclusion zones	The Operational Area for Routine Operations comprises: • The platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the platform • The export pipeline (PITL) and associated 6-inch chemical supply line covered by Pipeline Licence WA-17-PL and a 1500 m corridor either side of the pipeline • Pluto, Xena and Pyxis subsea facilities (including wells, production and pigging manifolds, production jumpers, spools, flowlines and flexible jumpers) and an area within 1500 m around the subsea infrastructure Xena-03 Drilling and Tie-Back: • The Operational Area includes a radius of 4000 m from the Xena-03 well to allow vessels to undertake drilling activities • Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements • An interactive map showing the location of the proposed activities will be available on the Woodside website and will be updated throughout the proposed activities
Distance to nearest town	• ~ 160 km north-west of Dampier
Distance to nearest marine park/ nature reserve	• The Operational Area overlaps the Montebello Australian Marine Park Multiple Use Zone (IUCN category VI)

Table 2. Approximate locations of key infrastructure related to the Pluto Facility Operations Petroleum Activities Program

Structure	Approximate Water Depth (m)	Latitude	Longitude	Petroleum Titles
Existing infrastructure				
Platform	-	19°54'49.23614"	115°7'54.46587"	WA-1-IL
Existing subsea infrastructure				
PYA manifold	-844 m	19°52'46.2896"S	115°09'00.0179"E	WA-34-L
XNA manifold	-182 m	19°57'52.6141"S	115°12'54.6816"E	
Pluto A and B flowlines	-	-	-	WA-16-PL
Export pipeline (Commonwealth)	-	-	-	WA-17-PL
Existing wells				
PLA01ST1 well	-830 m	19°54'48.23107"	115°7'54.75273"	WA-34-L
PLA02 well	-830 m	19°54'48.56705"	115°7'55.78025"	
PLA03ST1 well	-830 m	19°54'48.70289"	115°7'56.32877"	
PLA04 well	-830 m	19°54'48.69494"	115°7'55.57246"	
PLA05 well	-830 m	19°54'49.23614"	115°7'54.46587"	
PLA06 well	-830 m	19°54'48.25708"	115°7'54.13355"	
PLA07 well	-830 m	19°54'48.96"	115°07'55.2"	
PLA08 well	-820 m	19°54'42.003"	115°08'02.424"	
PYA01 well	-985 m	19°49'40.331"	115°10'34.942"	
PL-PYA02 well	-862 m	19°52'34.882"	115°09'00.645"	
XNA01 well	-180 m	19°58'13.56660"	115°12'46.17465"	
XNA02 well	-180 m	19°57'49.130"	115°13'02.764"	
Proposed well and infrastructure				
XNA03	-177 m	19°56'28.914"S	115°13'44.302"E	WA-34-L
Xena tie-in	-	19° 58' 15.25052"	115°12 '45.46775"	

Environment That May Be Affected (EMBA)

The environment that may be affected (EMBA) is the largest spatial extent where Pluto Facility Operations (including Xena-03 drilling and tie-back activities) could potentially have an environmental consequence (direct or indirect). The broadest extent of the EMBA takes into consideration planned and unplanned activities. For this EP, the EMBA has been developed by combining numerous modelling outputs based on highly unlikely releases of hydrocarbons to the environment. For this EP, the modelling scenarios that inform the EMBA are a loss of well integrity, loss of pipeline integrity or a vessel collision. The EMBA is depicted in **Figure 2**.

The EMBA does not represent the extent of the predicted impact of the highly unlikely unplanned release of hydrocarbons. Rather, the EMBA represents the merged area of many possible paths that a highly unlikely hydrocarbon release could travel, depending on the weather and ocean conditions at the time of the release. This means that in the highly unlikely event that a hydrocarbon release does occur, the whole EMBA will not be affected. The specific and minimal part of the EMBA that is affected will only be known at the time of the release.

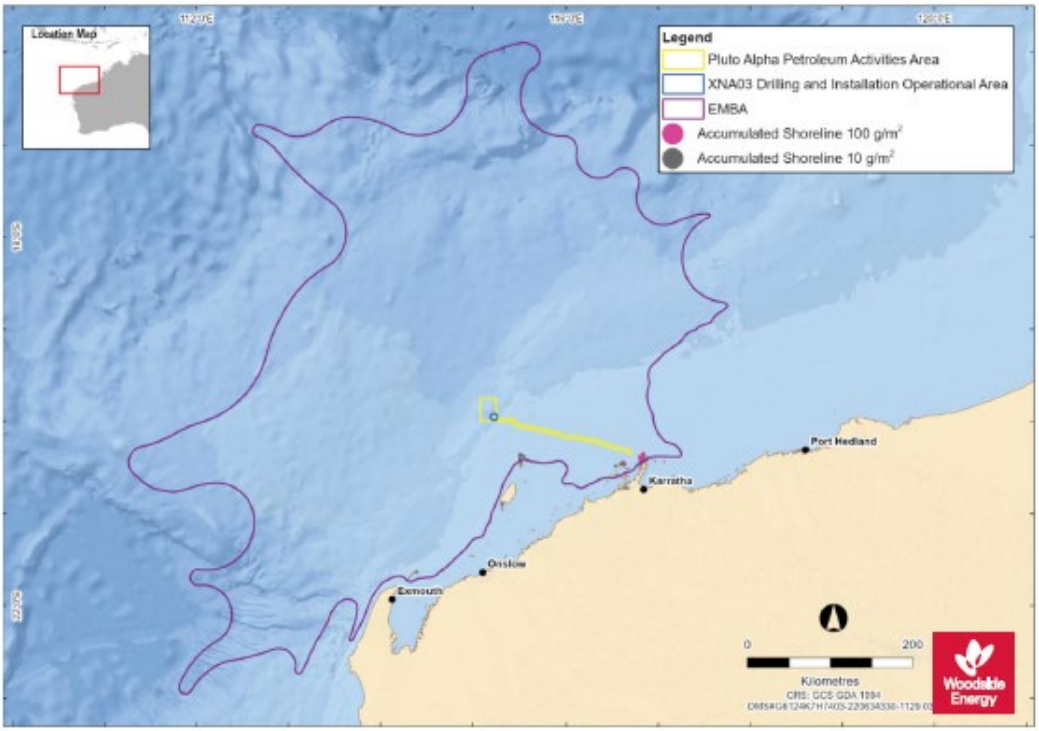


Figure 2: Environment that May Be Affected by the Pluto Facility Operations Petroleum Activities Program including Xena-03 drilling and tie-back

Mitigation and Management Measures

Woodside has undertaken an assessment to identify potential impacts and risks to the environment arising from the proposed activities considering timing, duration, location. Mitigation and management measures for proposed activities are outlined in **Table 3**. Further details will be provided in the EP.

Table 3. Summary of key risks and/or impacts and management measures associated with Pluto Facility Operations, including Xena-03 drilling and tie-back.

Potential Impact/ Risk	Description of Source of Potential Impact/Risk	Description of Potential Impacts/Risks	Preliminary Draft Mitigation and/or Management Measure
Planned Activities (Routine and Non-routine)			

Physical Presence: Interaction with Other Marine Users	**Operations**
	Presence of the Pluto facility, subsea infrastructure and routine IMMR activities excluding and/or displacing other users from the Petroleum Safety Zone (PSZ) and Operational Area respectively.
	
	Drilling and Tie-back Activities
	Physical presence of anchor system, mobile offshore drilling unit (MODU), support vessels, anchor handling vessels, installation vessels, and associated safety exclusion zones.
		Operations
		Potential isolated social impact resulting from interaction with other sea users such as:
		• Commercial fisheries
		• Tourism and recreation
		• Commercial vessels/ shipping
		
		Drilling and Tie-back Activities
		Temporary displacement of commercial fishing activities.
			• Implement a 500 m PSZ around the platform.
			• Establish a 500 m safety exclusion zone around MODU and the installation vessel which is communicated to marine users
			• Notifying the Australian Hydrographic Office (AHO) of location of permanent new infrastructure to enable update of maritime charts
			• Continued consultation relating to the Petroleum Activities Program
			• Implement Pluto's collision prevention system to alert marine vessels of the facility location which reduces the likelihood of adverse interaction with other marine users
			• Other controls include:
			  • Activity support vessel on standby as required (during drilling)
			  • Notice to Mariners
			  • Notify Australian Maritime Safety Authority (AMSA)
			  • Activity support vessel surveillance

Physical Presence: Disturbance to Seabed	**Operations** Presence of Pluto facility and subsea infrastructure modifying marine habitats. Subsea operations, IMMR activities resulting in disturbance to seabed. **Drilling and Tie-back Activities** Disturbance to seabed during drilling operations. Disturbance to seabed during subsea installation.	**Operations** Localised modification of seabed habitat (formation of artificial reef) within Operational Area. Potential minor, localised modification of seabed habitat within the Operational Areas. **Drilling and Tie-back Activities** Loss or damage to benthic habitats and communities.	• Monitoring and maintenance of subsea infrastructure to manage scour and flowline movement within integrity envelope • Monitoring and maintenance of redundant infrastructure in accordance with the IMMR process • Vessels used for IMMR will not anchor under routine operations • Reasonable attempt(s) at removal of wellhead will be undertaken in the event of a re-spud • Positioning technology used to place seabed infrastructure within the design footprint to reduce seabed disturbance • Project-specific Basis of Well Design, which includes an assessment of seabed sensitivity • Wet parked items will be tracked and removed from the seabed • Pre-lay survey undertaken prior to installation of flowlines
Routine Acoustic Emissions: Generation of Noise during Routine Operations	Noise generated from operational activities from: • facility and associated infrastructure • vessels • helicopters • IMMR activities • Positioning equipment	Localised behavioural impacts to marine fauna around vessels and Pluto platform.	• Comply with regulatory requirements for interactions with marine fauna to prevent adverse interactions

Potential Impact/ Risk	Description of Source of Potential Impact/Risk	Description of Potential Impacts/Risks	Preliminary Draft Mitigation and/or Management Measure
Acoustic Emissions: Generation of Noise during Tie-back Activities	Noise during Tie-back Activities generated from: • drilling, (hybrid MODU and DP) • vessels and helicopters • positioning equipment	Potential impacts to marine mammals, reptiles and fish, varying from behavioural responses to physiological impact (TTS).	• Comply with regulatory requirements for interactions with marine fauna to prevent adverse interactions • Implement adaptive management procedures as required

Routine and Non-Routine Discharges: Discharge of Hydrocarbons and Chemicals	**Operations**
	Discharge of subsea control fluids.
	Potential non-routine hydraulic fluid discharge.
	Discharge of hydrocarbons remaining in subsea pipelines/ flowlines and equipment as a result of subsea intervention works.
	Discharge of chemicals remaining in subsea infrastructure and equipment or the use of chemicals for subsea IMMR activities.
	Discharge of minor fugitive hydrocarbon from subsea equipment.
	Drilling and Tie-back Activities
	Discharge of flexible jumper and flying leads precommissioning fluids to the marine environment.
	Discharge of minor fugitive hydrocarbon from subsea equipment.
		Operations
		Potential slight short-term, localised decrease in water quality at release location during IMMR activities.
		Drilling and Tie-back Activities
		Potential short-term impacts on marine biota.
		Potential slight short-term, localised decrease in water quality at release location during installation activities.
			• Marine discharges managed according to regulatory requirements
			• Chemicals selected with the lowest reasonably practicable environmental impacts and risks subject to technical constraints and approved through the Woodside chemical assessment process
			• Flushing and isolation of subsea infrastructure where practicable during IMMR disconnection activities to reduce releases to the environment
			• Monitoring subsea control fluid use, investigating material discrepancies to identify potential integrity failures
			• Other controls include:
			  • Chemical Selection and Assessment
			  • Development and application of robust procedures

Routine and Non-Routine Discharges: Produced Water (PW)	Discharge of PW during routine and non-routine operations.	Potential minor, short term impact to water quality, marine sediments and marine biota.	• Marine discharges managed according to regulatory requirements • Online monitoring and procedural controls in place for PW discharge • Chemicals selected with the lowest reasonably practicable environmental impacts and risks subject to technical constraints and approved through the Woodside chemical assessment process. Woodside internal guidance and procedures are adhered to • Implement adaptive monitoring and management
Routine and Non-Routine Marine Wastewater Discharges: Discharge of Sewage, Putrescible Waste, Grey Water, Bilge Water, Drain Water, Cooling Water and Brine	**Operations** Discharge of sewage, grey water and putrescible waste from the platform and support vessels to the marine environment. Discharge of deck, bilge and drain water from the platform and support vessels to the marine environment. Discharge brine and cooling water from platform and support vessels to the marine environment. **Drilling and Tie-back Activities** Routine offshore discharge from MODU and vessels of sewage, grey water, waste, bilge water and deck drainage.	**Operations** Potential slight, localised increase in water temperature, salinity and short-term water quality changes around discharge location. **Drilling and Tie-back Activities** Potential slight, localised increase in water temperature, salinity and short-term water quality changes around discharge location.	• Marine discharges managed according to regulatory requirements • Chemicals selected with the lowest reasonably practicable environmental impacts and risks subject to technical constraints and approved through the Woodside chemical assessment process • Where there is the potential for loss of primary containment of oil and chemicals on the platform, MODU or vessels, bunding or closed drainage systems are in place to contain spills

Potential Impact/ Risk	Description of Source of Potential Impact/Risk	Description of Potential Impacts/Risks	Preliminary Draft Mitigation and/or Management Measure
Routine and Non-routine Atmospheric Emissions	**Operations** Operational fuel combustion, flaring and fugitive emissions. Operational emissions associated with energy generation, onshore processing of Pluto gas, third party transportation, regassification and combustion by end users. **Drilling and Tie-back Activities** Contingent venting of gas during drilling (e.g. well kick). Vessel and helicopter emissions.	Potential slight short-term, localised air quality changes, limited to the airshed local to the facility.	• Comply with legislative and regulatory requirements for marine air pollution and emissions reporting • Robust well control procedures to minimise risk of well kick during drilling • Maintain flare to maximise efficiency of combustion
Routine Light Emissions: Light Emissions from the Platform and Project Vessels	**Operations** Light emissions from facility, MODU and support vessels. Light emissions from facility during flaring. **Drilling and Tie-back Activities** Light emissions during drilling including flaring, from support vessels, primary installation vessel as well as subsea vehicles.	Negligible, localised potential for behavioural disturbance of species near Pluto platform and vessels including fish, marine reptiles and seabirds.	• Lighting limited to the minimum required for navigational and safety requirements, except for emergency events • Well unloading acceptance criteria that define the well objectives will be established, minimising light from flaring • Implementation of a Seabird Management Plan

Routine and Non-Routine Discharges: Drill Cuttings, Drilling Fluids and Well Removal Fluids during drilling and tie-back activities	Routine discharge of water-based muds (WBM) drill cuttings to the seabed and the marine environment.
	Non-routine discharge of treated non-water-based muds (NWBM) drill cuttings to the marine environment.
	Non-routine discharge of wash water from mud pits and vessel tank wash fluids during drilling and tie-back.
	Routine discharge of well clean-out fluids during drilling and tie-back.
	Non-routine discharge of well annular fluids during drilling and tie-back.
	Non-routine discharge of WBM and cement cuttings to the marine environment during drilling out of a cement plug.
	Non-routine discharge of grit and flocculant during removal of well infrastructure.
		Potential impacts to marine biota, as well as localised reduction in water quality with potential effects on both water quality and benthic communities.	• Chemicals selected with the lowest reasonably practicable environmental impacts and risks subject to technical constraints and approved through the Woodside chemical assessment process
			• NWBM base oils selected based on expected toxicity
			• NWBM will be used where written justification process has been followed and bulk NWBM will be retained for disposal onshore or maintained on rig for re-use
			• Fluids contaminated with hydrocarbons will be treated to meet specified discharge limits prior to discharge or contained. If discharge specifications are not met the fluid will be returned to shore
			• Drill cuttings returned to the MODU will be discharged below the water line to reduce carriage and dispersion to other areas
			• Other controls include:
			  ◦ Restrict overboard discharge of NWBM
			  ◦ Measure oil content in displacement, brine, workover or intervention fluids, pit and tank wash
			  ◦ Permit to Work system
			  ◦ Solid Control Equipment
			  ◦ Woodside Engineering Standard for Rig Equipment

Potential Impact/ Risk	Description of Source of Potential Impact/Risk	Description of Potential Impacts/Risks	Preliminary Draft Mitigation and/or Management Measure
Routine and Non-Routine Discharges: Cement, Cementing Fluids, Subsea Well Fluids, Unused Bulk Product and Subsea Chemicals during drilling and tie-back activities	Routine discharge of cement and cementing fluids, to the seabed and the marine environment during drilling and tie-back. Routine discharge of subsea well fluids (inc. blow-out preventer (BOP)) and well construction activity control fluids) during drilling and tie-back. Non-routine discharge of unused bulk products during drilling and tie-back.	Potential impacts to marine biota, as well as localised reduction in water quality with potential effects on both water quality and benthic communities.	• Chemicals selected with the lowest reasonably practicable environmental impacts and risks subject to technical constraints and approved through the Woodside chemical assessment process • Fluids contaminated with hydrocarbons will be treated to meet specified discharge limits prior to discharge or contained. If discharge specifications are not met, fluids will be returned to shore • During well unloading and completion activities, if produced water is not flared, it will be processed through a water treatment package prior to discharge to the environment • Options for use of excess bulk cement, bentonite or barite will be managed and only discharged to the marine environment as a last option
Unplanned Events (Accidents / Incidents) – Routine Operations (i.e. no drilling or subsea installation activities)			
Unplanned Hydrocarbon Release: Loss of Well Containment	Release of hydrocarbons resulting from loss of subsea well containment.	Potential significant impacts to the marine environment: • Long-term impacts to sensitive nearshore areas of offshore islands and coastal shorelines • Disruption to marine fauna, including protected species • Potential medium-term interference with or displacement of other sea users	**Preventing loss of well control** • Well operated in compliance with the accepted well operation management plan (WOMP) including implementation of barriers to prevent a loss of well control • Checks completed during well operations to establish a minimum acceptable standard of well integrity **Spill response arrangements** • Arrangements supporting the Oil Pollution Emergency Plan (OPEP) will be tested to ensure the OPEP can be implemented as planned • Emergency response activities would be implemented in line with the OPEP
Unplanned Hydrocarbon Release: Pipeline and Riser Loss of Containment	Release of hydrocarbons resulting from loss of export pipeline containment. Release of hydrocarbons resulting from loss of containment of subsea flowlines and infrastructure.	Potential significant impacts to the marine environment: • Long-term impacts to sensitive nearshore areas of offshore islands and coastal shorelines • Disruption to marine fauna, including protected species • Potential medium-term interference with or displacement of other sea users	**Preventing loss of pipeline and riser containment** • The pipeline, flowline and riser design include a range of measures that specifically aid in minimising the risk of external damage • Maintain well integrity to contain reservoir fluids within the well envelope to avoid an incident • Maintain emergency shutdown (ESD) system and critical external and internal communication systems to facilitate prevention and response to accidents and emergencies **Spill response arrangements** • Arrangements supporting the OPEP will be tested to ensure the OPEP can be implemented as planned • Emergency response activities would be implemented in line with the OPEP
Unplanned Hydrocarbon Release: Loss of Structural Integrity	Surface or subsea release from flowline, pipeline and riser to the marine environment and atmosphere. Hydrocarbon release from topsides equipment to the marine environment and atmosphere.	Potential significant impacts to the marine environment: • Long-term impacts to sensitive nearshore areas of offshore islands and coastal shorelines • Disruption to marine fauna, including protected species • Potential medium-term interference with or displacement of other sea users	**Preventing loss of structural integrity** • Maintain structural integrity to ensure availability of critical systems during a major accident or environment event and prevent structural failures from contributing to escalation • Maintain control of ignition sources and passive fire protection to prevent loss of structural integrity • Maintain topsides hydrocarbon-containing infrastructure integrity **Spill response arrangements** • Arrangements supporting the OPEP will be tested to ensure the OPEP can be implemented as planned • Emergency response activities would be implemented in line with the OPEP

Potential Impact/ Risk	Description of Source of Potential Impact/Risk	Description of Potential Impacts/Risks	Preliminary Draft Mitigation and/or Management Measure
Unplanned Hydrocarbon Release: Loss of Structural Integrity	A loss of marine vessel separation between a vessel and the platform may result in a loss of hydrocarbon containment from the Pluto facility and/or the release of fuel from the vessel.	Potential significant impacts to the marine environment: • Long-term impacts to sensitive nearshore areas of offshore islands and coastal shorelines • Disruption to marine fauna, including protected species • Potential medium-term interference with or displacement of other sea users	**Preventing loss of marine vessel separation** • Maintaining collision warning systems and navigational aids to alert facility of a potential collision with a vessel, and to alert vessels so that they may avoid collisions with the facility **Spill response arrangements** • Arrangements supporting the OPEP will be tested to ensure the OPEP can be implemented as planned • Emergency response activities would be implemented in line with the OPEP
Unplanned Hydrocarbon Release: Topsides Loss of Containment	Hydrocarbon release from topsides process equipment o the marine environment and atmosphere.	Potential moderate short-term impacts to the marine environment: • Disruption to marine fauna, including protected species and/or impacts to water quality	**Preventing topsides loss of containment** • Wells drilled in compliance with the accepted WOMP including implementation of barriers to prevent a loss of well control • Checks completed during well operations to establish a minimum acceptable standard of well integrity • An approved Source Control Emergency Response Plan will be prepared prior to drilling each well including feasibility and specific considerations for relief well • Subsea BOP specification, installation and testing compliant with internal Woodside Standards and international requirements **Spill response arrangements** • Arrangements supporting the OPEP will be tested to ensure the OPEP can be implemented as planned • Emergency response activities would be implemented in line with the OPEP are raised for unplanned releases within event reporting system
Unplanned Hydrocarbon Release: Loss of Control of Suspended Load from Platform	Surface or subsea release from flowline, pipeline and riser to the marine environment and atmosphere. Hydrocarbon release from topsides equipment to the marine environment and atmosphere.	Potential significant impacts to the marine environment: • Long-term impacts to sensitive nearshore areas of offshore islands and coastal shorelines • Disruption to marine fauna, including protected species • Potential medium-term interference with or displacement of other sea users	**Preventing loss of control of suspended load** • Maintain platform lifting equipment to prevent failure or dropped/swinging loads that could result in an incident
Unplanned Events (Accidents / Incidents) – Drilling and subsea installation			
Unplanned Hydrocarbon Release: Loss of Well Integrity During Drilling Operations	Loss of hydrocarbons to marine environment due to loss of well containment.	Potential significant impacts to the marine environment: • Long-term impacts to sensitive nearshore areas of offshore islands and coastal shorelines • Disruption to marine fauna, including protected species • Potential medium-term interference with or displacement of other sea users	**Preventing loss of well control** • Wells drilled in compliance with the accepted WOMP including implementation of barriers to prevent a loss of well control • An approved Source Control Emergency Response Plan will be prepared prior to drilling each well including feasibility and specific considerations for relief well • Subsea BOP specification, installation and testing compliant with internal Woodside Standards and international requirements **Spill response arrangements** • Arrangements supporting the OPEP will be tested to ensure the OPEP can be implemented as planned • Emergency response activities would be implemented in line with the OPEP

Potential Impact/ Risk	Description of Source of Potential Impact/Risk	Description of Potential Impacts/Risks	Preliminary Draft Mitigation and/or Management Measure

Unplanned Hydrocarbon Release: Vessel Collision	Loss of hydrocarbons to marine environment due to a vessel collision (e.g. project vessels or other marine users).	Potential minor, short-term impact on marine species, habitats and protected areas.	**Preventing vessel collision**
			• Comply with regulatory requirements for the prevention of vessel collisions and safety and emergency arrangements
			• Establish temporary safety exclusion zones around vessels which are communicated to marine users to reduce the likelihood of collision
			• Other controls include:
			  • Activity support vessel on standby as required (during drilling)
			  • Notice to Mariners
			  • Notify Australian Maritime Safety Authority (AMSA)
			Spill response arrangements
			• Arrangements supporting the OPEP will be tested to ensure the OPEP can be implemented as planned
			• Emergency response activities would be implemented in line with the OPEP

Unplanned Discharges: Release of Hydrocarbons During Bunkering, Transfer, Storage and Use	Accidental discharge of marine diesel to the marine environment during bunkering, transfer, storage or use on the facility, MODU or vessels.	Potential slight, short-term local impacts to marine species and habitats.	**Preventing unplanned hydrocarbon release due to bunkering** • Comply with regulatory requirements for the prevention of marine pollution • Liquid chemical and fuel storage areas bunded or secondarily contained when they are not being handled or temporarily moved • Appropriate bunkering equipment kept and maintained • Compliance with Contractor procedures for the management of bunkering/helicopter operations to reduce the likelihood and potential severity of a spill **Spill response arrangements** • Maintain and locate spill kits in proximity to hydrocarbon storage and deck areas for use to contain and recover deck spills • Arrangements supporting the OPEP will be tested to ensure the OPEP can be implemented as planned • Emergency response activities would be implemented in line with the OPEP • Incident reports are raised for unplanned releases within event reporting system
Unplanned Discharges: Deck and Subsea Spills	Accidental discharge of hydrocarbons/ chemicals from MODU, installation vessel and project vessels deck activities and equipment, from subsea ROV hydraulic leaks. Unplanned release of chemicals or hydraulic fluid due to failure of subsea equipment.	No lasting effect, localised impact to the marine environment.	• Comply with regulatory requirements for the prevention of marine pollution • Liquid chemical and fuel storage areas are bunded or secondarily contained when they are not being handled/moved temporarily • Spill kits positioned in high-risk locations around vessels and the MODU (near potential spill points such as transfer stations) • Chemicals selected with the lowest reasonably practicable environmental impacts and risks subject to technical constraints and approved through the Woodside chemical assessment process • Installation vessels have self-containing hydraulic oil drip tray management system • Woodside Engineering Standard for Rig Equipment (incl third party equipment such as ROVs) **Spill response arrangements** • First strike plan • Shipboard Oil Pollution Emergency Plan (SOPEP)

Potential Impact/ Risk	Description of Source of Potential Impact/Risk	Description of Potential Impacts/Risks	Preliminary Draft Mitigation and/or Management Measure

Unplanned Discharge: Drilling/ Project Fluids	Accidental discharge of project fluids (WBM/NWBM/ base oil) and cement to marine environment due to failure of slip joint packers, bulk transfer hose/fitting, emergency disconnect system or from drilling and installation operations.	Potential slight, short-term local impacts to marine species and habitats.	• Chemicals selected with the lowest reasonably practicable environmental impacts and risks subject to technical constraints and approved through the Woodside chemical assessment process
			• Marine riser's telescopic joint to be comprised of a minimum of two packers (one hydraulic and one pneumatic) and pressure tested
			• No overboard disposal of bulk NWBM
			• Compliance with Contractor procedures for the transfer and management of drilling fluids to reduce the likelihood and severity of a spill
			• Other controls include:
			  • Oil % content in displacement, brine, workover or intervention fluids, pit and tank wash
			  • PTW system
			  • Solid Control Equipment

Unplanned Discharges: Loss of Hazardous and Non-Hazardous Waste	Incorrect disposal or accidental discharge of non hazardous and hazardous waste to the marine environment.	No lasting effect, localised impact to the marine environment.	• Comply with regulatory requirements for the prevention of marine pollution and handling of hazardous wastes • Implement Waste Management Plan, which provides for safe handling and transportation, segregation and storage and appropriate classification of waste generated • Solid waste/equipment dropped to the marine environment will be recovered where safe and practicable to do so • Where retrieval is not reasonably practicable and/ or safe, material items (property) lost to the marine environment will undergo an impact assessment and will be added to the inventory for the title • Incident reports are raised for unplanned releases within event reporting system
Physical Presence: Seabed disturbance from dropped objects or loss of station keeping leading to anchor drag	Dropped objects resulting in the disturbance of benthic habitat. Loss of station keeping of the MODU leading to anchor drag and the disturbance of benthic habitat. Dropped objects over live infrastructure. Dropped objects during vessel transfers or installation activities.	Potential slight, short-term local impacts to marine species and habitats.	• MODU/installation vessel inductions include control measures for dropped object prevention • Equipment dropped to the marine environment will be recovered where safe and practicable to do so • Where retrieval is not reasonably practicable and/ or safe, material items (property) lost to the marine environment will undergo an impact assessment and will be added to the inventory for the title • Implement project-specific mooring design, with sufficient capability, testing and inspection
Physical Presence: Interactions with Marine Fauna	Physical presence of project/ support vessels resulting in collision with marine fauna.	Potential injury or death of marine fauna (single animal), including protected species.	• Comply with regulatory requirements for interactions with marine fauna to reduce the likelihood of a collision occurring
Physical Presence: Introduction of Invasive Marine Species (IMS)	Invasive species in vessel ballast tanks or on vessels/ submersible equipment.	Potential introduction of IMS possibly resulting in an alteration of the localised environment and potential reduction in native species through predation, competition or interspecies breeding.	• Ballast water and biofouling will be managed according to regulatory requirements, including the Australian Ballast Water Management Requirements, and the Australian Biofouling Management Requirements, as applicable • Woodside's IMS risk assessment process will be applied to project vessels and immersible equipment entering the Operational Area

Feedback

Woodside consults relevant persons in the course of preparing Environment Plans to notify them of the activity and to obtain relevant feedback to inform its planning for proposed petroleum activities in the region.

If you would like to comment on the proposed activities outlined in this information sheet, or would like additional information, please contact Woodside before **29 March 2024** via:

E: Feedback@woodside.com.au

Toll free: 1800 442 977

You can subscribe on our website to receive Consultation Information Sheets for proposed activities:

http://www.woodside.com/what-we-do/consultation-activities

Please note that stakeholder feedback will be communicated to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) as required under legislation. Woodside will communicate material changes to the proposed activity to affected stakeholders as they arise.

Please note that your feedback and our response will be included in our Environment Plan for the proposed activity, which will be submitted to the NOPSEMA for acceptance in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023* (Cth) and to support other regulatory processes associated with the planned activities (which may or may not be confidential).

Please let us know if you request that particular information that you provide in the consultation not be published. If so, we will make your request known to NOPSEMA so that the information is not included when the EP is published on NOPSEMA's website.

www.woodside.com

Woodside Energy

2. INITIAL CONSULTATION

2.1 Email sent to Australian Border Force (ABF), Australian Maritime Safety Authority (AMSA) Marine Pollution, Pilbara Ports Authority (26 February 2024)

Woodside is planning to submit a five-year revision of the Pluto Facility Operations Environment Plan (EP).

The Pluto platform is in Production Licence WA-1-IL and WA-34-L, located in Commonwealth waters approximately 160 km north west of Dampier, Western Australia.

Woodside plans to continue producing wet gas and condensate from the Pluto, Xena and Pyxis reservoirs. The gas and condensate are transported via a 180 km long export pipeline to the onshore Pluto facility. Operations began in 2012.

The following proposed activities will continue at the Facility:

- Routine production
- Routine inspection, monitoring, maintenance and repair (IMMR)
- Commissioning and operation of the water handling unit
- Non-routine and unplanned activities and incidents associated with the above.

In addition, Woodside proposes to conduct drilling, subsea installation and commissioning (tie-back), and production from the Xena-03 well into the existing Pluto production systems.

Environment that May be Affected (EMBA)
Following changes to Commonwealth EP consultation requirements, Woodside is now consulting persons or organisations who are located within the EMBA by a proposed petroleum activity. The EMBA is the largest spatial extent where unplanned events could potentially have an environmental consequence. For this EP, it is determined by a highly unlikely release of hydrocarbons to the environment due to a loss of well integrity, loss of pipeline integrity or a vessel collision.

A **Consultation Information Sheet** is attached, which provides additional background on the proposed activities, including summaries of potential key impacts and risks, and associated management measures. These are also available on our website. You can also subscribe to receive updates on our consultation activities by subscribing here.

Activity: Pluto Facility Operations

Environment Plan	**Pluto Facility Operations Environment Plan**	
Summary of activities	Ongoing Operations	Drilling and tie-back
	Continued wet gas and condensate production at the Pluto, Xena and Pyxis reservoir.	Drilling and tie-back of the Xena-03 well into the existing Pluto production systems

Permit Area	Activities will occur within Production License WA-1-IL and WA-34-L.	Activities will occur within Production License WA-34-L
Location	160 km north west of Dampier, Western Australia	190 km west north west of Dampier, Western Australia
Approx. Water Depth (m)	80-960 m	176 m
Schedule	Production Commenced: 2012 Routine Operations: Ongoing	Drilling expected in Q2 2025 Subsea installation expected in Q3 2025
Operational Areas / Exclusion Zones	The riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the platform. The export pipeline (P1TL) and associated 6-inch chemical supply line covered by Pipeline License WA-17-PL and a 1500 m corridor either side of the pipeline. Pluto, Xena and Pyxis subsea facilities (including wells, production and pigging manifolds, production jumpers, spools, flowlines and flexible jumpers) and an area within 1500 m around the subsea infrastructure.	The Operational Area includes a radius of 4000 m from the Xena-03 well to allow vessels to undertake drilling activities. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	Key infrastructure includes, but is not limited to: i. Riser platform i. Pluto A and B flowlines i. Export pipeline (Commonwealth)	Key infrastructure includes, but is not limited to: v. Xena tie-in v. One subsea Xmas tree and wellhead
Vessels	Operations support vessels will be used to undertake IMMR of subsea infrastructure.	Mobile offshore drilling unit (MODU), support and installation vessels.

Feedback

If you have feedback specific to the proposed activities described under the proposed EP, we would welcome your feedback at Feedback@woodside.com.au or 1800 442 977 by **Wednesday 29 March 2024.**

Your feedback and our response will be included in our EP which will be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for acceptance in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023* (Cth). Your feedback may also be used to support other regulatory processes associated with the planned activities (which may or may not be confidential)

Please let us know if you request that particular information that you provide in the consultation not be published. If so, we will make your request known to NOPSEMA so that the information is not included when the EP is published on NOPSEMA's website.

NOPSEMA has published a brochure entitled *Consultation on offshore petroleum environment plans – Information for the Community* to help community members understand consultation requirements for Commonwealth EPs and how to participate in consultation.

2.2 Email sent to Australian Communications and Media Authority (ACMA) (26 February 2024)

Woodside is planning to submit a five-year revision of the Pluto Facility Operations Environment Plan (EP).

The Pluto platform is in Production Licence WA-1-IL and WA-34-L, located in Commonwealth waters approximately 160 km north west of Dampier, Western Australia.

Woodside plans to continue producing wet gas and condensate from the Pluto, Xena and Pyxis reservoirs. The gas and condensate are transported via a 180 km long export pipeline to the onshore Pluto facility. Operations began in 2012.

The following proposed activities will continue at the Facility:

- Routine production
- Routine inspection, monitoring, maintenance and repair (IMMR)
- Commissioning and operation of the water handling unit
- Non-routine and unplanned activities and incidents associated with the above.

In addition, Woodside proposes to conduct drilling, subsea installation and commissioning (tie-back), and production from the Xena-03 well into the existing Pluto production systems.

Environment that May be Affected (EMBA)
Following changes to Commonwealth EP consultation requirements, Woodside is now consulting persons or organisations who are located within the EMBA by a proposed petroleum activity. The EMBA is the largest spatial extent where unplanned events could potentially have an environmental consequence. For this EP, it is determined by a highly unlikely release of hydrocarbons to the environment due to a loss of well integrity, loss of pipeline integrity or a vessel collision.

A **Consultation Information Sheet** is attached, which provides additional background on the proposed activities, including summaries of potential key impacts and risks, and associated management measures. Also attached is a map of the submarine communications cables in the operational area. These are also available on our website. You can also subscribe to receive updates on our consultation activities by subscribing here.

Activity: Pluto Facility Operations

Environment Plan	Pluto Facility Operations Environment Plan

Summary of activities	Ongoing Operations	Drilling and tie-back
	Continued wet gas and condensate production at the Pluto, Xena and Pyxis reservoir.	Drilling and tie-back of the Xena-03 well into the existing Pluto production systems
Permit Area	Activities will occur within Production License WA-1-IL and WA-34-L.	Activities will occur within Production License WA-34-L
Location	160 km north west of Dampier, Western Australia	190 km west north west of Dampier, Western Australia
Approx. Water Depth (m)	80-960 m	176 m
Schedule	Production Commenced: 2012 Routine Operations: Ongoing	Drilling expected in Q2 2025 Subsea installation expected in Q3 2025
Operational Areas / Exclusion Zones	The riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the platform. The export pipeline (P1TL) and associated 6-inch chemical supply line covered by Pipeline License WA-17-PL and a 1500 m corridor either side of the pipeline. Pluto, Xena and Pyxis subsea facilities (including wells, production and pigging manifolds, production jumpers, spools, flowlines and flexible jumpers) and an area within 1500 m around the subsea infrastructure.	The Operational Area includes a radius of 4000 m from the Xena-03 well to allow vessels to undertake drilling activities. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	Key infrastructure includes, but is not limited to: i. Riser platform i. Pluto A and B flowlines i. Export pipeline (Commonwealth)	Key infrastructure includes, but is not limited to: x. Xena tie-in x. One subsea Xmas tree and wellhead
Vessels	Operations support vessels will be used to undertake IMMR of subsea infrastructure.	Mobile offshore drilling unit (MODU), support and installation vessels.

Feedback

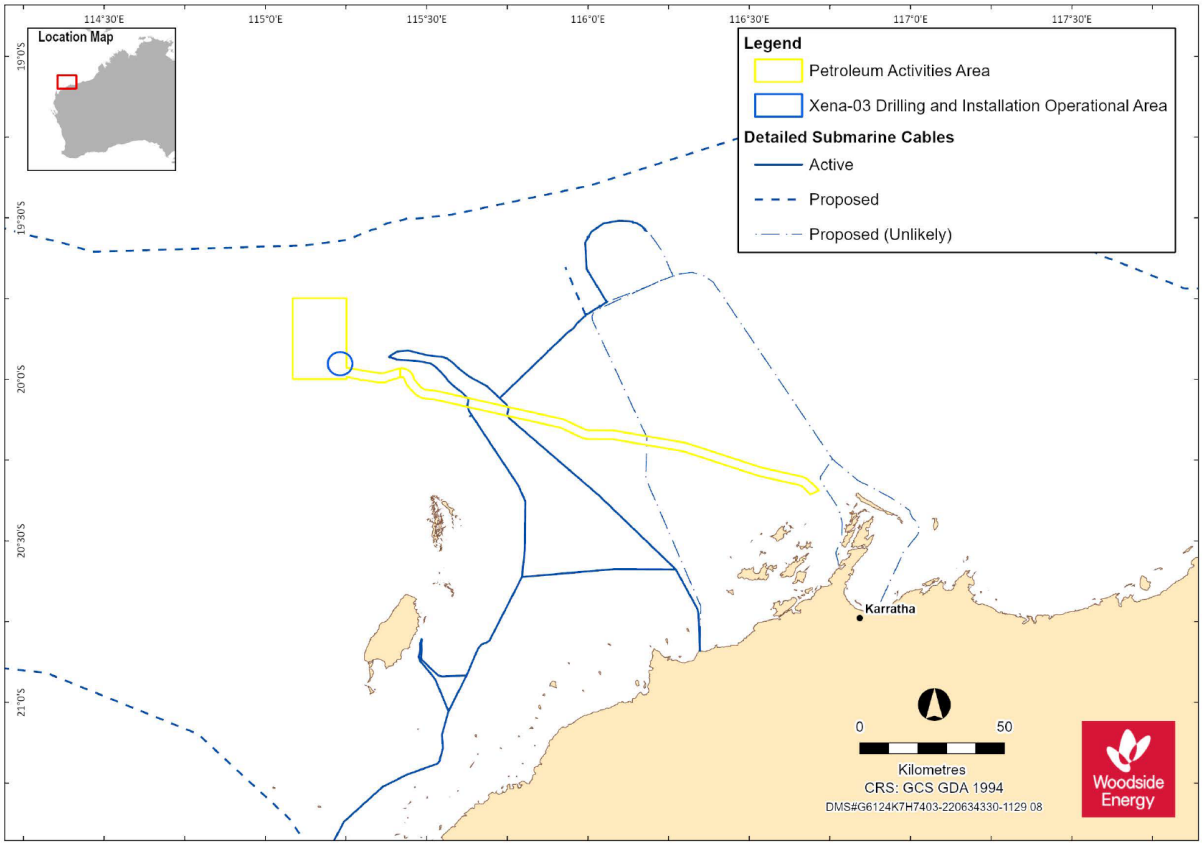
If you have feedback specific to the proposed activities described under the proposed EP, we would welcome your feedback at Feedback@woodside.com.au or 1800 442 977 by **Wednesday 29 March 2024.**

Your feedback and our response will be included in our EP which will be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for acceptance in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023* (Cth). Your feedback may also be used to support other regulatory processes associated with the planned activities (which may or may not be confidential)

Please let us know if you request that particular information that you provide in the consultation not be published. If so, we will make your request known to NOPSEMA so that the information is not included when the EP is published on NOPSEMA's website.

NOPSEMA has published a brochure entitled *Consultation on offshore petroleum environment plans – Information for the Community* to help community members understand consultation requirements for Commonwealth EPs and how to participate in consultation.

2.2.1 Submarine Communications Cables



2.3 Email sent to Australian Fisheries Management Authority (AFMA), Department of Primary Industries and Regional Development (DPIRD) (26 February 2024)

Woodside is planning to submit a five-year revision of the Operations Environment Plan (EP) for the Pluto Facility.

The Pluto platform is in Production Licence WA-1-IL and WA-34-L, located in Commonwealth waters approximately 160 km north west of Dampier, Western Australia.

Woodside plans to continue producing wet gas and condensate from the Pluto, Xena and Pyxis reservoirs. The gas and condensate are transported onshore via a 180 km long export pipeline. Operations began in 2012.

The following proposed activities will continue at the Facility:

- Routine production
- Routine inspection, monitoring, maintenance and repair (IMMR)
- Commissioning and operation of the water handling unit
- Non-routine and unplanned activities and incidents associated with the above.

In addition, Woodside proposes to conduct drilling, subsea installation and commissioning (tie-back), and production from the Xena-03 well into the existing Pluto production systems.

Operational Areas and Exclusion Zones

Infrastructure is located within the Operational Areas described below. This area is where Woodside vessels can be expected to be operating to undertake routine operations:

- The riser platform and the area within a 500 m radius operational area around the platform
- The export pipeline (P1TL) and associated 6-inch chemical supply line covered by Pipeline Licence WA-17-PL and a 1500 m operational area corridor either side of the pipeline
- Pluto, Xena and Pyxis subsea facilities (including wells, production and pigging manifolds, production jumpers, spools, flowlines and flexible jumpers) and an area within 1500 m operational area around the subsea infrastructure.

The Xena-03 Drilling and Tie-Back activity will take place within an Operational Area that includes the Xena-03 well location and the area within a 4000 m radius.

Exclusion zones, which are established for navigational safety and fishing vessels are not allowed to enter, will include:

- The 500 m-radius Petroleum Safety Zone (PSZ) around the platform, and
- A temporary 500 m-radius safety exclusion zone around vessels conducting drilling and installation activities.

An interactive map showing the location of the proposed activities will be available on the Woodside website and will be updated throughout the proposed activities.

Environment that May be Affected (EMBA)

Following changes to Commonwealth EP consultation requirements, Woodside is now consulting persons or organisations who are located within the EMBA by a proposed petroleum activity. The EMBA is the largest spatial extent where unplanned events could potentially have an environmental consequence. For this EP, it is determined by a highly unlikely release of hydrocarbons to the environment due to a loss of well integrity, loss of pipeline integrity or a vessel collision.

A Consultation Information Sheet is attached, which provides additional background on the proposed activities, including summaries of potential key impacts and risks, and associated management measures. These are also available on our website. You can also subscribe to receive updates on our consultation activities by subscribing here.

Environment Plan	Pluto Facility Operations Environment Plan	
Summary of activities	Ongoing Operations	Drilling and tie-back
	Continued wet gas and condensate production at the Pluto, Xena and Pyxis reservoir.	Drilling and tie-back of the Xena-03 well into the existing Pluto production systems
Permit Area	Activities will occur within Production License WA-1-IL and WA-34-L.	Activities will occur within Production License WA-34-L
Location	160 km north west of Dampier, Western Australia	190 km west north west of Dampier, Western Australia
Approx. Water Depth (m)	80-960 m	176 m
Schedule	Production Commenced: 2012 Routine Operations: Ongoing	Drilling expected in Q2 2025 Subsea installation expected in Q3 2025
Operational Areas / Exclusion Zones	The riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the platform. The export pipeline (P1TL) and associated 6-inch chemical supply line covered by Pipeline License WA-17-PL and a 1500 m corridor either side of the pipeline. Pluto, Xena and Pyxis subsea facilities (including wells, production and pigging manifolds, production jumpers, spools, flowlines and flexible jumpers) and an area within 1500 m around the subsea infrastructure.	The Operational Area includes a radius of 4000 m from the Xena-03 well to allow vessels to undertake drilling activities. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	Key infrastructure includes, but is not limited to: i. Riser platform i. Pluto A and B flowlines i. Export pipeline (Commonwealth)	Key infrastructure includes, but is not limited to: v. Xena tie-in v. One subsea Xmas tree and wellhead
Vessels	Operations support vessels will be used to undertake IMMR of subsea infrastructure.	Mobile offshore drilling unit (MODU), support and installation vessels.

Relevant Fisheries	**Commonwealth fisheries** **Operational Areas:** North-West Slope Trawl Fishery. **EMBA:** North-West Slope Trawl Fishery, Western Deepwater Trawl Fishery.

Feedback
Should you require notification prior to, and on completion of, the proposed activities, or have feedback specific to the proposed activities described, we would welcome your feedback at Feedback@woodside.com.au or 1800 442 977 by **Wednesday 29 March 2024.**

Your feedback and our response will be included in our EP which will be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for acceptance in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023* (Cth). Your feedback may also be used to support other regulatory processes associated with the planned activities (which may or may not be confidential).

Please let us know if you request that particular information that you provide in the consultation not be published. If so, we will make your request known to NOPSEMA so that the information is not included when the EP is published on NOPSEMA's website.

NOPSEMA has published a brochure entitled *Consultation on offshore petroleum environment plans – Information for the Community* to help community members understand consultation requirements for Commonwealth EPs and how to participate in consultation.

2.4 Email sent to Australian Hydrographic Office (AHO), Australian Maritime Safety Authority (AMSA) Marine Safety (26 February 2024)

Woodside is planning to submit a five-year revision of the Pluto Facility Operations Environment Plan (EP).

The Pluto platform is in Production Licence WA-1-IL and WA-34-L, located in Commonwealth waters approximately 160 km north west of Dampier, Western Australia.

Woodside plans to continue producing wet gas and condensate from the Pluto, Xena and Pyxis reservoirs. The gas and condensate are transported via a 180 km long export pipeline to the onshore Pluto facility. Operations began in 2012.

The following proposed activities will continue at the Facility:
- Routine production
- Routine inspection, monitoring, maintenance and repair (IMMR)
- Commissioning and operation of the water handling unit
- Non-routine and unplanned activities and incidents associated with the above.

In addition, Woodside proposes to conduct drilling, subsea installation and commissioning (tie-back), and production from the Xena-03 well into the existing Pluto production systems.

Environment that May be Affected (EMBA)

Following changes to Commonwealth EP consultation requirements, Woodside is now consulting persons or organisations who are located within the EMBA by a proposed petroleum activity. The EMBA is the largest spatial extent where unplanned events could potentially have an environmental consequence. For this EP, it is determined by a highly unlikely release of hydrocarbons to the environment due to a loss of well integrity, loss of pipeline integrity or a vessel collision.

A **Consultation Information Sheet** is attached, which provides additional background on the proposed activities, including summaries of potential key impacts and risks, and associated management measures. Also attached are a map of the shipping lanes and GIS shape files. These are also available on our website. You can also subscribe to receive updates on our consultation activities by subscribing here.

Activity: Pluto Facility Operations

Environment Plan	**Pluto Facility Operations Environment Plan**	
Summary of activities	Ongoing Operations	Drilling and tie-back
	Continued wet gas and condensate production at the Pluto, Xena and Pyxis reservoir.	Drilling and tie-back of the Xena-03 well into the existing Pluto production systems
Permit Area	Activities will occur within Production License WA-1-IL and WA-34-L.	Activities will occur within Production License WA-34-L
Location	160 km north west of Dampier, Western Australia	190 km west north west of Dampier, Western Australia
Approx. Water Depth (m)	80-960 m	176 m
Schedule	Production Commenced: 2012 Routine Operations: Ongoing	Drilling expected in Q2 2025 Subsea installation expected in Q3 2025
Operational Areas / Exclusion Zones	The riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the platform. The export pipeline (P1TL) and associated 6-inch chemical supply line covered by Pipeline License WA-17-PL and a 1500 m corridor either side of the pipeline. Pluto, Xena and Pyxis subsea facilities (including wells, production and pigging manifolds, production jumpers, spools, flowlines and flexible jumpers) and an area within 1500 m around the subsea infrastructure.	The Operational Area includes a radius of 4000 m from the Xena-03 well to allow vessels to undertake drilling activities. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.

Infrastructure	Key infrastructure includes, but is not limited to: i. Riser platform i. Pluto A and B flowlines i. Export pipeline (Commonwealth)	Key infrastructure includes, but is not limited to: x. Xena tie-in x. One subsea Xmas tree and wellhead
Vessels	Operations support vessels will be used to undertake IMMR of subsea infrastructure.	Mobile offshore drilling unit (MODU), support and installation vessels.

Feedback
If you have feedback specific to the proposed activities described under the proposed EP, we would welcome your feedback at Feedback@woodside.com or 1800 442 977 by **Wednesday 29 March 2024.**

Your feedback and our response will be included in our EP which will be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for acceptance in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023* (Cth). Your feedback may also be used to support other regulatory processes associated with the planned activities (which may or may not be confidential)

Please let us know if you request that particular information that you provide in the consultation not be published. If so, we will make your request known to NOPSEMA so that the information is not included when the EP is published on NOPSEMA's website.

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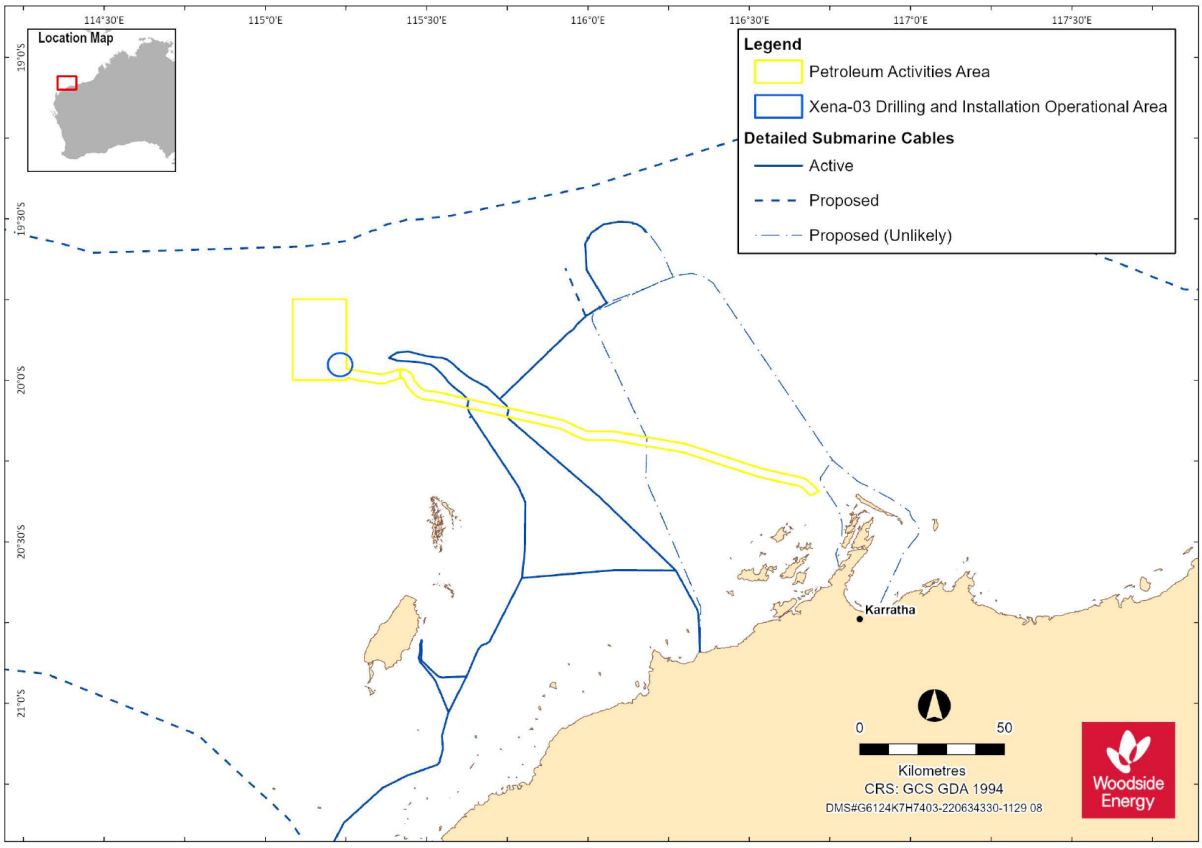
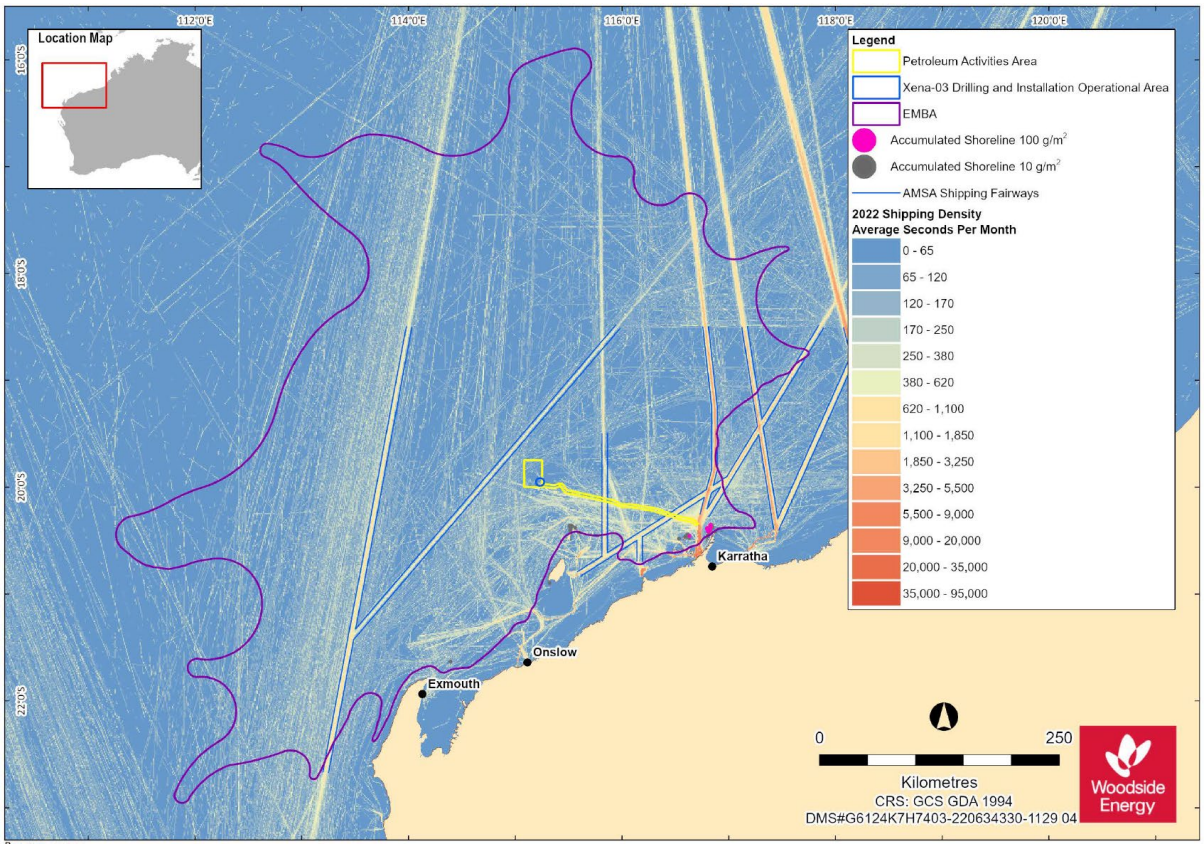
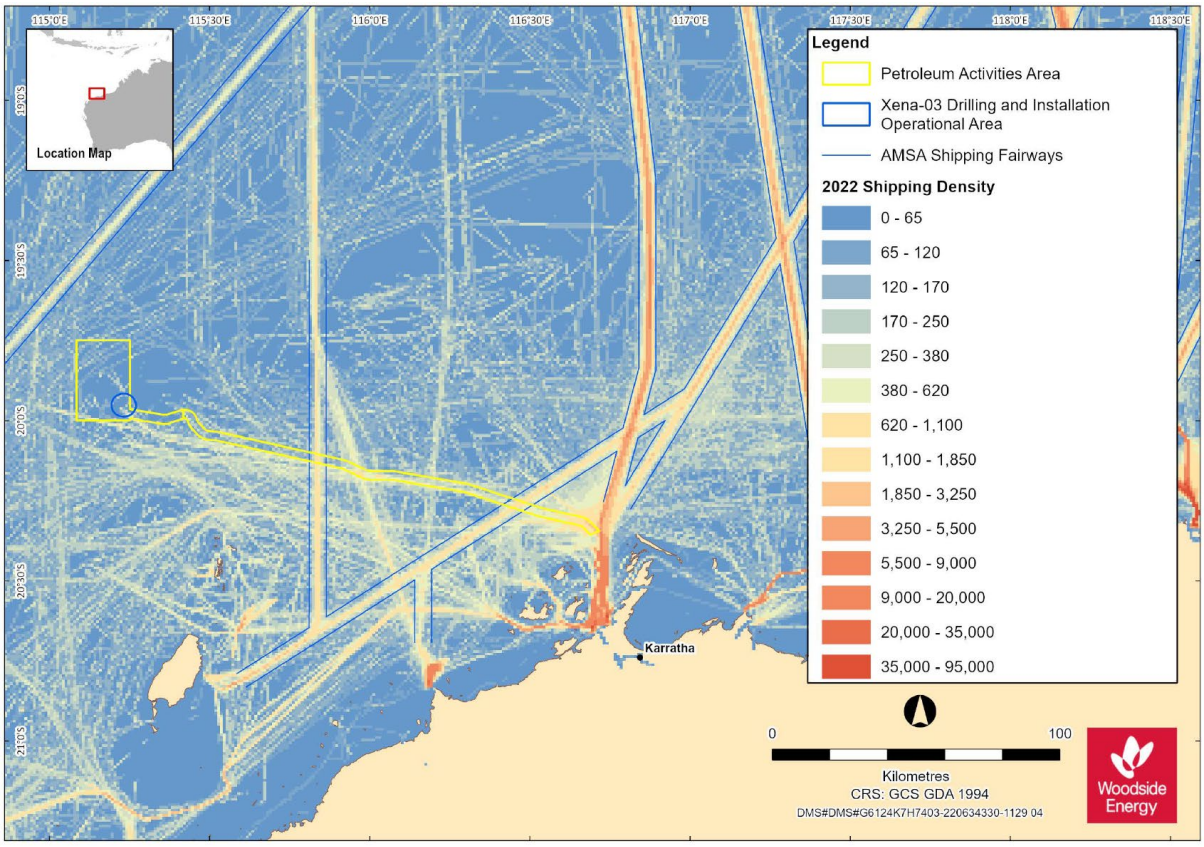
2.4.1 Submarine Communications Cables



2.4.2 Shipping Lanes





2.5 Email sent to Department of Agriculture, Fisheries and Forestry (DAFF) Fisheries and Biosecurity (26 February 2024)

Woodside is planning to submit a five-year revision of the Operations Environment Plan (EP) for the Pluto Facility.

The Pluto platform is in Production Licence WA-1-IL and WA-34-L, located in Commonwealth waters approximately 160 km north west of Dampier, Western Australia.

Woodside plans to continue producing wet gas and condensate from the Pluto, Xena and Pyxis reservoirs. The gas and condensate are transported onshore via a 180 km long export pipeline. Operations began in 2012.

The following proposed activities will continue at the Facility:

- Routine production
- Routine inspection, monitoring, maintenance and repair (IMMR)
- Commissioning and operation of the water handling unit
- Non-routine and unplanned activities and incidents associated with the above.

In addition, Woodside proposes to conduct drilling, subsea installation and commissioning (tie-back), and production from the Xena-03 well into the existing Pluto production systems.

Operational Areas and Exclusion Zones

Infrastructure is located within the Operational Area described below. This area is where Woodside vessels can be expected to be operating to undertake routine operations:

- The riser platform and the area within a 500 m radius around the platform
- The export pipeline (P1TL) and associated 6-inch chemical supply line covered by Pipeline Licence WA-17-PL and a 1500 m corridor either side of the pipeline
- Pluto, Xena and Pyxis subsea facilities (including wells, production and pigging manifolds, production jumpers, spools, flowlines and flexible jumpers) and an area within 1500 m around the subsea infrastructure.

The Xena-03 Drilling and Tie-Back activity will take place within an Operational Area that includes the Xena-03 well location and the area within a 4000 m radius.

Exclusion zones, which are established for navigational safety and fishing vessels are not allowed to enter, will include:

- The 500 m-radius Petroleum Safety Zone (PSZ) around the platform, and
- A temporary 500 m-radius safety exclusion zone around vessels conducting drilling and installation activities.

An interactive map showing the location of the proposed activities will be available on the Woodside website and will be updated throughout the proposed activities.

Environment that May be Affected (EMBA)

Following changes to Commonwealth EP consultation requirements, Woodside is now consulting persons or organisations who are located within the EMBA by a proposed petroleum activity. The EMBA is the largest spatial extent where unplanned events could potentially have an environmental consequence. For this EP, it is determined by a highly unlikely release of hydrocarbons to the environment due to a loss of well integrity, loss of pipeline integrity or a vessel collision.

A Consultation Information Sheet is attached, which provides additional background on the proposed activities, including summaries of potential key impacts and risks, and associated management measures. These are also available on our website. You can also subscribe to receive updates on our consultation activities by subscribing here.

Activity: Pluto Facility Operations Environment Plan

Environment Plan	**Pluto Facility Operations Environment Plan**	
Summary of activities	Ongoing Operations	Drilling and tie-back
	Continued wet gas and condensate production at the Pluto, Xena and Pyxis reservoir.	Drilling and tie-back of the Xena-03 well into the existing Pluto production systems
Permit Area	Activities will occur within Production License WA-1-IL and WA-34-L.	Activities will occur within Production License WA-34-L
Location	160 km north west of Dampier, Western Australia	190 km west north west of Dampier, Western Australia
Approx. Water Depth (m)	80-960 m	176 m
Schedule	Production Commenced: 2012 Routine Operations: Ongoing	Drilling expected in Q2 2025 Subsea installation expected in Q3 2025
Operational Areas / Exclusion Zones	The riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the platform. The export pipeline (P1TL) and associated 6-inch chemical supply line covered by Pipeline License WA-17-PL and a 1500 m corridor either side of the pipeline. Pluto, Xena and Pyxis subsea facilities (including wells, production and pigging manifolds, production jumpers, spools, flowlines and flexible jumpers) and an area within 1500 m around the subsea infrastructure.	The Operational Area includes a radius of 4000 m from the Xena-03 well to allow vessels to undertake drilling activities. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.

Infrastructure	Key infrastructure includes, but is not limited to: i. Riser platform i. Pluto A and B flowlines i. Export pipeline (Commonwealth)	Key infrastructure includes, but is not limited to: v. Xena tie-in v. One subsea Xmas tree and wellhead
Vessels	Operations support vessels will be used to undertake IMMR of subsea infrastructure.	Mobile offshore drilling unit (MODU), support and installation vessels.
Relevant Fisheries	**Commonwealth fisheries** **Operational Areas:** North-West Slope Trawl Fishery. **EMBA:** North-West Slope Trawl Fishery, Western Deepwater Trawl Fishery.	

Biosecurity

With respect to biosecurity matters, please note the following information below:

Environment description:	
The operational areas for Pluto routine operations and Xena-03 drilling and tie-back are located in water depths of approximately 80-960 m within the North-West Marine Region (NWMR). Within the NWMR, the Pluto export pipeline lies within the North West Shelf Province, while the platform and subsea infrastructure lie across the boundary of the North West Shelf Province and the deeper waters of the Northwest Province.	
Potential biosecurity risk	***Biosecurity risk mitigation and/or management***
Accidental introduction and establishment of non-indigenous species	All vessels will manage their ballast water in compliance with Australian Ballast Water Management Requirements under the *Biosecurity Act 2015*) to prevent the introduction of IMS. Internationally sourced project vessels will manage their biosecurity risk associated with biofouling in compliance with Australian Biofouling Management Requirements. Woodside's IMS risk assessment process will be applied to MODU, project vessels and relevant immersible equipment undertaking the Petroleum Activities Program. Based on the outcomes of each IMS risk assessment, management measures commensurate with the risk (such as the treatment of internal systems, IMS inspections or cleaning) will be implemented to minimise the likelihood of IMS being introduced. Woodside recognises the requirement to manage biosecurity risk to domestic conveyances, the requirements under the Biosecurity

Control Act 2015, and the mechanism for exemption under the Biosecurity (Exposed Conveyances - Exceptions from Biosecurity Control) Determination 2016.

Woodside notes the specified timeframes for pre-arrival reporting using the Maritime and Aircraft Reporting System (MARS), and for submission of the supplied "Questionnaire for Biosecurity Exemptions for Biosecurity Control Determination".

Woodside works closely with our suppliers and contractors to address the risks and assure awareness of the obligations outlined above.

Feedback

If you have feedback specific to the proposed activities described under the proposed EP, we would welcome your feedback at Feedback@woodside.com or 1800 442 977 **Wednesday 29 March 2024.**

Your feedback and our response will be included in our EP which will be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for acceptance in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023* (Cth). Your feedback may also be used to support other regulatory processes associated with the planned activities (which may or may not be confidential).

Please let us know if you request that particular information that you provide in the consultation not be published. If so, we will make your request known to NOPSEMA so that the information is not included when the EP is published on NOPSEMA's website.

NOPSEMA has published a brochure entitled *Consultation on offshore petroleum environment plans – Information for the Community* to help community members understand consultation requirements for Commonwealth EPs and how to participate in consultation.

2.6 Email sent to Department of Defence (DoD) (26 February 2024)

Woodside is planning to submit a five-year revision of the Pluto Facility Operations Environment Plan (EP).

The Pluto platform is in Production Licence WA-1-IL and WA-34-L, located in Commonwealth waters approximately 160 km north west of Dampier, Western Australia.

Woodside plans to continue producing wet gas and condensate from the Pluto, Xena and Pyxis reservoirs. The gas and condensate are transported via a 180 km long export pipeline to the onshore Pluto facility. Operations began in 2012.

The following proposed activities will continue at the Facility:

- Routine production
- Routine inspection, monitoring, maintenance and repair (IMMR)
- Commissioning and operation of the water handling unit
- Non-routine and unplanned activities and incidents associated with the above.

In addition, Woodside proposes to conduct drilling, subsea installation and commissioning (tie-back), and production from the Xena-03 well into the existing Pluto production systems.

Environment that May be Affected (EMBA)
Following changes to Commonwealth EP consultation requirements, Woodside is now consulting persons or organisations who are located within the EMBA by a proposed petroleum activity. The EMBA is the largest spatial extent where unplanned events could potentially have an environmental consequence. For this EP, it is determined by a highly unlikely release of hydrocarbons to the environment due to a loss of well integrity, loss of pipeline integrity or a vessel collision.

A **Consultation Information Sheet** is attached, which provides additional background on the proposed activities, including summaries of potential key impacts and risks, and associated management measures. These are also available on our website. Also attached is a map of the defence zones. You can also subscribe to receive updates on our consultation activities by subscribing here.

Activity: Pluto Facility Operations

Environment Plan	**Pluto Facility Operations Environment Plan**	
Summary of activities	Ongoing Operations	Drilling and tie-back
	Continued wet gas and condensate production at the Pluto, Xena and Pyxis reservoir.	Drilling and tie-back of the Xena-03 well into the existing Pluto production systems
Permit Area	Activities will occur within Production License WA-1-IL and WA-34-L.	Activities will occur within Production License WA-34-L
Location	160 km north west of Dampier, Western Australia	190 km west north west of Dampier, Western Australia
Approx. Water Depth (m)	80-960 m	176 m
Schedule	Production Commenced: 2012 Routine Operations: Ongoing	Drilling expected in Q2 2025 Subsea installation expected in Q3 2025
Operational Areas / Exclusion Zones	The riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the platform. The export pipeline (P1TL) and associated 6-inch chemical supply line covered by Pipeline License WA-17-PL and a 1500 m corridor either side of the pipeline. Pluto, Xena and Pyxis subsea facilities (including wells, production	The Operational Area includes a radius of 4000 m from the Xena-03 well to allow vessels to undertake drilling activities. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.

	and pigging manifolds, production jumpers, spools, flowlines and flexible jumpers) and an area within 1500 m around the subsea infrastructure.	
Infrastructure	Key infrastructure includes, but is not limited to: xxvi. Riser platform xxvii. Pluto A and B flowlines xxviii. Export pipeline (Commonwealth)	Key infrastructure includes, but is not limited to: xxix. Xena tie-in xxx. One subsea Xmas tree and wellhead
Vessels	Operations support vessels will be used to undertake IMMR of subsea infrastructure.	Mobile offshore drilling unit (MODU), support and installation vessels.

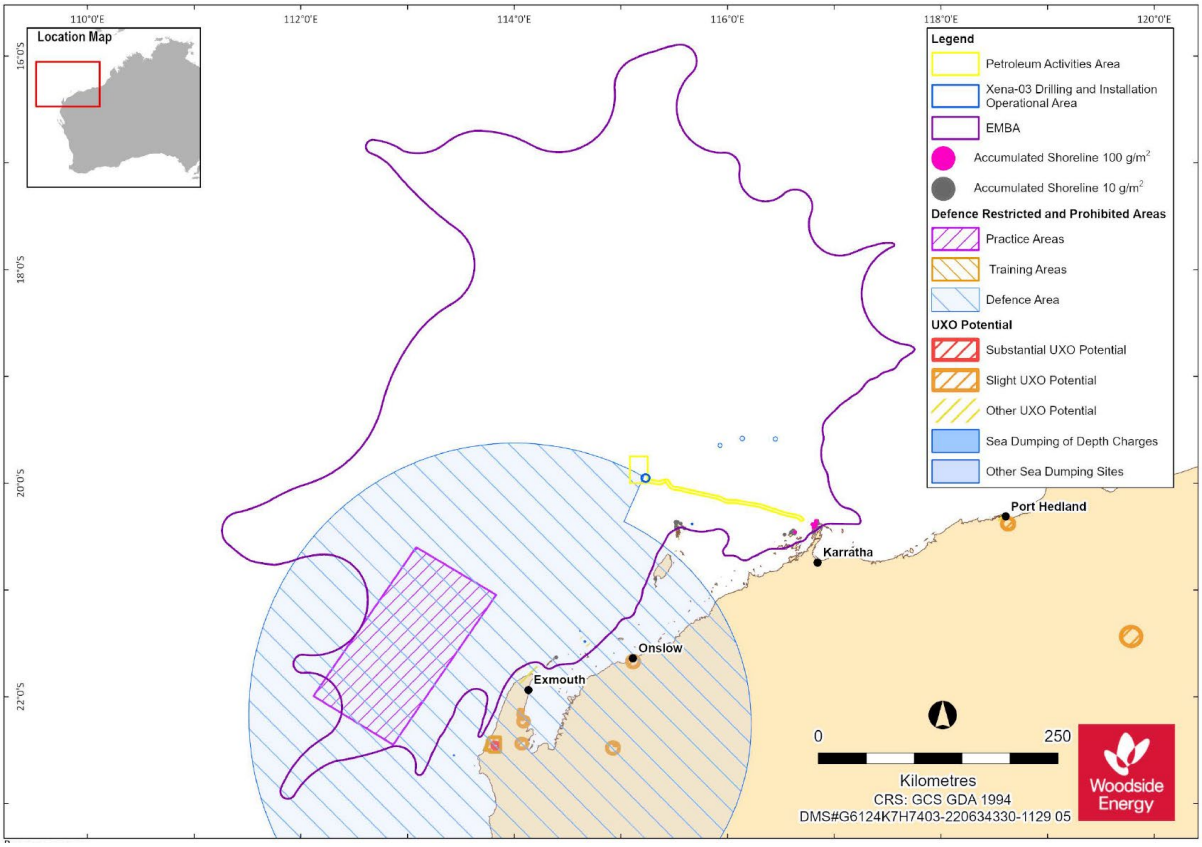
Feedback
If you have feedback specific to the proposed activities described under the proposed EP, we would welcome your feedback at Feedback@woodside.com.au or 1800 442 977 by **Wednesday 29 March 2024.**

Your feedback and our response will be included in our EP which will be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for acceptance in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023* (Cth). Your feedback may also be used to support other regulatory processes associated with the planned activities (which may or may not be confidential)

Please let us know if you request that particular information that you provide in the consultation not be published. If so, we will make your request known to NOPSEMA so that the information is not included when the EP is published on NOPSEMA's website.

NOPSEMA has published a brochure entitled *Consultation on offshore petroleum environment plans – Information for the Community* to help community members understand consultation requirements for Commonwealth EPs and how to participate in consultation.

2.6.1 Defence Zones



2.7 Email sent to Department of Transport (DoT) (26 February 2024)

Woodside is planning to submit a five-year revision of the Pluto Facility Operations Environment Plan (EP).

The Pluto platform is in Production Licence WA-1-IL and WA-34-L, located in Commonwealth waters approximately 160 km north west of Dampier, Western Australia.

Woodside plans to continue producing wet gas and condensate from the Pluto, Xena and Pyxis reservoirs. The gas and condensate are transported via a 180 km long export pipeline to the onshore Pluto facility. Operations began in 2012.

The following proposed activities will continue at the Facility:

- Routine production
- Routine inspection, monitoring, maintenance and repair (IMMR)
- Commissioning and operation of the water handling unit
- Non-routine and unplanned activities and incidents associated with the above.

In addition, Woodside proposes to conduct drilling, subsea installation and commissioning (tie-back), and production from the Xena-03 well into the existing Pluto production systems.

Environment that May be Affected (EMBA)

Following changes to Commonwealth EP consultation requirements, Woodside is now consulting persons or organisations who are located within the EMBA by a proposed petroleum activity. The EMBA is the largest spatial extent where unplanned events could

potentially have an environmental consequence. For this EP, it is determined by a highly unlikely release of hydrocarbons to the environment due to a loss of well integrity, loss of pipeline integrity or a vessel collision.

If there is a risk of a spill impacting State waters, Woodside will further consult the Department of Transport as outlined in the Department of Transport Offshore Petroleum Industry Guidance Note – Marine Oil Pollution: Response and Consultation Arrangements (July 2020).

A **Consultation Information Sheet** is attached, which provides additional background on the proposed activities, including summaries of potential key impacts and risks, and associated management measures. These are also available on our website. You can also subscribe to receive updates on our consultation activities by subscribing here.

Activity: Pluto Facility Operations

Environment Plan	**Pluto Facility Operations Environment Plan**	
Summary of activities	Ongoing Operations	Drilling and tie-back
	Continued wet gas and condensate production at the Pluto, Xena and Pyxis reservoir.	Drilling and tie-back of the Xena-03 well into the existing Pluto production systems
Permit Area	Activities will occur within Production License WA-1-IL and WA-34-L.	Activities will occur within Production License WA-34-L
Location	160 km north west of Dampier, Western Australia	190 km west north west of Dampier, Western Australia
Approx. Water Depth (m)	80-960 m	176 m
Schedule	Production Commenced: 2012 Routine Operations: Ongoing	Drilling expected in Q2 2025 Subsea installation expected in Q3 2025
Operational Areas / Exclusion Zones	The riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the platform. The export pipeline (P1TL) and associated 6-inch chemical supply line covered by Pipeline License WA-17-PL and a 1500 m corridor either side of the pipeline. Pluto, Xena and Pyxis subsea facilities (including wells, production and pigging manifolds, production jumpers, spools, flowlines and flexible	The Operational Area includes a radius of 4000 m from the Xena-03 well to allow vessels to undertake drilling activities. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.

	jumpers) and an area within 1500 m around the subsea infrastructure.	
Infrastructure	Key infrastructure includes, but is not limited to: i. Riser platform i. Pluto A and B flowlines i. Export pipeline (Commonwealth)	Key infrastructure includes, but is not limited to: v. Xena tie-in v. One subsea Xmas tree and wellhead
Vessels	Operations support vessels will be used to undertake IMMR of subsea infrastructure.	Mobile offshore drilling unit (MODU), support and installation vessels.

Feedback:
If you have feedback specific to the proposed activities described under the proposed EP, we would welcome your feedback at Feedback@woodside.com or 1800 442 977 by **Wednesday 29 March 2024.**

Your feedback and our response will be included in our EP which will be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for acceptance in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023* (Cth). Your feedback may also be used to support other regulatory processes associated with the planned activities (which may or may not be confidential)

Please let us know if you request that particular information that you provide in the consultation not be published. If so, we will make your request known to NOPSEMA so that the information is not included when the EP is published on NOPSEMA's website.

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2.8 Email sent to Department of Planning, Lands and Heritage (DPLH) (26 February 2024)

Woodside is planning to submit a five-year revision of the Pluto Facility Operations Environment Plan (EP).

The Pluto platform is in Production Licence WA-1-IL and WA-34-L, located in Commonwealth waters approximately 160 km north west of Dampier, Western Australia.

Woodside plans to continue producing wet gas and condensate from the Pluto, Xena and Pyxis reservoirs. The gas and condensate are transported via a 180 km long export pipeline to the onshore Pluto facility. Operations began in 2012.

The following proposed activities will continue at the Facility:

- Routine production
- Routine inspection, monitoring, maintenance and repair (IMMR)
- Commissioning and operation of the water handling unit
- Non-routine and unplanned activities and incidents associated with the above.

In addition, Woodside proposes to conduct drilling, subsea installation and commissioning (tie-back), and production from the Xena-03 well into the existing Pluto production systems.

Given the proximity of the proposed activities with Marine Parks, Woodside is consulting with the Department of Biodiversity, Conservation and Attractions (DBCA) for this EP. Woodside is also consulting with the Western Australian Museum and provided relevant shipwreck information for this EP.

Environment that May be Affected (EMBA)
Following changes to Commonwealth EP consultation requirements, Woodside is now consulting persons or organisations who are located within the EMBA by a proposed petroleum activity. The EMBA is the largest spatial extent where unplanned events could potentially have an environmental consequence. For this EP, it is determined by a highly unlikely release of hydrocarbons to the environment due to a loss of well integrity, loss of pipeline integrity or a vessel collision.

A **Consultation Information Sheet** is attached, which provides additional background on the proposed activities, including summaries of potential key impacts and risks, and associated management measures. These are also available on our website. You can also subscribe to receive updates on our consultation activities by subscribing here.

Activity: Pluto Facility Operations

Environment Plan	**Pluto Facility Operations Environment Plan**	
Summary of activities	Ongoing Operations	Drilling and tie-back
	Continued wet gas and condensate production at the Pluto, Xena and Pyxis reservoir.	Drilling and tie-back of the Xena-03 well into the existing Pluto production systems
Permit Area	Activities will occur within Production License WA-1-IL and WA-34-L.	Activities will occur within Production License WA-34-L
Location	160 km north west of Dampier, Western Australia	190 km west north west of Dampier, Western Australia
Approx. Water Depth (m)	80-960 m	176 m

Schedule	Production Commenced: 2012 Routine Operations: Ongoing	Drilling expected in Q2 2025 Subsea installation expected in Q3 2025
Operational Areas / Exclusion Zones	The riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the platform. The export pipeline (P1TL) and associated 6-inch chemical supply line covered by Pipeline License WA-17-PL and a 1500 m corridor either side of the pipeline. Pluto, Xena and Pyxis subsea facilities (including wells, production and pigging manifolds, production jumpers, spools, flowlines and flexible jumpers) and an area within 1500 m around the subsea infrastructure.	The Operational Area includes a radius of 4000 m from the Xena-03 well to allow vessels to undertake drilling activities. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	Key infrastructure includes, but is not limited to: i. Riser platform i. Pluto A and B flowlines i. Export pipeline (Commonwealth)	Key infrastructure includes, but is not limited to: k. Xena tie-in l. One subsea Xmas tree and wellhead
Vessels	Operations support vessels will be used to undertake IMMR of subsea infrastructure.	Mobile offshore drilling unit (MODU), support and installation vessels.

Feedback
If you have feedback specific to the proposed activities described under the proposed EP, we would welcome your feedback at Feedback@woodside.com or 1800 442 977 by **Wednesday 29 March 2024.**

Your feedback and our response will be included in our EP which will be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for acceptance in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023* (Cth). Your feedback may also be used to support other regulatory processes associated with the planned activities (which may or may not be confidential)

Please let us know if you request that particular information that you provide in the consultation not be published. If so, we will make your request known to NOPSEMA so that the information is not included when the EP is published on NOPSEMA's website.

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2.8.1 Email sent to DPLH including State Shipwrecks (29 February 2024)

Dear Department of Planning, Lands and Heritage,

Further to the email sent to you on 26 February 2024 (below), please find attached the list of State Shipwrecks.

Pluto Facility Operations EP State Historical Shipwrecks OVERLAP					
Vessel Name	Comments	When Lost	Where Lost	Latitude	Longitude
Trial	Ship	1622/05/24	Trial Rocks	20°17.159	115°22.514
McCormack	Barge	1989/10/00	N.E. tip of Eaglehawk Island West of Dampier, Dampier Archipelago	20°08.200	115°57.200
Plym HMS	Warship	10/2/1948	Trimouille Island Island	20°24.208	115°33.950
Dampier		unknown	Enderby Island, Dampier Archipelago	20°31.4	116°14.2
Haw Kiet		6/25/1905		18°27.49	117°15.5
Tropic Queen		4/9/1975		20°26	115°30.05
Zelma		7/20/1990	Dampier Archipelago	20°22.63	116°52.48
Veronica	Lugger	1928/07	Sunday Island, Exmouth Gulf	21°41	114°23
Lady Ann	Ship (non-sail)	9/18/1982	24 miles north of NW Cape	21°24	114°12
McDermott Derrick Barge No 20	Barge	10/20/1989	N.E. tip of Eaglehawk Island, Dampier Archipelago	20°08.200	115°57.200

2.9 Email sent to Western Australian Museum (26 February 2024)

Woodside is planning to submit a five-year revision of the Pluto Facility Operations Environment Plan (EP).

The Pluto platform is in Production Licence WA-1-IL and WA-34-L, located in Commonwealth waters approximately 160 km north west of Dampier, Western Australia.

Woodside plans to continue producing wet gas and condensate from the Pluto, Xena and Pyxis reservoirs. The gas and condensate are transported via a 180 km long export pipeline to the onshore Pluto facility. Operations began in 2012.

The following proposed activities will continue at the Facility:

- Routine production
- Routine inspection, monitoring, maintenance and repair (IMMR)
- Commissioning and operation of the water handling unit
- Non-routine and unplanned activities and incidents associated with the above.

In addition, Woodside proposes to conduct drilling, subsea installation and commissioning (tie-back), and production from the Xena-03 well into the existing Pluto production systems.

As per the Underwater Cultural Heritage Act 2018 (Cwth), Woodside will contact the Commonwealth regulator – the Department of Climate Change, Energy, the Environment and Water (DCCEEW) regarding this EP.

Woodside also refers to the Commonwealth Government's Underwater Cultural Heritage (UCH) Guidance document regarding assessments and the draft Guidelines for Working in Near and Offshore Environment to Protect Underwater Cultural Heritage.

Any additional identification for non-Aboriginal UCH within the project areas will be done during EP development if not previously completed within the project areas during ongoing operations.

Environment that May be Affected (EMBA)
Following changes to Commonwealth EP consultation requirements, Woodside is now consulting persons or organisations who are located within the EMBA by a proposed petroleum activity. The EMBA is the largest spatial extent where unplanned events could potentially have an environmental consequence. For this EP, it is determined by a highly unlikely release of hydrocarbons to the environment due to a loss of well integrity, loss of pipeline integrity or a vessel collision.

A **Consultation Information Sheet** is attached, which provides additional background on the proposed activities, including summaries of potential key impacts and risks, and associated management measures. These are also available on our website. Also attached is a list of shipwrecks in State waters within the EMBA. You can also subscribe to receive updates on our consultation activities by subscribing here.

Activity: Pluto Facility Operations

Environment Plan	**Pluto Facility Operations Environment Plan**	
Summary of activities	Ongoing Operations	Drilling and tie-back
	Continued wet gas and condensate production at the Pluto, Xena and Pyxis reservoir.	Drilling and tie-back of the Xena-03 well into the existing Pluto production systems
Permit Area	Activities will occur within Production License WA-1-IL and WA-34-L.	Activities will occur within Production License WA-34-L
Location	160 km north west of Dampier, Western Australia	190 km west north west of Dampier, Western Australia
Approx. Water Depth (m)	80-960 m	176 m
Schedule	Production Commenced: 2012 Routine Operations: Ongoing	Drilling expected in Q2 2025 Subsea installation expected in Q3 2025
Operational Areas / Exclusion Zones	The riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the platform. The export pipeline (P1TL) and associated 6-inch chemical supply line covered by Pipeline License WA-17-PL and a 1500 m corridor either side of the pipeline.	The Operational Area includes a radius of 4000 m from the Xena-03 well to allow vessels to undertake drilling activities. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.

	Pluto, Xena and Pyxis subsea facilities (including wells, production and pigging manifolds, production jumpers, spools, flowlines and flexible jumpers) and an area within 1500 m around the subsea infrastructure.	
Infrastructure	Key infrastructure includes, but is not limited to: i. Riser platform i. Pluto A and B flowlines i. Export pipeline (Commonwealth)	Key infrastructure includes, but is not limited to: v. Xena tie-in v. One subsea Xmas tree and wellhead
Vessels	Operations support vessels will be used to undertake IMMR of subsea infrastructure.	Mobile offshore drilling unit (MODU), support and installation vessels.

Feedback
If you have feedback specific to the proposed activities described under the proposed EP, we would welcome your feedback at Feedback@woodside.com or 1800 442 977 by **Wednesday 29 March 2024.**

Your feedback and our response will be included in our EP which will be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for acceptance in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023* (Cth). Your feedback may also be used to support other regulatory processes associated with the planned activities (which may or may not be confidential)

Please let us know if you request that particular information that you provide in the consultation not be published. If so, we will make your request known to NOPSEMA so that the information is not included when the EP is published on NOPSEMA's website.

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2.9.1 State Shipwrecks

Pluto Facility Operations EP State Historical Shipwrecks OVERLAP					
Vessel Name	Comments	When Lost	Where Lost	Latitude	Longitude
Trial	Ship	1622/05/24	Trial Rocks	20°17.159	115°22.514
McCormack	Barge	1989/10/00	N.E. tip of Eaglehawk Island West of Dampier, Dampier Archipelago	20°08.200	115°57.200
Plym HMS	Warship	10/2/1948	Trimouille Island Island	20°24.208	115°33.950
Dampier		unknown	Enderby Island, Dampier Archipelago	20°31.4	116°14.2
Haw Kiet		6/25/1905		18°27.49	117°15.5
Tropic Queen		4/9/1975		20°26	115°30.05
Zelma		7/20/1990	Dampier Archipelago	20°22.63	116°52.48
Veronica	Lugger	1928/07	Sunday Island, Exmouth Gulf	21°41	114°23
Lady Ann	Ship (non-sail)	9/18/1982	24 miles north of NW Cape	21°24	114°12
McDermott Derrick Barge No 20	Barge	10/20/1989	N.E. tip of Eaglehawk Island, Dampier Archipelago	20°08.200	115°57.200

2.10 Email sent to Department of Climate Change, Energy, the Environment and Water (DCCEEW) (26 February 2024)

Woodside is planning to submit a five-year revision of the Pluto Facility Operations Environment Plan (EP).

The Pluto platform is in Production Licence WA-1-IL and WA-34-L, located in Commonwealth waters approximately 160 km north west of Dampier, Western Australia.

Woodside plans to continue producing wet gas and condensate from the Pluto, Xena and Pyxis reservoirs. The gas and condensate are transported via a 180 km long export pipeline to the onshore Pluto facility. Operations began in 2012.

The following proposed activities will continue at the Facility:

- Routine production
- Routine inspection, monitoring, maintenance and repair (IMMR)
- Commissioning and operation of the water handling unit
- Non-routine and unplanned activities and incidents associated with the above.

In addition, Woodside proposes to conduct drilling, subsea installation and commissioning (tie-back), and production from the Xena-03 well into the existing Pluto production systems.

Environment that May be Affected (EMBA)
Following changes to Commonwealth EP consultation requirements, Woodside is now consulting persons or organisations who are located within the EMBA by a proposed petroleum activity. The EMBA is the largest spatial extent where unplanned events could potentially have an environmental consequence. For this EP, it is determined by a highly unlikely release of hydrocarbons to the environment due to a loss of well integrity, loss of pipeline integrity or a vessel collision.

A **Consultation Information Sheet** is attached, which provides additional background on the proposed activities, including summaries of potential key impacts and risks, and associated management measures. These are also available on our website. Also attached is a list of shipwrecks in Commonwealth waters within the EMBA. You can also subscribe to receive updates on our consultation activities by subscribing here.
Activity: Pluto Facility Operations

Environment Plan	**Pluto Facility Operations Environment Plan**	
Summary of activities	Ongoing Operations	Drilling and tie-back
	Continued wet gas and condensate production at the Pluto, Xena and Pyxis reservoir.	Drilling and tie-back of the Xena-03 well into the existing Pluto production systems
Permit Area	Activities will occur within Production License WA-1-IL and WA-34-L.	Activities will occur within Production License WA-34-L
Location	160 km north west of Dampier, Western Australia	190 km west north west of Dampier, Western Australia
Approx. Water Depth (m)	80-960 m	176 m
Schedule	Production Commenced: 2012 Routine Operations: Ongoing	Drilling expected in Q2 2025 Subsea installation expected in Q3 2025
Operational Areas / Exclusion Zones	The riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the platform. The export pipeline (P1TL) and associated 6-inch chemical supply line covered by Pipeline License WA-17-PL and a 1500 m corridor either side of the pipeline. Pluto, Xena and Pyxis subsea facilities (including wells, production and pigging manifolds, production jumpers, spools, flowlines and flexible jumpers) and an area within 1500 m around the subsea infrastructure.	The Operational Area includes a radius of 4000 m from the Xena-03 well to allow vessels to undertake drilling activities. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	Key infrastructure includes, but is not limited to: i. Riser platform i. Pluto A and B flowlines i. Export pipeline (Commonwealth)	Key infrastructure includes, but is not limited to: x. Xena tie-in l. One subsea Xmas tree and wellhead
Vessels	Operations support vessels will be used to undertake IMMR of subsea infrastructure.	Mobile offshore drilling unit (MODU), support and installation vessels.

Feedback

If you have feedback specific to the proposed activities described under the proposed EP, we would welcome your feedback at Feedback@woodside.com or 1800 442 977 by **Wednesday 29 March 2024.**

Your feedback and our response will be included in our EP which will be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for acceptance in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023* (Cth). Your feedback may also be used to support other regulatory processes associated with the planned activities (which may or may not be confidential)

Please let us know if you request that particular information that you provide in the consultation not be published. If so, we will make your request known to NOPSEMA so that the information is not included when the EP is published on NOPSEMA's website.

NOPSEMA has published a brochure entitled *Consultation on offshore petroleum environment plans – Information for the Community* to help community members understand consultation requirements for Commonwealth EPs and how to participate in consultation.

2.10.1 Commonwealth Shipwrecks

Pluto Facility Operations EP Australia National Shipwrecks OVERLAP					
Vessel Name	Vessel Type	Wreck Year	Where Lost	Latitude	Longitude
Vianen	Sailing vessel	1628	Barrow Island Area	-20	115.1666667
Wild Wave (China)	Sailing vessel	1873	Monte Bello Island	-20	115.1666667
Haw Kiet	Unknown	2003		-18.45816667	117.2583333
Marietta	Unknown	1905	Barrow Island	-20	115.1666667
Lady Ann	Sailing vessel	1982	24 miles north of NW Cape	-21.4	114.2
Beatrice	Sailing vessel	1899	Off North-West Cape	-21.61666667	113.9833333
Tanami	Sailing vessel		Trial Rocks	-20.28333	115.36666
Trial	Sailing vessel	1622	Trial Rocks	-20.28598333	115.3752333
Veronica	Sailing vessel	1928	Sunday Island, Exmouth Gulf	-21.68333333	114.3833333
Zelma	Unknown	1990	Dampier Archipelago	-20.37716667	116.8746667
Gem	Sailing vessel	1893	North West Cape	-21.61666667	113.9833333
Curlew	Sailing vessel	1911	At Onslow, Monte Bellos Group	-20	115.1666667
Dampier	Trawler		Enderby Island, Dampier Archipelago	-20.52333333	116.2366667
McCormack		1989	N.E. tip of Eaglehawk Island West of Dampier,	-20.13666667	115.9533333
McDermott Derrick Barge No 20	Barge	1989	N.E. tip of Eaglehawk Island, Dampier Archipelago	-20.13666667	115.9533333
Plym HMS	Frigate	1952		-20.40346667	115.5658333
Tropic Queen		1975		-20.43333333	115.5008333

2.11 Email sent to Director of National Parks (DNP) (26 February 2024)

Woodside is planning to submit a five-year revision of the Operations Environment Plan (EP) for the Pluto Facility.

The Pluto platform is in Production Licence WA-1-IL and WA-34-L, located in Commonwealth waters approximately 160 km north west of Dampier, Western Australia.

Woodside plans to continue producing wet gas and condensate from the Pluto, Xena and Pyxis reservoirs. The gas and condensate are transported onshore via a 180 km long export pipeline. Operations began in 2012.

The following proposed activities will continue at the Facility:

- Routine production
- Routine inspection, monitoring, maintenance and repair (IMMR)
- Commissioning and operation of the water handling unit
- Non-routine and unplanned activities and incidents associated with the above.

In addition, Woodside proposes to conduct drilling, subsea installation and commissioning (tie-back), and production from the Xena-03 well into the existing Pluto production systems.

Australian Marine Parks

We note Australian Government Guidance on consultation activities and confirm that:

- A small portion of the facility Operational Area overlaps the Montebello AMP, and
- The export pipeline Operational Area is 13 km east of the Dampier AMP.
- We have assessed potential impacts to AMPs in the development of the proposed EP revisions and believe that planned activities have no potential to impact the values of the Marine Parks.
- For this EP, the worst-case credible spill scenario is a hydrocarbon release from a loss of well control, or a vessel collision, releasing crude oil to the environment. Through review of hydrocarbon spill modelling, and with consideration of a 50 ppb dissolved and 100 ppb entrained hydrocarbon threshold, the following AMPs may be contacted in the event of a spill:
  - Montebello AMP
  - Dampier AMP
  - Argo-Rowley Terrace AMP
  - Gascoyne AMP
  - Ningaloo AMP
- A Commonwealth Government-approved oil spill response plan will be in place for the duration of the activities, which will include notification to relevant agencies and organisations as to the nature and scale of the event, as soon as practicable following an occurrence. The Director of National Parks will be advised if an environmental incident occurs that may impact on the values of any Marine Park.

Woodside is aware of and will consider the 'Petroleum Activities and Australian Marine Parks' guidance note developed and published jointly by DNP and NOPSEMA, while preparing this EP to ensure that the EP:

- Identifies and manages all impacts and risks on AMP values (including ecosystem values) to an acceptable level and has considered all options to avoid or reduce them to as low as reasonably practicable (ALARP),
- Clearly demonstrates that the activities will not be inconsistent with the North-west Marine Parks Network Management Plan 2018.

If there is a change in activities which results in an overlap or new impact to a marine park Woodside will notify DNP.

Environment that May Be Affected (EMBA)

Following changes to Commonwealth EP consultation requirements, Woodside is now consulting persons or organisations whom are located within the EMBA by a proposed petroleum activity. The EMBA is the largest spatial extent where unplanned events could potentially have an environmental consequence. For this EP, it is determined by a highly unlikely release of hydrocarbons to the environment due to a loss of well integrity, loss of pipeline integrity or a vessel collision.

A **Consultation Information Sheet** is attached, which provides additional background on the proposed activities, including summaries of potential key impacts and risks, and associated management measures. These are also available on our website. You can also subscribe to receive updates on our consultation activities by subscribing here.

Activity: Pluto Facility Operations Environment Plan

Environment Plan	**Pluto Facility Operations Environment Plan**	
Summary of activities	Ongoing Operations	Drilling and tie-back
	Continued wet gas and condensate production at the Pluto, Xena and Pyxis reservoir.	Drilling and tie-back of the Xena-03 well into the existing Pluto production systems
Permit Area	Activities will occur within Production License WA-1-IL and WA-34-L.	Activities will occur within Production License WA-34-L
Location	160 km north west of Dampier, Western Australia	190 km west north west of Dampier, Western Australia
Approx. Water Depth (m)	80-960 m	176 m
Schedule	Production Commenced: 2012 Routine Operations: Ongoing	Drilling expected in Q2 2025 Subsea installation expected in Q3 2025
Operational Areas / Exclusion Zones	The riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the platform. The export pipeline (P1TL) and associated 6-inch chemical supply line covered by Pipeline License WA-17-PL and a 1500 m corridor either side of the pipeline. Pluto, Xena and Pyxis subsea facilities (including wells, production and pigging manifolds, production jumpers, spools, flowlines and flexible jumpers) and an area within 1500 m around the subsea infrastructure.	The Operational Area includes a radius of 4000 m from the Xena-03 well to allow vessels to undertake drilling activities. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.

Infrastructure	Key infrastructure includes, but is not limited to: i. Riser platform i. Pluto A and B flowlines i. Export pipeline (Commonwealth)	Key infrastructure includes, but is not limited to: v. Xena tie-in v. One subsea Xmas tree and wellhead
Vessels	Operations support vessels will be used to undertake IMMR of subsea infrastructure.	Mobile offshore drilling unit (MODU), support and installation vessels.

Feedback

If you have feedback specific to the proposed activities described under the proposed EP, we would welcome your feedback at Feedback@woodside.com or 1800 442 977 by **Wednesday 29 March 2024.**

Your feedback and our response will be included in our EP which will be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth). Your feedback may also be used to support other regulatory processes associated with the planned activities (which may or may not be confidential).

Please let us know if you request that particular information that you provide in the consultation not be published. If so, we will make your request known to NOPSEMA so that the information is not included when the EP is published on NOPSEMA's website.

NOPSEMA has published a brochure entitled *Consultation on offshore petroleum environment plans – Information for the Community* to help community members understand consultation requirements for Commonwealth EPs and how to participate in consultation.

2.12 Email sent to Ningaloo Coast World Heritage Advisory Committee (NCWHAC), Department of Biodiversity, Conservation and Attractions (DBCA) (26 February 2024)

Woodside is planning to submit a five-year revision of the Pluto Facility Operations Environment Plan (EP).

The Pluto platform is in Production Licence WA-1-IL and WA-34-L, located in Commonwealth waters approximately 160 km north west of Dampier, Western Australia.

Woodside plans to continue producing wet gas and condensate from the Pluto, Xena and Pyxis reservoirs. The gas and condensate are transported via a 180 km long export pipeline to the onshore Pluto facility. Operations began in 2012.

The following proposed activities will continue at the Facility:

- Routine production
- Routine inspection, monitoring, maintenance and repair (IMMR)
- Commissioning and operation of the water handling unit
- Non-routine and unplanned activities and incidents associated with the above.

In addition, Woodside proposes to conduct drilling, subsea installation and commissioning (tie-back), and production from the Xena-03 well into the existing Pluto production systems.

Environment that May be Affected (EMBA)
Following changes to Commonwealth EP consultation requirements, Woodside is now consulting persons or organisations who are located within the EMBA by a proposed petroleum activity. The EMBA is the largest spatial extent where unplanned events could potentially have an environmental consequence. For this EP, it is determined by a highly unlikely release of hydrocarbons to the environment due to a loss of well integrity, loss of pipeline integrity or a vessel collision.

A **Consultation Information Sheet** is attached, which provides additional background on the proposed activities, including summaries of potential key impacts and risks, and associated management measures. These are also available on our website. You can also subscribe to receive updates on our consultation activities by subscribing here.

Activity: Pluto Facility Operations

Environment Plan	**Pluto Facility Operations Environment Plan**	
Summary of activities	Ongoing Operations	Drilling and tie-back
	Continued wet gas and condensate production at the Pluto, Xena and Pyxis reservoir.	Drilling and tie-back of the Xena-03 well into the existing Pluto production systems
Permit Area	Activities will occur within Production License WA-1-IL and WA-34-L.	Activities will occur within Production License WA-34-L
Location	160 km north west of Dampier, Western Australia	190 km west north west of Dampier, Western Australia
Approx. Water Depth (m)	80-960 m	176 m
Schedule	Production Commenced: 2012 Routine Operations: Ongoing	Drilling expected in Q2 2025 Subsea installation expected in Q3 2025
Operational Areas / Exclusion Zones	The riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the platform. The export pipeline (P1TL) and associated 6-inch chemical supply line covered by Pipeline License WA-17-PL and a 1500 m corridor either side of the pipeline. Pluto, Xena and Pyxis subsea facilities (including wells, production	The Operational Area includes a radius of 4000 m from the Xena-03 well to allow vessels to undertake drilling activities. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.

	and pigging manifolds, production jumpers, spools, flowlines and flexible jumpers) and an area within 1500 m around the subsea infrastructure.	
Infrastructure	Key infrastructure includes, but is not limited to: i. Riser platform i. Pluto A and B flowlines i. Export pipeline (Commonwealth)	Key infrastructure includes, but is not limited to: x. Xena tie-in x. One subsea Xmas tree and wellhead
Vessels	Operations support vessels will be used to undertake IMMR of subsea infrastructure.	Mobile offshore drilling unit (MODU), support and installation vessels.

Feedback
If you have feedback specific to the proposed activities described under the proposed EP, we would welcome your feedback at Feedback@woodside.com or 1800 442 977 by **Wednesday 29 March 2024.**

Your feedback and our response will be included in our EP which will be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for acceptance in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023* (Cth). Your feedback may also be used to support other regulatory processes associated with the planned activities (which may or may not be confidential)

Please let us know if you request that particular information that you provide in the consultation not be published. If so, we will make your request known to NOPSEMA so that the information is not included when the EP is published on NOPSEMA's website.

NOPSEMA has published a brochure entitled *Consultation on offshore petroleum environment plans – Information for the Community* to help community members understand consultation requirements for Commonwealth EPs and how to participate in consultation.

2.13 Email sent to Department of Industry, Science and Resources (DISR), Department of Energy, Mines, Industry Regulation and Safety (DEMIRS) (26 February 2024)

Woodside is planning to submit a five-year revision of the Pluto Facility Operations Environment Plan (EP).

The Pluto platform is in Production Licence WA-1-IL and WA-34-L, located in Commonwealth waters approximately 160 km north west of Dampier, Western Australia.

Woodside plans to continue producing wet gas and condensate from the Pluto, Xena and Pyxis reservoirs. The gas and condensate are transported via a 180 km long export pipeline to the onshore Pluto facility. Operations began in 2012.

The following proposed activities will continue at the Facility:

- Routine production
- Routine inspection, monitoring, maintenance and repair (IMMR)
- Commissioning and operation of the water handling unit
- Non-routine and unplanned activities and incidents associated with the above.

In addition, Woodside proposes to conduct drilling, subsea installation and commissioning (tie-back), and production from the Xena-03 well into the existing Pluto production systems.

Environment that May be Affected (EMBA)
Following changes to Commonwealth EP consultation requirements, Woodside is now consulting persons or organisations who are located within the EMBA by a proposed petroleum activity. The EMBA is the largest spatial extent where unplanned events could potentially have an environmental consequence. For this EP, it is determined by a highly unlikely release of hydrocarbons to the environment due to a loss of well integrity, loss of pipeline integrity or a vessel collision.

A **Consultation Information Sheet** is attached, which provides additional background on the proposed activities, including summaries of potential key impacts and risks, and associated management measures. These are also available on our website. You can also subscribe to receive updates on our consultation activities by subscribing here.

Activity: Pluto Facility Operations

Environment Plan	**Pluto Facility Operations Environment Plan**	
Summary of activities	Ongoing Operations	Drilling and tie-back
	Continued wet gas and condensate production at the Pluto, Xena and Pyxis reservoir.	Drilling and tie-back of the Xena-03 well into the existing Pluto production systems
Permit Area	Activities will occur within Production License WA-1-IL and WA-34-L.	Activities will occur within Production License WA-34-L
Location	160 km north west of Dampier, Western Australia	190 km west north west of Dampier, Western Australia
Approx. Water Depth (m)	80-960 m	176 m
Schedule	Production Commenced: 2012 Routine Operations: Ongoing	Drilling expected in Q2 2025 Subsea installation expected in Q3 2025

Operational Areas / Exclusion Zones	The riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the platform. The export pipeline (P1TL) and associated 6-inch chemical supply line covered by Pipeline License WA-17-PL and a 1500 m corridor either side of the pipeline. Pluto, Xena and Pyxis subsea facilities (including wells, production and pigging manifolds, production jumpers, spools, flowlines and flexible jumpers) and an area within 1500 m around the subsea infrastructure.	The Operational Area includes a radius of 4000 m from the Xena-03 well to allow vessels to undertake drilling activities. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	Key infrastructure includes, but is not limited to: i. Riser platform i. Pluto A and B flowlines i. Export pipeline (Commonwealth)	Key infrastructure includes, but is not limited to: v. Xena tie-in v. One subsea Xmas tree and wellhead
Vessels	Operations support vessels will be used to undertake IMMR of subsea infrastructure.	Mobile offshore drilling unit (MODU), support and installation vessels.

Feedback
If you have feedback specific to the proposed activities described under the proposed EP, we would welcome your feedback at Feedback@woodside.com or 1800 442 977 by **Wednesday 29 March 2024.**

Your feedback and our response will be included in our EP which will be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for acceptance in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023* (Cth). Your feedback may also be used to support other regulatory processes associated with the planned activities (which may or may not be confidential)

Please let us know if you request that particular information that you provide in the consultation not be published. If so, we will make your request known to NOPSEMA so that the information is not included when the EP is published on NOPSEMA's website.

NOPSEMA has published a brochure entitled *Consultation on offshore petroleum environment plans – Information for the Community* to help community members understand consultation requirements for Commonwealth EPs and how to participate in consultation.

2.14 Email sent to North West Slope Trawl Fishery, Western Deepwater Trawl Fishery, Commonwealth Fisheries Association (CFA),

Australian Southern Bluefin Tuna Industry Association (ASBTIA), Tuna Australia (26 and 27 February 2024)

Woodside is planning to submit a five-year revision of the Operations Environment Plan (EP) for the Pluto Facility.

The Pluto platform is in Production Licence WA-1-IL and WA-34-L, located in Commonwealth waters approximately 160 km north west of Dampier, Western Australia.

Woodside plans to continue producing wet gas and condensate from the Pluto, Xena and Pyxis reservoirs. The gas and condensate are transported onshore via a 180 km long export pipeline. Operations began in 2012.

The following proposed activities will continue at the Facility:

- Routine production
- Routine inspection, monitoring, maintenance and repair (IMMR)
- Commissioning and operation of the water handling unit
- Non-routine and unplanned activities and incidents associated with the above.

In addition, Woodside proposes to conduct drilling, subsea installation and commissioning (tie-back), and production from the Xena-03 well into the existing Pluto production systems.

Operational Areas and Exclusion Zones

Infrastructure is located within the Operational Areas described below. This area is where Woodside vessels can be expected to be operating to undertake routine operations:

- The riser platform and the area within a 500 m radius operational area around the platform
- The export pipeline (P1TL) and associated 6-inch chemical supply line covered by Pipeline Licence WA-17-PL and a 1500 m operational area corridor either side of the pipeline
- Pluto, Xena and Pyxis subsea facilities (including wells, production and pigging manifolds, production jumpers, spools, flowlines and flexible jumpers) and an area within 1500 m operational area around the subsea infrastructure.

The Xena-03 Drilling and Tie-Back activity will take place within an Operational Area that includes the Xena-03 well location and the area within a 4000 m radius.

Exclusion zones, which are established for navigational safety and fishing vessels are not allowed to enter, will include:

- The 500 m-radius Petroleum Safety Zone (PSZ) around the platform, and
- A temporary 500 m-radius safety exclusion zone around vessels conducting drilling and installation activities.

An interactive map showing the location of the proposed activities will be available on the Woodside website and will be updated throughout the proposed activities.

Environment that May be Affected (EMBA)

Following changes to Commonwealth EP consultation requirements, Woodside is now consulting persons or organisations who are located within the EMBA by a proposed petroleum activity. The EMBA is the largest spatial extent where unplanned events could

potentially have an environmental consequence. For this EP, it is determined by a highly unlikely release of hydrocarbons to the environment due to a loss of well integrity, loss of pipeline integrity or a vessel collision.

A Consultation Information Sheet is attached, which provides additional background on the proposed activities, including summaries of potential key impacts and risks, and associated management measures. These are also available on our website. You can also subscribe to receive updates on our consultation activities by subscribing here.

Activity: Pluto Facility Operations Environment Plan

Environment Plan	**Pluto Facility Operations Environment Plan**	
Summary of activities	Ongoing Operations	Drilling and tie-back
	Continued wet gas and condensate production at the Pluto, Xena and Pyxis reservoir.	Drilling and tie-back of the Xena-03 well into the existing Pluto production systems
Permit Area	Activities will occur within Production License WA-1-IL and WA-34-L.	Activities will occur within Production License WA-34-L
Location	160 km north west of Dampier, Western Australia	190 km west north west of Dampier, Western Australia
Approx. Water Depth (m)	80-960 m	176 m
Schedule	Production Commenced: 2012 Routine Operations: Ongoing	Drilling expected in Q2 2025 Subsea installation expected in Q3 2025
Operational Areas / Exclusion Zones	The riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the platform. The export pipeline (P1TL) and associated 6-inch chemical supply line covered by Pipeline License WA-17-PL and a 1500 m corridor either side of the pipeline. Pluto, Xena and Pyxis subsea facilities (including wells, production and pigging manifolds, production jumpers, spools, flowlines and flexible jumpers) and an area within 1500 m around the subsea infrastructure.	The Operational Area includes a radius of 4000 m from the Xena-03 well to allow vessels to undertake drilling activities. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.

Infrastructure	Key infrastructure includes, but is not limited to: i. Riser platform i. Pluto A and B flowlines i. Export pipeline (Commonwealth)	Key infrastructure includes, but is not limited to: x. Xena tie-in x. One subsea Xmas tree and wellhead
Vessels	Operations support vessels will be used to undertake IMMR of subsea infrastructure.	Mobile offshore drilling unit (MODU), support and installation vessels.
Relevant Fisheries	**Commonwealth fisheries** **Operational Areas:** North-West Slope Trawl Fishery. **EMBA:** North-West Slope Trawl Fishery, Western Deepwater Trawl Fishery.	

Feedback
Should you require notification prior to, and on completion of, the proposed activities, or have feedback specific to the proposed activities described, we would welcome your feedback at Feedback@woodside.com or 1800 442 977 by **Wednesday 29 March 2024.**

Your feedback and our response will be included in our EP which will be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for acceptance in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023* (Cth). Your feedback may also be used to support other regulatory processes associated with the planned activities (which may or may not be confidential).

Please let us know if you request that particular information that you provide in the consultation not be published. If so, we will make your request known to NOPSEMA so that the information is not included when the EP is published on NOPSEMA's website.

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2.15 Email sent to Western Australian Fishing Industry Council (WAFIC) (28 February 2024)

Woodside is planning to submit a five-year revision of the Operations Environment Plan (EP) for the Pluto Facility.

The Pluto platform is in Production Licence WA-1-IL and WA-34-L, located in Commonwealth waters approximately 160 km north west of Dampier, Western Australia.

Woodside plans to continue producing wet gas and condensate from the Pluto, Xena and Pyxis reservoirs. The gas and condensate are transported onshore via a 180 km long export pipeline. Operations began in 2012.

The following proposed activities will continue at the Facility:

- Routine production
- Routine inspection, monitoring, maintenance and repair (IMMR)
- Commissioning and operation of the water handling unit
- Non-routine and unplanned activities and incidents associated with the above.

In addition, Woodside proposes to conduct drilling, subsea installation and commissioning (tie-back), and production from the Xena-03 well into the existing Pluto production systems.

Operational Areas and Exclusion Zones

Infrastructure is located within the Operational Areas described below. This area is where Woodside vessels can be expected to be operating to undertake routine operations:

- The riser platform and the area within a 500 m radius operational area around the platform
- The export pipeline (P1TL) and associated 6-inch chemical supply line covered by Pipeline Licence WA-17-PL and a 1500 m operational area corridor either side of the pipeline
- Pluto, Xena and Pyxis subsea facilities (including wells, production and pigging manifolds, production jumpers, spools, flowlines and flexible jumpers) and an area within 1500 m operational area around the subsea infrastructure.

The Xena-03 Drilling and Tie-Back activity will take place within an Operational Area that includes the Xena-03 well location and the area within a 4000 m radius.

Exclusion zones, which are established for navigational safety and fishing vessels are not allowed to enter, will include:

- The 500 m-radius Petroleum Safety Zone (PSZ) around the platform, and
- A temporary 500 m-radius safety exclusion zone around vessels conducting drilling and installation activities.

An interactive map showing the location of the proposed activities will be available on the Woodside website and will be updated throughout the proposed activities.

Environment that May be Affected (EMBA)

Following changes to Commonwealth EP consultation requirements, Woodside is now consulting persons or organisations who are located within the EMBA by a proposed petroleum activity. The EMBA is the largest spatial extent where unplanned events could potentially have an environmental consequence. For this EP, it is determined by a highly unlikely release of hydrocarbons to the environment due to a loss of well integrity, loss of pipeline integrity or a vessel collision.

A Consultation Information Sheet is attached, which provides additional background on the proposed activities, including summaries of potential key impacts and risks, and associated management measures. These are also available on our website. You can also subscribe to receive updates on our consultation activities by subscribing here.

Activity: Pluto Facility Operations Environment Plan

Environment Plan	**Pluto Facility Operations Environment Plan**	
Summary of activities	Ongoing Operations	Drilling and tie-back
	Continued wet gas and condensate production at the Pluto, Xena and Pyxis reservoir.	Drilling and tie-back of the Xena-03 well into the existing Pluto production systems
Permit Area	Activities will occur within Production License WA-1-IL and WA-34-L.	Activities will occur within Production License WA-34-L
Location	160 km north west of Dampier, Western Australia	190 km west north west of Dampier, Western Australia
Approx. Water Depth (m)	80-960 m	176 m
Schedule	Production Commenced: 2012 Routine Operations: Ongoing	Drilling expected in Q2 2025 Subsea installation expected in Q3 2025
Operational Areas / Exclusion Zones	The riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the platform. The export pipeline (P1TL) and associated 6-inch chemical supply line covered by Pipeline License WA-17-PL and a 1500 m corridor either side of the pipeline. Pluto, Xena and Pyxis subsea facilities (including wells, production and pigging manifolds, production jumpers, spools, flowlines and flexible jumpers) and an area within 1500 m around the subsea infrastructure.	The Operational Area includes a radius of 4000 m from the Xena-03 well to allow vessels to undertake drilling activities. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.

Infrastructure	Key infrastructure includes, but is not limited to: i. Riser platform i. Pluto A and B flowlines i. Export pipeline (Commonwealth)	Key infrastructure includes, but is not limited to: v. Xena tie-in v. One subsea Xmas tree and wellhead
Vessels	Operations support vessels will be used to undertake IMMR of subsea infrastructure.	Mobile offshore drilling unit (MODU), support and installation vessels.
Relevant Fisheries	**State Fisheries** **Operational Areas:** The West Australian Sea Cucumber Fishery, Hermit Crab Fishery, Mackerel Managed Fishery (Area 2 and 3), Marine Aquarium Fish Managed Fishery, Onslow Prawn Managed Fishery, Pilbara Crab Managed Fishery, Pilbara Fish Trawl Managed Fishery, Pilbara Line Fishery, Specimen Shell Managed Fishery, Tour Operators. **EMBA:** The Exmouth Gulf Prawn Managed Fishery, West Australian Sea Cucumber Fishery, Hermit Crab Fishery, Mackerel Managed Fishery (Area 2), Marine Aquarium Fish Managed Fishery, Nickol Bay Prawn Managed Fishery, Onslow Prawn Managed Fishery, Pilbara Crab Managed Fishery, Pilbara Fish Trawl Fishery, Specimen Shell Managed Fishery, West Coast Deep Sea Crustacean Managed Fishery.	

Feedback

Should you require notification prior to, and on completion of, the proposed activities, or have feedback specific to the proposed activities described, we would welcome your feedback at Feedback@woodside.com or 1800 442 977 by **Wednesday 29 March 2024.**

Your feedback and our response will be included in our EP which will be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for acceptance in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023* (Cth). Your feedback may also be used to support other regulatory processes associated with the planned activities (which may or may not be confidential).

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2.16 Letter sent to Gascoyne and Pilbara/Kimberley Recreational Marine Users (26 February 2024)

Please direct all responses/queries to:
Woodside Energy Feedback
T: 1800 442 977
E: feedback@woodside.com

26 February 2024

Woodside Energy (Australia) Pty Ltd
ACN 006 923 879
Mia Yellagonga
11 Mount Street
Perth WA 6000
Australia
T +61 8 9348 4000
www.woodside.com

Dear Stakeholder

Woodside is planning to submit a five-year revision of the Operations Environment Plan (EP) for the Pluto Facility.

The Pluto platform is in Production Licence WA-1-IL and WA-34-L, located in Commonwealth waters approximately 160 km north west of Dampier, Western Australia.

Woodside plans to continue producing wet gas and condensate from the Pluto, Xena and Pyxis reservoirs. The gas and condensate are transported onshore via a 180 km long export pipeline. Operations began in 2012.

The following proposed activities will continue at the Facility:

- Routine production
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In addition, Woodside proposes to conduct drilling, subsea installation and commissioning (tie-back), and production from the Xena-03 well into the existing Pluto production systems.

Operational Areas and Exclusion Zones
Infrastructure is located within the Operational Areas described below. This area is where Woodside vessels can be expected to be operating to undertake routine operations:

- The riser platform and the area within a 500 m radius operational area around the platform
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- Pluto, Xena and Pyxis subsea facilities (including wells, production and pigging manifolds, production jumpers, spools, flowlines and flexible jumpers) and an area within 1500 m operational area around the subsea infrastructure.

The Xena-03 Drilling and Tie-Back activity will take place within an Operational Area that includes the Xena-03 well location and the area within a 4000 m radius.

Exclusion zones, which are established for navigational safety and fishing vessels are not allowed to enter, will include:

- The 500 m-radius Petroleum Safety Zone (PSZ) around the platform, and
- A temporary 500 m-radius safety exclusion zone around vessels conducting drilling and installation activities.

An interactive map showing the location of the proposed activities will be available on the Woodside website and will be updated throughout the proposed activities.

Environment that May be Affected (EMBA)
Following changes to Commonwealth EP consultation requirements, Woodside is now consulting persons or organisations who are located within the EMBA by a proposed petroleum activity. The EMBA is the largest spatial extent where unplanned events could potentially have an environmental consequence. For this EP, it is determined by a highly unlikely release of hydrocarbons to the environment due to a loss of well integrity, loss of pipeline integrity or a vessel collision.

A **Consultation Information Sheet** is attached, which provides additional background on the proposed activities, including summaries of potential key impacts and risks, and associated management measures. You can also choose to receive updates on our consultation activities by subscribing on our website woodside.com.

Activity: Pluto Facility Operations Environment Plan

Environment Plan	**Pluto Facility Operations Environment Plan**	
Summary of activities	Ongoing Operations	Drilling and tie-back
	Continued wet gas and condensate production at the Pluto, Xena and Pyxis reservoir.	Drilling and tie-back of the Xena-03 well into the existing Pluto production systems
Permit Area	Activities will occur within Production License WA-1-IL and WA-34-L.	Activities will occur within Production License WA-34-L
Location	160 km north west of Dampier, Western Australia	190 km west north west of Dampier, Western Australia
Approx. Water Depth (m)	80-960 m	176 m
Schedule	Production Commenced: 2012 Routine Operations: Ongoing	Drilling expected in Q2 2025 Subsea installation expected in Q3 2025
Operational Areas / Exclusion Zones	The riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the platform. The export pipeline (P1TL) and associated 6-inch chemical supply line covered by Pipeline License WA-17-PL and a 1500 m corridor either side of the pipeline. Pluto, Xena and Pyxis subsea facilities (including wells, production and pigging manifolds, production jumpers, spools, flowlines and flexible jumpers) and an area within 1500 m around the subsea infrastructure.	The Operational Area includes a radius of 4000 m from the Xena-03 well to allow vessels to undertake drilling activities. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.

Infrastructure	Key infrastructure includes, but is not limited to: • Riser platform • Pluto A and B flowlines • Export pipeline (Commonwealth)	Key infrastructure includes, but is not limited to: • Xena tie-in • One subsea Xmas tree and wellhead
Vessels	Operations support vessels will be used to undertake IMMR of subsea infrastructure.	Mobile offshore drilling unit (MODU), support and installation vessels.

Feedback:
Should you require notification prior to, and on completion of, the proposed activities, or have feedback specific to the proposed activities described, we would welcome your feedback at Feedback@woodside.com.au or 1800 442 977 by **Wednesday 29 March 2024.**

Your feedback and our response will be included in our EP which will be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for acceptance in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023* (Cth). Your feedback may also be used to support other regulatory processes associated with the planned activities (which may or may not be confidential).

NOPSEMA has published a brochure entitled *Consultation on offshore petroleum environment plans – Information for the Community* to help community members understand consultation requirements for Commonwealth EPs and how to participate in consultation. It can be accessed online through the QR code provided below.

Please let us know if you request that particular information that you provide in the consultation not be published. If so, we will make your request known to NOPSEMA so that the information is not included when the EP is published on NOPSEMA's website.

Regards,

Woodside Energy Feedback

Woodside Energy
Mia Yellagonga
Karlak, 11 Mount Street
Perth WA 6000
Australia

T: 1800 442 977
E: feedback@woodside.com
www.woodside.com

2.17 Email sent to Gascoyne Recreational Marine Users, Recfishwest, Marine Tourism WA, WA Game Fishing Association (28 February 2024)

Woodside is planning to submit a five-year revision of the Operations Environment Plan (EP) for the Pluto Facility.

The Pluto platform is in Production Licence WA-1-IL and WA-34-L, located in Commonwealth waters approximately 160 km north west of Dampier, Western Australia.

Woodside plans to continue producing wet gas and condensate from the Pluto, Xena and Pyxis reservoirs. The gas and condensate are transported onshore via a 180 km long export pipeline. Operations began in 2012.

The following proposed activities will continue at the Facility:

- Routine production
- Routine inspection, monitoring, maintenance and repair (IMMR)
- Commissioning and operation of the water handling unit
- Non-routine and unplanned activities and incidents associated with the above.

In addition, Woodside proposes to conduct drilling, subsea installation and commissioning (tie-back), and production from the Xena-03 well into the existing Pluto production systems.

Operational Areas and Exclusion Zones

Infrastructure is located within the Operational Areas described below. This area is where Woodside vessels can be expected to be operating to undertake routine operations:

- The riser platform and the area within a 500 m radius operational area around the platform
- The export pipeline (P1TL) and associated 6-inch chemical supply line covered by Pipeline Licence WA-17-PL and a 1500 m operational area corridor either side of the pipeline
- Pluto, Xena and Pyxis subsea facilities (including wells, production and pigging manifolds, production jumpers, spools, flowlines and flexible jumpers) and an area within 1500 m operational area around the subsea infrastructure.

The Xena-03 Drilling and Tie-Back activity will take place within an Operational Area that includes the Xena-03 well location and the area within a 4000 m radius.

Exclusion zones, which are established for navigational safety and fishing vessels are not allowed to enter, will include:

- The 500 m-radius Petroleum Safety Zone (PSZ) around the platform, and
- A temporary 500 m-radius safety exclusion zone around vessels conducting drilling and installation activities.

An interactive map showing the location of the proposed activities will be available on the Woodside website and will be updated throughout the proposed activities.

Environment that May be Affected (EMBA)

Following changes to Commonwealth EP consultation requirements, Woodside is now consulting persons or organisations who are located within the EMBA by a proposed petroleum activity. The EMBA is the largest spatial extent where unplanned events could potentially have an environmental consequence. For this EP, it is determined by a highly

unlikely release of hydrocarbons to the environment due to a loss of well integrity, loss of pipeline integrity or a vessel collision.

A Consultation Information Sheet is attached, which provides additional background on the proposed activities, including summaries of potential key impacts and risks, and associated management measures. These are also available on our website. You can also subscribe to receive updates on our consultation activities by subscribing here.

Activity: Pluto Facility Operations Environment Plan

Environment Plan	**Pluto Facility Operations Environment Plan**	
Summary of activities	Ongoing Operations	Drilling and tie-back
	Continued wet gas and condensate production at the Pluto, Xena and Pyxis reservoir.	Drilling and tie-back of the Xena-03 well into the existing Pluto production systems
Permit Area	Activities will occur within Production License WA-1-IL and WA-34-L.	Activities will occur within Production License WA-34-L
Location	160 km north west of Dampier, Western Australia	190 km west north west of Dampier, Western Australia
Approx. Water Depth (m)	80-960 m	176 m
Schedule	Production Commenced: 2012 Routine Operations: Ongoing	Drilling expected in Q2 2025 Subsea installation expected in Q3 2025
Operational Areas / Exclusion Zones	The riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the platform. The export pipeline (P1TL) and associated 6-inch chemical supply line covered by Pipeline License WA-17-PL and a 1500 m corridor either side of the pipeline. Pluto, Xena and Pyxis subsea facilities (including wells, production and pigging manifolds, production jumpers, spools, flowlines and flexible jumpers) and an area within 1500 m around the subsea infrastructure.	The Operational Area includes a radius of 4000 m from the Xena-03 well to allow vessels to undertake drilling activities. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.

Infrastructure	Key infrastructure includes, but is not limited to: i. Riser platform i. Pluto A and B flowlines i. Export pipeline (Commonwealth)	Key infrastructure includes, but is not limited to: x. Xena tie-in x. One subsea Xmas tree and wellhead
Vessels	Operations support vessels will be used to undertake IMMR of subsea infrastructure.	Mobile offshore drilling unit (MODU), support and installation vessels.

Feedback
Should you require notification prior to, and on completion of, the proposed activities, or have feedback specific to the proposed activities described, we would welcome your feedback at Feedback@woodside.com or 1800 442 977 by **Friday 29 March 2024.**

Your feedback and our response will be included in our EP which will be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for acceptance in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023* (Cth). Your feedback may also be used to support other regulatory processes associated with the planned activities (which may or may not be confidential).

Please let us know if you request that particular information that you provide in the consultation not be published. If so, we will make your request known to NOPSEMA so that the information is not included when the EP is published on NOPSEMA's website.

NOPSEMA has published a brochure entitled *Consultation on offshore petroleum environment plans – Information for the Community* to help community members understand consultation requirements for Commonwealth EPs and how to participate in consultation.

2.18 Email sent to Chevron, Osaka Gas Gorgon, Tokyo Gas Gorgon and JERA Gorgon (28 February 2024)

Woodside is planning to submit a five-year revision of the Pluto Facility Operations Environment Plan (EP).

The Pluto platform is in Production Licence WA-1-IL and WA-34-L, located in Commonwealth waters approximately 160 km north west of Dampier, Western Australia.

Woodside plans to continue producing wet gas and condensate from the Pluto, Xena and Pyxis reservoirs. The gas and condensate are transported via a 180 km long export pipeline to the onshore Pluto facility. Operations began in 2012.

The following proposed activities will continue at the Facility:

- Routine production
- Routine inspection, monitoring, maintenance and repair (IMMR)
- Commissioning and operation of the water handling unit
- Non-routine and unplanned activities and incidents associated with the above.

In addition, Woodside proposes to conduct drilling, subsea installation and commissioning (tie-back), and production from the Xena-03 well into the existing Pluto production systems.

Environment that May be Affected (EMBA)
Following changes to Commonwealth EP consultation requirements, Woodside is now consulting persons or organisations who are located within the EMBA by a proposed petroleum activity. The EMBA is the largest spatial extent where unplanned events could potentially have an environmental consequence. For this EP, it is determined by a highly unlikely release of hydrocarbons to the environment due to a loss of well integrity, loss of pipeline integrity or a vessel collision.

A **Consultation Information Sheet** is attached, which provides additional background on the proposed activities, including summaries of potential key impacts and risks, and associated management measures. Also attached are the GIS shape files. These are also available on our website. You can also subscribe to receive updates on our consultation activities by subscribing here.

Activity: Pluto Facility Operations

Environment Plan	Pluto Facility Operations Environment Plan	
Summary of activities	Ongoing Operations	Drilling and tie-back
	Continued wet gas and condensate production at the Pluto, Xena and Pyxis reservoir.	Drilling and tie-back of the Xena-03 well into the existing Pluto production systems
Permit Area	Activities will occur within Production License WA-1-IL and WA-34-L.	Activities will occur within Production License WA-34-L
Location	160 km north west of Dampier, Western Australia	190 km west north west of Dampier, Western Australia
Approx. Water Depth (m)	80-960 m	176 m
Schedule	Production Commenced: 2012 Routine Operations: Ongoing	Drilling expected in Q2 2025 Subsea installation expected in Q3 2025
Operational Areas / Exclusion Zones	The riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the platform. The export pipeline (P1TL) and associated 6-inch chemical supply line covered by Pipeline License WA-17-PL and a 1500 m corridor either side of the pipeline.	The Operational Area includes a radius of 4000 m from the Xena-03 well to allow vessels to undertake drilling activities. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.

	Pluto, Xena and Pyxis subsea facilities (including wells, production and pigging manifolds, production jumpers, spools, flowlines and flexible jumpers) and an area within 1500 m around the subsea infrastructure.	
Infrastructure	Key infrastructure includes, but is not limited to: i. Riser platform i. Pluto A and B flowlines i. Export pipeline (Commonwealth)	Key infrastructure includes, but is not limited to: v. Xena tie-in v. One subsea Xmas tree and wellhead
Vessels	Operations support vessels will be used to undertake IMMR of subsea infrastructure.	Mobile offshore drilling unit (MODU), support and installation vessels.

Feedback
If you have feedback specific to the proposed activities described under the proposed EP, we would welcome your feedback at Feedback@woodside.com or 1800 442 977 by **Wednesday 29 March 2024.**

Your feedback and our response will be included in our EP which will be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for acceptance in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023* (Cth). Your feedback may also be used to support other regulatory processes associated with the planned activities (which may or may not be confidential)

Please let us know if you request that particular information that you provide in the consultation not be published. If so, we will make your request known to NOPSEMA so that the information is not included when the EP is published on NOPSEMA's website.

NOPSEMA has published a brochure entitled *Consultation on offshore petroleum environment plans – Information for the Community* to help community members understand consultation requirements for Commonwealth EPs and how to participate in consultation.

We would be grateful if you could please forward this consultation information to your Joint Venture participants Osaka Gas Gorgon, Tokyo Gas Gorgon and JERA Gorgon for feedback.

2.19 Email sent to Western Gas, Exxon Mobil Australia, Shell Australia, BP Developments Australia, Carnarvon Energy, PE Wheatstone, Kyushu Electric Wheatstone, Eni Australia, Finder Energy, Jadestone Energy, KUFPEC Australia, Vermilion Oil & Gas, Santos NA Energy Holdings / Santos Lt / Santos WA Northwest / Santos Offshore / Santos WA Southwest / Santos BOL / Santos WA PVG, Coastal Oil and Gas,

Bounty Oil and Gas, OMV Australia, KATO Energy / KATO Corowa, INPEX Alpha, Beagle No.1, JX Nippon O&G Exploration Australia (28 February 2024)

Woodside is planning to submit a five-year revision of the Pluto Facility Operations Environment Plan (EP).

The Pluto platform is in Production Licence WA-1-IL and WA-34-L, located in Commonwealth waters approximately 160 km north west of Dampier, Western Australia.

Woodside plans to continue producing wet gas and condensate from the Pluto, Xena and Pyxis reservoirs. The gas and condensate are transported via a 180 km long export pipeline to the onshore Pluto facility. Operations began in 2012.

The following proposed activities will continue at the Facility:

- Routine production
- Routine inspection, monitoring, maintenance and repair (IMMR)
- Commissioning and operation of the water handling unit
- Non-routine and unplanned activities and incidents associated with the above.

In addition, Woodside proposes to conduct drilling, subsea installation and commissioning (tie-back), and production from the Xena-03 well into the existing Pluto production systems.

Environment that May be Affected (EMBA)
Following changes to Commonwealth EP consultation requirements, Woodside is now consulting persons or organisations who are located within the EMBA by a proposed petroleum activity. The EMBA is the largest spatial extent where unplanned events could potentially have an environmental consequence. For this EP, it is determined by a highly unlikely release of hydrocarbons to the environment due to a loss of well integrity, loss of pipeline integrity or a vessel collision.

A **Consultation Information Sheet** is attached, which provides additional background on the proposed activities, including summaries of potential key impacts and risks, and associated management measures. These are also available on our website. You can also subscribe to receive updates on our consultation activities by subscribing here.

Activity: Pluto Facility Operations

Environment Plan	**Pluto Facility Operations Environment Plan**	
Summary of activities	Ongoing Operations	Drilling and tie-back
	Continued wet gas and condensate production at the Pluto, Xena and Pyxis reservoir.	Drilling and tie-back of the Xena-03 well into the existing Pluto production systems
Permit Area	Activities will occur within Production License WA-1-IL and WA-34-L.	Activities will occur within Production License WA-34-L
Location	160 km north west of Dampier, Western Australia	190 km west north west of Dampier, Western Australia

Approx. Water Depth (m)	80-960 m	176 m
Schedule	Production Commenced: 2012 Routine Operations: Ongoing	Drilling expected in Q2 2025 Subsea installation expected in Q3 2025
Operational Areas / Exclusion Zones	The riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the platform. The export pipeline (P1TL) and associated 6-inch chemical supply line covered by Pipeline License WA-17-PL and a 1500 m corridor either side of the pipeline. Pluto, Xena and Pyxis subsea facilities (including wells, production and pigging manifolds, production jumpers, spools, flowlines and flexible jumpers) and an area within 1500 m around the subsea infrastructure.	The Operational Area includes a radius of 4000 m from the Xena-03 well to allow vessels to undertake drilling activities. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	Key infrastructure includes, but is not limited to: i. Riser platform i. Pluto A and B flowlines i. Export pipeline (Commonwealth)	Key infrastructure includes, but is not limited to: x. Xena tie-in c. One subsea Xmas tree and wellhead
Vessels	Operations support vessels will be used to undertake IMMR of subsea infrastructure.	Mobile offshore drilling unit (MODU), support and installation vessels.

Feedback
If you have feedback specific to the proposed activities described under the proposed EP, we would welcome your feedback at Feedback@woodside.com or 1800 442 977 by **Wednesday 29 March 2024.**

Your feedback and our response will be included in our EP which will be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for acceptance in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023* (Cth). Your feedback may also be used to support other regulatory processes associated with the planned activities (which may or may not be confidential)

Please let us know if you request that particular information that you provide in the consultation not be published. If so, we will make your request known to NOPSEMA so that the information is not included when the EP is published on NOPSEMA's website.

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2.20 Email sent to Fox Resources (11 March 2024)

Woodside is planning to submit a five-year revision of the Pluto Facility Operations Environment Plan (EP). As we've been unable to reach Coastal Oil and Gas NL via email, we are reaching out to you, given your role as the key Principal of Coastal Oil and Gas NL.

Please let us know if fxr@foxresources.com.au should be used moving forward for outreach to Coastal Oil and Gas NL for consultation, or if another email is preferred.

The Pluto platform is in Production Licence WA-1-IL and WA-34-L, located in Commonwealth waters approximately 160 km north west of Dampier, Western Australia.

Woodside plans to continue producing wet gas and condensate from the Pluto, Xena and Pyxis reservoirs. The gas and condensate are transported via a 180 km long export pipeline to the onshore Pluto facility. Operations began in 2012.

The following proposed activities will continue at the Facility:

- Routine production
- Routine inspection, monitoring, maintenance and repair (IMMR)
- Commissioning and operation of the water handling unit
- Non-routine and unplanned activities and incidents associated with the above.

In addition, Woodside proposes to conduct drilling, subsea installation and commissioning (tie-back), and production from the Xena-03 well into the existing Pluto production systems.

Environment that May be Affected (EMBA)
Following changes to Commonwealth EP consultation requirements, Woodside is now consulting persons or organisations who are located within the EMBA by a proposed petroleum activity. The EMBA is the largest spatial extent where unplanned events could potentially have an environmental consequence. For this EP, it is determined by a highly unlikely release of hydrocarbons to the environment due to a loss of well integrity, loss of pipeline integrity or a vessel collision.

A **Consultation Information Sheet** is attached, which provides additional background on the proposed activities, including summaries of potential key impacts and risks, and associated management measures. These are also available on our website. You can also subscribe to receive updates on our consultation activities by subscribing here.

Activity: Pluto Facility Operations

Environment Plan	**Pluto Facility Operations Environment Plan**	
Summary of activities	Ongoing Operations	Drilling and tie-back

	Continued wet gas and condensate production at the Pluto, Xena and Pyxis reservoir.	Drilling and tie-back of the Xena-03 well into the existing Pluto production systems
Permit Area	Activities will occur within Production License WA-1-IL and WA-34-L.	Activities will occur within Production License WA-34-L
Location	160 km north west of Dampier, Western Australia	190 km west north west of Dampier, Western Australia
Approx. Water Depth (m)	80-960 m	176 m
Schedule	Production Commenced: 2012 Routine Operations: Ongoing	Drilling expected in Q2 2025 Subsea installation expected in Q3 2025
Operational Areas / Exclusion Zones	The riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the platform. The export pipeline (P1TL) and associated 6-inch chemical supply line covered by Pipeline License WA-17-PL and a 1500 m corridor either side of the pipeline. Pluto, Xena and Pyxis subsea facilities (including wells, production and pigging manifolds, production jumpers, spools, flowlines and flexible jumpers) and an area within 1500 m around the subsea infrastructure.	The Operational Area includes a radius of 4000 m from the Xena-03 well to allow vessels to undertake drilling activities. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	Key infrastructure includes, but is not limited to: i. Riser platform i. Pluto A and B flowlines i. Export pipeline (Commonwealth)	Key infrastructure includes, but is not limited to: v. Xena tie-in v. One subsea Xmas tree and wellhead
Vessels	Operations support vessels will be used to undertake IMMR of subsea infrastructure.	Mobile offshore drilling unit (MODU), support and installation vessels.

Feedback

If you have feedback specific to the proposed activities described under the proposed EP, we would welcome your feedback at Feedback@woodside.com or 1800 442 977 by **29 March 2024.**

Your feedback and our response will be included in our EP which will be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for acceptance in accordance with the *Offshore Petroleum and Greenhouse Gas Storage*

(Environment) Regulations 2023 (Cth). Your feedback may also be used to support other regulatory processes associated with the planned activities (which may or may not be confidential)

Please let us know if you request that particular information that you provide in the consultation not be published. If so, we will make your request known to NOPSEMA so that the information is not included when the EP is published on NOPSEMA's website.

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2.21 Email sent Australian Energy Producers (AEP) (27 February 2024)

Woodside is planning to submit a five-year revision of the Pluto Facility Operations Environment Plan (EP).

The Pluto platform is in Production Licence WA-1-IL and WA-34-L, located in Commonwealth waters approximately 160 km north west of Dampier, Western Australia.

Woodside plans to continue producing wet gas and condensate from the Pluto, Xena and Pyxis reservoirs. The gas and condensate are transported via a 180 km long export pipeline to the onshore Pluto facility. Operations began in 2012.

The following proposed activities will continue at the Facility:

- Routine production
- Routine inspection, monitoring, maintenance and repair (IMMR)
- Commissioning and operation of the water handling unit
- Non-routine and unplanned activities and incidents associated with the above.

In addition, Woodside proposes to conduct drilling, subsea installation and commissioning (tie-back), and production from the Xena-03 well into the existing Pluto production systems.

Environment that May be Affected (EMBA)
Following changes to Commonwealth EP consultation requirements, Woodside is now consulting persons or organisations who are located within the EMBA by a proposed petroleum activity. The EMBA is the largest spatial extent where unplanned events could potentially have an environmental consequence. For this EP, it is determined by a highly unlikely release of hydrocarbons to the environment due to a loss of well integrity, loss of pipeline integrity or a vessel collision.

A **Consultation Information Sheet** is attached, which provides additional background on the proposed activities, including summaries of potential key impacts and risks, and associated management measures. These are also available on our website. You can also subscribe to receive updates on our consultation activities by subscribing here.

Activity: Pluto Facility Operations

Environment Plan	Pluto Facility Operations Environment Plan

Summary of activities	Ongoing Operations	Drilling and tie-back
	Continued wet gas and condensate production at the Pluto, Xena and Pyxis reservoir.	Drilling and tie-back of the Xena-03 well into the existing Pluto production systems
Permit Area	Activities will occur within Production License WA-1-IL and WA-34-L.	Activities will occur within Production License WA-34-L
Location	160 km north west of Dampier, Western Australia	190 km west north west of Dampier, Western Australia
Approx. Water Depth (m)	80-960 m	176 m
Schedule	Production Commenced: 2012 Routine Operations: Ongoing	Drilling expected in Q2 2025 Subsea installation expected in Q3 2025
Operational Areas / Exclusion Zones	The riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the platform. The export pipeline (P1TL) and associated 6-inch chemical supply line covered by Pipeline License WA-17-PL and a 1500 m corridor either side of the pipeline. Pluto, Xena and Pyxis subsea facilities (including wells, production and pigging manifolds, production jumpers, spools, flowlines and flexible jumpers) and an area within 1500 m around the subsea infrastructure.	The Operational Area includes a radius of 4000 m from the Xena-03 well to allow vessels to undertake drilling activities. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	Key infrastructure includes, but is not limited to: i. Riser platform i. Pluto A and B flowlines i. Export pipeline (Commonwealth)	Key infrastructure includes, but is not limited to: x. Xena tie-in c. One subsea Xmas tree and wellhead
Vessels	Operations support vessels will be used to undertake IMMR of subsea infrastructure.	Mobile offshore drilling unit (MODU), support and installation vessels.

Feedback

If you have feedback specific to the proposed activities described under the proposed EP, we would welcome your feedback at Feedback@woodside.com.au or 1800 442 977 by **Wednesday 29 March 2024.**

Your feedback and our response will be included in our EP which will be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for acceptance in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023* (Cth). Your feedback may also be used to support other regulatory processes associated with the planned activities (which may or may not be confidential)

Please let us know if you request that particular information that you provide in the consultation not be published. If so, we will make your request known to NOPSEMA so that the information is not included when the EP is published on NOPSEMA's website.

NOPSEMA has published a brochure entitled *Consultation on offshore petroleum environment plans – Information for the Community* to help community members understand consultation requirements for Commonwealth EPs and how to participate in consultation.

2.22 Email sent to Shire of Exmouth, City of Karratha, Exmouth Community Liaison Group, Karratha Community Liaison Group, Onslow Chamber of Commerce and Industry (27 February 2024)

Woodside is planning to submit a five-year revision of the Pluto Facility Operations Environment Plan (EP).

The Pluto platform is in Production Licence WA-1-IL and WA-34-L, located in Commonwealth waters approximately 160 km north west of Dampier, Western Australia.

Woodside plans to continue producing wet gas and condensate from the Pluto, Xena and Pyxis reservoirs. The gas and condensate are transported via a 180 km long export pipeline to the onshore Pluto facility. Operations began in 2012.

The following proposed activities will continue at the Facility:

- Routine production
- Routine inspection, monitoring, maintenance and repair (IMMR)
- Commissioning and operation of the water handling unit
- Non-routine and unplanned activities and incidents associated with the above.

In addition, Woodside proposes to conduct drilling, subsea installation and commissioning (tie-back), and production from the Xena-03 well into the existing Pluto production systems.

Environment that May be Affected (EMBA)
Following changes to Commonwealth EP consultation requirements, Woodside is now consulting persons or organisations who are located within the EMBA by a proposed petroleum activity. The EMBA is the largest spatial extent where unplanned events could potentially have an environmental consequence. For this EP, it is determined by a highly unlikely release of hydrocarbons to the environment due to a loss of well integrity, loss of pipeline integrity or a vessel collision.

A **Consultation Information Sheet** is attached, which provides additional background on the proposed activities, including summaries of potential key impacts and risks, and

associated management measures. These are also available on our website. You can also subscribe to receive updates on our consultation activities by subscribing here.

Activity: Pluto Facility Operations

Environment Plan	Pluto Facility Operations Environment Plan	
Summary of activities	Ongoing Operations	Drilling and tie-back
	Continued wet gas and condensate production at the Pluto, Xena and Pyxis reservoir.	Drilling and tie-back of the Xena-03 well into the existing Pluto production systems
Permit Area	Activities will occur within Production License WA-1-IL and WA-34-L.	Activities will occur within Production License WA-34-L
Location	160 km north west of Dampier, Western Australia	190 km west north west of Dampier, Western Australia
Approx. Water Depth (m)	80-960 m	176 m
Schedule	Production Commenced: 2012 Routine Operations: Ongoing	Drilling expected in Q2 2025 Subsea installation expected in Q3 2025
Operational Areas / Exclusion Zones	The riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the platform. The export pipeline (P1TL) and associated 6-inch chemical supply line covered by Pipeline License WA-17-PL and a 1500 m corridor either side of the pipeline. Pluto, Xena and Pyxis subsea facilities (including wells, production and pigging manifolds, production jumpers, spools, flowlines and flexible jumpers) and an area within 1500 m around the subsea infrastructure.	The Operational Area includes a radius of 4000 m from the Xena-03 well to allow vessels to undertake drilling activities. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	Key infrastructure includes, but is not limited to: i. Riser platform i. Pluto A and B flowlines i. Export pipeline (Commonwealth)	Key infrastructure includes, but is not limited to: v. Xena tie-in v. One subsea Xmas tree and wellhead

Vessels	Operations support vessels will be used to undertake IMMR of subsea infrastructure.	Mobile offshore drilling unit (MODU), support and installation vessels.

Feedback
If you have feedback specific to the proposed activities described under the proposed EP, we would welcome your feedback at Feedback@woodside.com.au or 1800 442 977 by **Wednesday 29 March 2024.**

Your feedback and our response will be included in our EP which will be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for acceptance in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023* (Cth). Your feedback may also be used to support other regulatory processes associated with the planned activities (which may or may not be confidential)

Please let us know if you request that particular information that you provide in the consultation not be published. If so, we will make your request known to NOPSEMA so that the information is not included when the EP is published on NOPSEMA's website.

NOPSEMA has published a brochure entitled *Consultation on offshore petroleum environment plans – Information for the Community* to help community members understand consultation requirements for Commonwealth EPs and how to participate in consultation.

2.23 Email sent to Shire of Ashburton (27 February 2024)

Woodside is planning to submit a five-year revision of the Pluto Facility Operations Environment Plan (EP).

The Pluto platform is in Production Licence WA-1-IL and WA-34-L, located in Commonwealth waters approximately 160 km north west of Dampier, Western Australia.

Woodside plans to continue producing wet gas and condensate from the Pluto, Xena and Pyxis reservoirs. The gas and condensate are transported via a 180 km long export pipeline to the onshore Pluto facility. Operations began in 2012.

The following proposed activities will continue at the Facility:

- Routine production
- Routine inspection, monitoring, maintenance and repair (IMMR)
- Commissioning and operation of the water handling unit
- Non-routine and unplanned activities and incidents associated with the above.

In addition, Woodside proposes to conduct drilling, subsea installation and commissioning (tie-back), and production from the Xena-03 well into the existing Pluto production systems.

Environment that May be Affected (EMBA)
Following changes to Commonwealth EP consultation requirements, Woodside is now consulting persons or organisations who are located within the EMBA by a proposed petroleum activity. The EMBA is the largest spatial extent where unplanned events could

potentially have an environmental consequence. For this EP, it is determined by a highly unlikely release of hydrocarbons to the environment due to a loss of well integrity, loss of pipeline integrity or a vessel collision.

Woodside is required to manage environmental impacts and risks to the EMBA by its proposed activities to As Low As Reasonably Practicable (ALARP) and to an acceptable level, as required by the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Environment Regulations), through the implementation of the EP. Woodside will submit the proposed EP to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

Preparedness and Response

In the course of developing the EP, Woodside will develop the oil spill preparedness and response position tailored to this activity including the drafting of the Oil Pollution First Strike Plan which details the potential impacts, notifications and response mitigations that may be executed to manage an emergency event. Woodside consults with the relevant jurisdictional authorities and controlling agencies, including the Western Australian Department of Transport (DoT), the Australian Maritime Safety Agency (AMSA) and, in some circumstances, relevant port authorities, during the plan drafting process to inform mitigation management measures in place for the proposed activities. Woodside may also consult with other relevant external emergency management agencies, including LEMC, to ensure emergency management plans are aligned with effective outcomes.

In addition to the jurisdictional authorities and controlling agencies, the plan includes standard emergency notifications to agencies including NOPSEMA, the Department of Climate Change, Energy, the Environment and Water (DCCEEW), the Director of National Parks (DNP), and the WA Department of Biodiversity, Conservation and Attractions (DBCA). Where applicable, notification information for relevant Shires is also included in the Oil Pollution First Strike Plan.

Cultural heritage

Woodside routinely utilises the Department of Planning, Land and Heritage Aboriginal Cultural Heritage Inquiry System as part of the EP development process and includes the results of these inquiry system searches as an appendix to each EP.

A **Consultation Information Sheet** is attached, which provides additional background on the proposed activities, including summaries of potential key impacts and risks, and associated management measures. These are also available on our website. You can also subscribe to receive updates on our consultation activities by subscribing here.

Activity: Pluto Facility Operations

Environment Plan	**Pluto Facility Operations Environment Plan**	
Summary of activities	Ongoing Operations	Drilling and tie-back
	Continued wet gas and condensate production at the Pluto, Xena and Pyxis reservoir.	Drilling and tie-back of the Xena-03 well into the existing Pluto production systems

Permit Area	Activities will occur within Production License WA-1-IL and WA-34-L.	Activities will occur within Production License WA-34-L
Location	160 km north west of Dampier, Western Australia	190 km west north west of Dampier, Western Australia
Approx. Water Depth (m)	80-960 m	176 m
Schedule	Production Commenced: 2012 Routine Operations: Ongoing	Drilling expected in Q2 2025 Subsea installation expected in Q3 2025
Operational Areas / Exclusion Zones	The riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the platform. The export pipeline (P1TL) and associated 6-inch chemical supply line covered by Pipeline License WA-17-PL and a 1500 m corridor either side of the pipeline. Pluto, Xena and Pyxis subsea facilities (including wells, production and pigging manifolds, production jumpers, spools, flowlines and flexible jumpers) and an area within 1500 m around the subsea infrastructure.	The Operational Area includes a radius of 4000 m from the Xena-03 well to allow vessels to undertake drilling activities. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	Key infrastructure includes, but is not limited to: i. Riser platform i. Pluto A and B flowlines i. Export pipeline (Commonwealth)	Key infrastructure includes, but is not limited to: x. Xena tie-in x. One subsea Xmas tree and wellhead
Vessels	Operations support vessels will be used to undertake IMMR of subsea infrastructure.	Mobile offshore drilling unit (MODU), support and installation vessels.

Feedback:

If you have feedback specific to the proposed activities described under the proposed EP, we would welcome your feedback at Feedback@woodside.com or 1800 442 977 by **Wednesday 29 March 2024.**

Your feedback and our response will be included in our EP which will be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for acceptance in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023* (Cth). Your feedback may also be used to support other regulatory processes associated with the planned activities (which may or may not be confidential)

Please let us know if you request that particular information that you provide in the consultation not be published. If so, we will make your request known to NOPSEMA so that the information is not included when the EP is published on NOPSEMA's website.

As per Woodside's ongoing consultation approach, feedback and comments received from relevant persons continue to be assessed and responded to, as required, throughout the life of an EP, including during its assessment and once accepted, in accordance with the intended outcome of consultation.

NOPSEMA has published a brochure entitled *Consultation on offshore petroleum environment plans – Information for the Community* to help community members understand consultation requirements for Commonwealth EPs and how to participate in consultation.

Please let us know if the Shire would like to receive start and end of activity notifications.

2.24 Email sent to Australian Conservation Foundation (ACF), Australian Marine Conservation Society (AMCS), Conservation Council of Western Australia (CCWA), Greenpeace Australia Pacific (GAP), 350 Australia (350A), Australasian Centre for Corporate Responsibility (ACCR), Friends of Australian Rock Art (FARA), Market Forces (27 February 2024)

Woodside is planning to submit a five-year revision of the Pluto Facility Operations Environment Plan (EP).

The Pluto platform is in Production Licence WA-1-IL and WA-34-L, located in Commonwealth waters approximately 160 km north west of Dampier, Western Australia.

Woodside plans to continue producing wet gas and condensate from the Pluto, Xena and Pyxis reservoirs. The gas and condensate are transported via a 180 km long export pipeline to the onshore Pluto facility. Operations began in 2012.

The following proposed activities will continue at the Facility:

- Routine production
- Routine inspection, monitoring, maintenance and repair (IMMR)
- Commissioning and operation of the water handling unit
- Non-routine and unplanned activities and incidents associated with the above.

In addition, Woodside proposes to conduct drilling, subsea installation and commissioning (tie-back), and production from the Xena-03 well into the existing Pluto production systems.

Environment that May be Affected (EMBA)
Following changes to Commonwealth EP consultation requirements, Woodside is now consulting persons or organisations who are located within the EMBA by a proposed petroleum activity. The EMBA is the largest spatial extent where unplanned events could potentially have an environmental consequence. For this EP, it is determined by a highly unlikely release of hydrocarbons to the environment due to a loss of well integrity, loss of pipeline integrity or a vessel collision.

A **Consultation Information Sheet** is attached, which provides additional background on the proposed activities, including summaries of potential key impacts and risks, and associated management measures. These are also available on our website. You can also subscribe to receive updates on our consultation activities by subscribing here.

Activity: Pluto Facility Operations

Environment Plan	**Pluto Facility Operations Environment Plan**	
Summary of activities	Ongoing Operations	Drilling and tie-back
	Continued wet gas and condensate production at the Pluto, Xena and Pyxis reservoir.	Drilling and tie-back of the Xena-03 well into the existing Pluto production systems
Permit Area	Activities will occur within Production License WA-1-IL and WA-34-L.	Activities will occur within Production License WA-34-L
Location	160 km north west of Dampier, Western Australia	190 km west north west of Dampier, Western Australia
Approx. Water Depth (m)	80-960 m	176 m
Schedule	Production Commenced: 2012 Routine Operations: Ongoing	Drilling expected in Q2 2025 Subsea installation expected in Q3 2025
Operational Areas / Exclusion Zones	The riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the platform. The export pipeline (P1TL) and associated 6-inch chemical supply line covered by Pipeline License WA-17-PL and a 1500 m corridor either side of the pipeline. Pluto, Xena and Pyxis subsea facilities (including wells, production and pigging manifolds, production jumpers, spools, flowlines and flexible jumpers) and an area within 1500 m around the subsea infrastructure.	The Operational Area includes a radius of 4000 m from the Xena-03 well to allow vessels to undertake drilling activities. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	Key infrastructure includes, but is not limited to: i. Riser platform i. Pluto A and B flowlines i. Export pipeline (Commonwealth)	Key infrastructure includes, but is not limited to: v. Xena tie-in v. One subsea Xmas tree and wellhead

Vessels	Operations support vessels will be used to undertake IMMR of subsea infrastructure.	Mobile offshore drilling unit (MODU), support and installation vessels.

Feedback
If you have feedback specific to the proposed activities described under the proposed EP, we would welcome your feedback at Feedback@woodside.com or 1800 442 977 by **Wednesday 29 March 2024.**

Your feedback and our response will be included in our EP which will be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for acceptance in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023* (Cth). Your feedback may also be used to support other regulatory processes associated with the planned activities (which may or may not be confidential)

Please let us know if you request that particular information that you provide in the consultation not be published. If so, we will make your request known to NOPSEMA so that the information is not included when the EP is published on NOPSEMA's website.

NOPSEMA has published a brochure entitled *Consultation on offshore petroleum environment plans – Information for the Community* to help community members understand consultation requirements for Commonwealth EPs and how to participate in consultation.

2.25 Email sent to Telstra, Vocus (27 February 2024)

Woodside is planning to submit a five-year revision of the Pluto Facility Operations Environment Plan (EP).

The Pluto platform is in Production Licence WA-1-IL and WA-34-L, located in Commonwealth waters approximately 160 km north west of Dampier, Western Australia.

Woodside plans to continue producing wet gas and condensate from the Pluto, Xena and Pyxis reservoirs. The gas and condensate are transported via a 180 km long export pipeline to the onshore Pluto facility. Operations began in 2012.

The following proposed activities will continue at the Facility:

- Routine production
- Routine inspection, monitoring, maintenance and repair (IMMR)
- Commissioning and operation of the water handling unit
- Non-routine and unplanned activities and incidents associated with the above.

In addition, Woodside proposes to conduct drilling, subsea installation and commissioning (tie-back), and production from the Xena-03 well into the existing Pluto production systems.

Environment that May be Affected (EMBA)
Following changes to Commonwealth EP consultation requirements, Woodside is now consulting persons or organisations who are located within the EMBA by a proposed petroleum activity. The EMBA is the largest spatial extent where unplanned events could potentially have an environmental consequence. For this EP, it is determined by a highly

unlikely release of hydrocarbons to the environment due to a loss of well integrity, loss of pipeline integrity or a vessel collision.

A **Consultation Information Sheet** is attached, which provides additional background on the proposed activities, including summaries of potential key impacts and risks, and associated management measures. Also attached is a map of the submarine communications cables in the operational area. These are also available on our website. You can also subscribe to receive updates on our consultation activities by subscribing here.

Activity: Pluto Facility Operations

Environment Plan	Pluto Facility Operations Environment Plan	
Summary of activities	Ongoing Operations	Drilling and tie-back
	Continued wet gas and condensate production at the Pluto, Xena and Pyxis reservoir.	Drilling and tie-back of the Xena-03 well into the existing Pluto production systems
Permit Area	Activities will occur within Production License WA-1-IL and WA-34-L.	Activities will occur within Production License WA-34-L
Location	160 km north west of Dampier, Western Australia	190 km west north west of Dampier, Western Australia
Approx. Water Depth (m)	80-960 m	176 m
Schedule	Production Commenced: 2012 Routine Operations: Ongoing	Drilling expected in Q2 2025 Subsea installation expected in Q3 2025
Operational Areas / Exclusion Zones	The riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the platform. The export pipeline (P1TL) and associated 6-inch chemical supply line covered by Pipeline License WA-17-PL and a 1500 m corridor either side of the pipeline. Pluto, Xena and Pyxis subsea facilities (including wells, production and pigging manifolds, production jumpers, spools, flowlines and flexible jumpers) and an area within 1500 m around the subsea infrastructure.	The Operational Area includes a radius of 4000 m from the Xena-03 well to allow vessels to undertake drilling activities. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.

Infrastructure	Key infrastructure includes, but is not limited to: i. Riser platform i. Pluto A and B flowlines i. Export pipeline (Commonwealth)	Key infrastructure includes, but is not limited to: x. Xena tie-in x. One subsea Xmas tree and wellhead
Vessels	Operations support vessels will be used to undertake IMMR of subsea infrastructure.	Mobile offshore drilling unit (MODU), support and installation vessels.

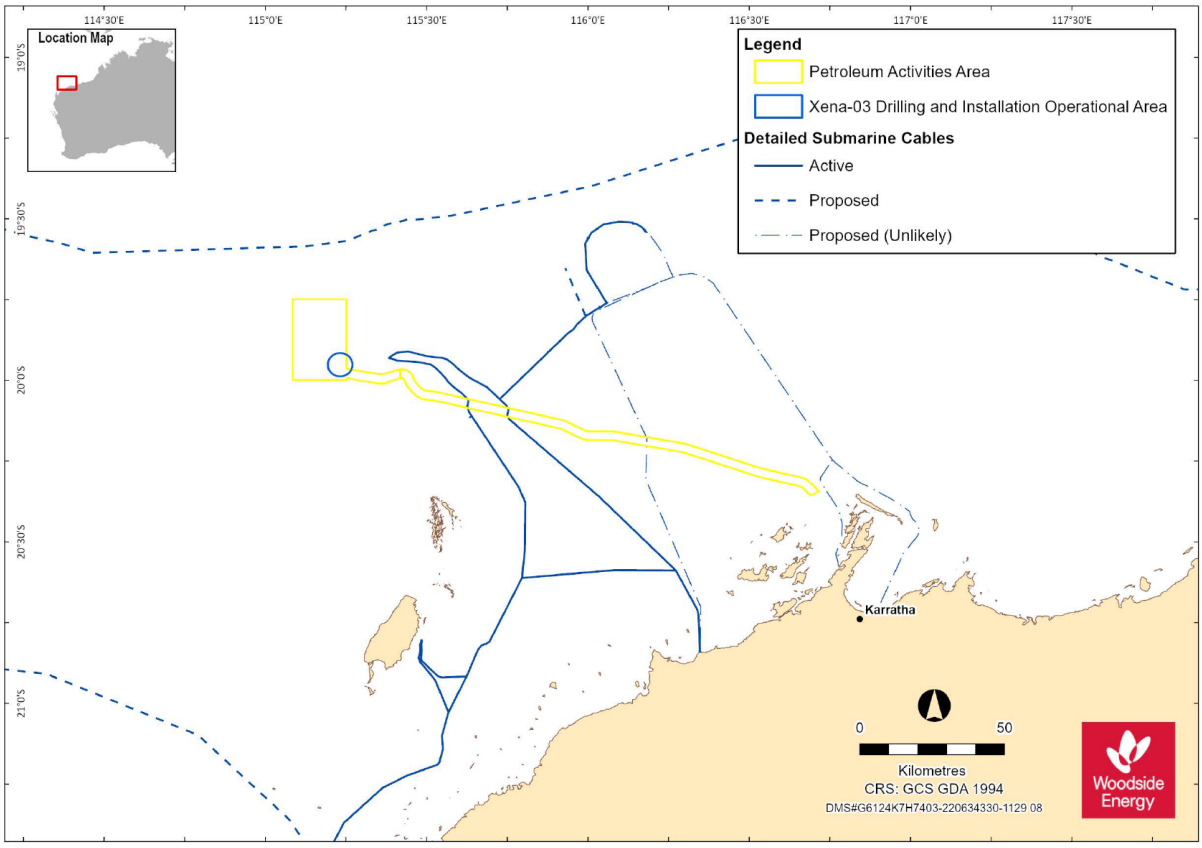
Feedback
If you have feedback specific to the proposed activities described under the proposed EP, we would welcome your feedback at Feedback@woodside.com or 1800 442 977 by **Wednesday 29 March 2024.**

Your feedback and our response will be included in our EP which will be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for acceptance in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023* (Cth). Your feedback may also be used to support other regulatory processes associated with the planned activities (which may or may not be confidential)

Please let us know if you request that particular information that you provide in the consultation not be published. If so, we will make your request known to NOPSEMA so that the information is not included when the EP is published on NOPSEMA's website.

NOPSEMA has published a brochure entitled *Consultation on offshore petroleum environment plans – Information for the Community* to help community members understand consultation requirements for Commonwealth EPs and how to participate in consultation.

2.25.1 Submarine Communications Cables



2.26 Email sent to Cape Conservation Group (CCG), Protect Ningaloo, University of Western Australia (UWA), Curtin University, Edith Cowan University (ECU), Murdoch University, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australian Institute of Marine Science (AIMS) (27 February 2024)

Woodside is planning to submit a five-year revision of the Pluto Facility Operations Environment Plan (EP).

The Pluto platform is in Production Licence WA-1-IL and WA-34-L, located in Commonwealth waters approximately 160 km north west of Dampier, Western Australia.

Woodside plans to continue producing wet gas and condensate from the Pluto, Xena and Pyxis reservoirs. The gas and condensate are transported via a 180 km long export pipeline to the onshore Pluto facility. Operations began in 2012.

The following proposed activities will continue at the Facility:

- Routine production
- Routine inspection, monitoring, maintenance and repair (IMMR)
- Commissioning and operation of the water handling unit
- Non-routine and unplanned activities and incidents associated with the above.

In addition, Woodside proposes to conduct drilling, subsea installation and commissioning (tie-back), and production from the Xena-03 well into the existing Pluto production systems.

Environment that May be Affected (EMBA)
Following changes to Commonwealth EP consultation requirements, Woodside is now consulting persons or organisations who are located within the EMBA by a proposed petroleum activity. The EMBA is the largest spatial extent where unplanned events could potentially have an environmental consequence. For this EP, it is determined by a highly unlikely release of hydrocarbons to the environment due to a loss of well integrity, loss of pipeline integrity or a vessel collision.

A **Consultation Information Sheet** is attached, which provides additional background on the proposed activities, including summaries of potential key impacts and risks, and associated management measures. These are also available on our website. You can also subscribe to receive updates on our consultation activities by subscribing here.

Activity: Pluto Facility Operations

Environment Plan	**Pluto Facility Operations Environment Plan**	
Summary of activities	Ongoing Operations	Drilling and tie-back
	Continued wet gas and condensate production at the Pluto, Xena and Pyxis reservoir.	Drilling and tie-back of the Xena-03 well into the existing Pluto production systems
Permit Area	Activities will occur within Production License WA-1-IL and WA-34-L.	Activities will occur within Production License WA-34-L
Location	160 km north west of Dampier, Western Australia	190 km west north west of Dampier, Western Australia
Approx. Water Depth (m)	80-960 m	176 m
Schedule	Production Commenced: 2012 Routine Operations: Ongoing	Drilling expected in Q2 2025 Subsea installation expected in Q3 2025
Operational Areas / Exclusion Zones	The riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the platform. The export pipeline (P1TL) and associated 6-inch chemical supply line covered by Pipeline License WA-17-PL and a 1500 m corridor either side of the pipeline. Pluto, Xena and Pyxis subsea facilities (including wells, production and pigging manifolds, production	The Operational Area includes a radius of 4000 m from the Xena-03 well to allow vessels to undertake drilling activities. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.

	jumpers, spools, flowlines and flexible jumpers) and an area within 1500 m around the subsea infrastructure.	
Infrastructure	Key infrastructure includes, but is not limited to: i. Riser platform i. Pluto A and B flowlines i. Export pipeline (Commonwealth)	Key infrastructure includes, but is not limited to: v. Xena tie-in v. One subsea Xmas tree and wellhead
Vessels	Operations support vessels will be used to undertake IMMR of subsea infrastructure.	Mobile offshore drilling unit (MODU), support and installation vessels.

Feedback
If you have feedback specific to the proposed activities described under the proposed EP, we would welcome your feedback at Feedback@woodside.com or 1800 442 977 by **Wednesday 29 March 2024.**

Your feedback and our response will be included in our EP which will be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for acceptance in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023* (Cth). Your feedback may also be used to support other regulatory processes associated with the planned activities (which may or may not be confidential)

Please let us know if you request that particular information that you provide in the consultation not be published. If so, we will make your request known to NOPSEMA so that the information is not included when the EP is published on NOPSEMA's website.

NOPSEMA has published a brochure entitled *Consultation on offshore petroleum environment plans – Information for the Community* to help community members understand consultation requirements for Commonwealth EPs and how to participate in consultation.

2.26.1 Email sent to WAMSI (18 March 2024)

Woodside is planning to submit a five-year revision of the Pluto Facility Operations Environment Plan (EP).

The Pluto platform is in Production Licence WA-1-IL and WA-34-L, located in Commonwealth waters approximately 160 km north west of Dampier, Western Australia.

Woodside plans to continue producing wet gas and condensate from the Pluto, Xena and Pyxis reservoirs. The gas and condensate are transported via a 180 km long export pipeline to the onshore Pluto facility. Operations began in 2012.

The following proposed activities will continue at the Facility:

- Routine production
- Routine inspection, monitoring, maintenance and repair (IMMR)
- Commissioning and operation of the water handling unit
- Non-routine and unplanned activities and incidents associated with the above.

In addition, Woodside proposes to conduct drilling, subsea installation and commissioning (tie-back), and production from the Xena-03 well into the existing Pluto production systems.

Environment that May be Affected (EMBA)
Following changes to Commonwealth EP consultation requirements, Woodside is now consulting persons or organisations who are located within the EMBA by a proposed petroleum activity. The EMBA is the largest spatial extent where unplanned events could potentially have an environmental consequence. For this EP, it is determined by a highly unlikely release of hydrocarbons to the environment due to a loss of well integrity, loss of pipeline integrity or a vessel collision.

A **Consultation Information Sheet** is attached, which provides additional background on the proposed activities, including summaries of potential key impacts and risks, and associated management measures. These are also available on our website. You can also subscribe to receive updates on our consultation activities by subscribing here.

Activity: Pluto Facility Operations

Environment Plan	**Pluto Facility Operations Environment Plan**	
Summary of activities	Ongoing Operations	Drilling and tie-back
	Continued wet gas and condensate production at the Pluto, Xena and Pyxis reservoir.	Drilling and tie-back of the Xena-03 well into the existing Pluto production systems
Permit Area	Activities will occur within Production License WA-1-IL and WA-34-L.	Activities will occur within Production License WA-34-L
Location	160 km north west of Dampier, Western Australia	190 km west north west of Dampier, Western Australia
Approx. Water Depth (m)	80-960 m	176 m
Schedule	Production Commenced: 2012 Routine Operations: Ongoing	Drilling expected in Q2 2025 Subsea installation expected in Q3 2025

Operational Areas / Exclusion Zones	The riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the platform. The export pipeline (P1TL) and associated 6-inch chemical supply line covered by Pipeline License WA-17-PL and a 1500 m corridor either side of the pipeline. Pluto, Xena and Pyxis subsea facilities (including wells, production and pigging manifolds, production jumpers, spools, flowlines and flexible jumpers) and an area within 1500 m around the subsea infrastructure.	The Operational Area includes a radius of 4000 m from the Xena-03 well to allow vessels to undertake drilling activities. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	Key infrastructure includes, but is not limited to: i. Riser platform i. Pluto A and B flowlines i. Export pipeline (Commonwealth)	Key infrastructure includes, but is not limited to: x. Xena tie-in x. One subsea Xmas tree and wellhead
Vessels	Operations support vessels will be used to undertake IMMR of subsea infrastructure.	Mobile offshore drilling unit (MODU), support and installation vessels.

Feedback
If you have feedback specific to the proposed activities described under the proposed EP, we would welcome your feedback at Feedback@woodside.com or 1800 442 977 by **17 April 2024.**

Your feedback and our response will be included in our EP which will be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for acceptance in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023* (Cth). Your feedback may also be used to support other regulatory processes associated with the planned activities (which may or may not be confidential)

Please let us know if you request that particular information that you provide in the consultation not be published. If so, we will make your request known to NOPSEMA so that the information is not included when the EP is published on NOPSEMA's website.

NOPSEMA has published a brochure entitled *Consultation on offshore petroleum environment plans – Information for the Community* to help community members understand consultation requirements for Commonwealth EPs and how to participate in consultation.

2.27 Email sent to Murujuga Aboriginal Corporation (1 March 2024)

Hi there [Individual 3]

Please be advised that Woodside Energy is planning to submit a five-year revision of the Operations EP for the Pluto Facility Operations that commenced in 2012 Pluto Facility Operations EP

Overview

The Pluto platform is in 80m water depth, and the associated subsea infrastructure is located in water depths ranging from ~80 m to 960 m, in Commonwealth waters around 160 km north-west of Dampier, Western Australia. The facility produces wet gas and condensate from the Pluto, Xena and Pyxis reservoirs. The gas and condensate are transported for processing at the onshore liquefied natural gas (LNG) plant via a 180 km long export pipeline. The Pluto platform is a not-normally-manned facility, with remote operation from the Pluto onshore central control room.

The Pluto Facility Operations EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Xena-03 well into the existing Pluto production systems.

Woodside is seeking to understand the nature of the interests that Murujuga Aboriginal Corporation (MAC) and its members may have in the environment that may be affected (EMBA) by this activity. The EMBA is set out in the attached Summary Information Sheets and consultation information sheets. We are seeking information and guidance from MAC in relation to the following:

1. How could these activities impact your cultural values, interests, and activities - does protecting the environment do enough to protect your cultural values?

2. Do you have any concerns about the proposed activities and what do you think we should do about them?

3. Is there anything you would like considered in the Environmental Plans?

4. Whether there are any other individuals, groups, or organisations you think we should talk to?

If you would like to speak with us, please let me know by Friday 29th March 2024 and please also advise of your preferred method of consultation. If there is any support or specific information that you require as part of our engagement, please let me know as soon as possible. Woodside will continue to take feedback from you for the life of the Environmental Plans.

Consultation Information
The National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) has published a brochure entitled Consultation on offshore petroleum environment plans – Information for the Community to help community members understand consultation requirements for Commonwealth EPs and how to participate in consultation. Please click on the italicised text above to access this document.
Publications below (please see Document Hub | NOPSEMA):

- Brochure: Consultation on offshore petroleum environment plans brochure.pdf (nopsema.gov.au)
- Guideline: Guideline: Consultation in the course of preparing an environment plan (nopsema.gov.au); and
- Policy: Draft policy for managing gender-restricted information PL2098.pdf (nopsema.gov.au).

Feedback can also be made directly to me or via the details below:
Woodside Energy - Feedback@woodside.com, by calling 1800 442 977.
NOPSEMA - Australian Government's National Offshore Petroleum Safety and Environmental Management Authority to communications@nopsema.gov.au or (08) 6188 8700.
Please also feel free to forward this email and the attached documents to MAC members and other people and/or organisations who you think may be interested. As you are aware, Woodside would be happy to speak with MAC members, the MAC Board, Circle of Elders, office holders and other interested parties with your guidance.
I look forward to hearing from you.

Kind regards

2.28 Email sent to Nganhurra Thanardi Garrbu Aboriginal Corporation (20 March 2024)

Good afternoon

Please be advised that Woodside Energy is planning to submit a five-year revision of the Operations Environment Plan for the Pluto Facility Operations that commenced in 2012 Pluto Facility Operations EP

Overview The Pluto platform is in 80 m water depth, and the associated subsea infrastructure is in water depths ranging from 80m to 960 m, in Commonwealth waters around 160 km north-west of Dampier, Western Australia.

Summary of activities:

- Routine production
- Routine inspection, monitoring, maintenance and repair (IMMR)of the platform and associated subsea infrastructure.
- Commissioning and operation of the water handling unit
- Non-routine and unplanned activities and incidents associated with the above
    - The Xena-03 Drilling and Tie-Back project, which includes drilling one new well (Xena-03) in the Xena field. tie back to the existing Pyxis Hub infrastructure and remotely operated Pluto platform pre-commissioning and commissioning activities.

Regarding Nganhurra Thanardi Garrbu Aboriginal Corporation. Woodside is seeking to understand the nature of the interests that Members may have in this activity. We are interested in hearing:

1. How could these activities impact your cultural values, interests, and activities - does protecting the environment do enough to protect your cultural values?

2. Do you have any concerns about the proposed activities and what do you think we should do about them?

3. Is there anything you would like considered in the Environmental Plans?

4. We will continue to take feedback from you for the life of the Environmental Plans.

5. We would like to understand how you would like to build a relationship with Woodside Energy.

6. Whether there are any other individuals, groups, or organisations you think we should talk to?

If you would like to speak with us, please let me know by Thursday 18th April 2024 and please also advise of your preferred method of consultation. If there is any support or specific information that you require as part of our engagement.

The National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) has published a brochure entitled Consultation on offshore petroleum environment plans – Information for the Community to help community members understand consultation requirements for Commonwealth EPs and how to participate in consultation. Please click on the italicised text above to access this document.
Publications below (please see Document Hub | NOPSEMA):

- Brochure: Consultation on offshore petroleum environment plans brochure.pdf (nopsema.gov.au)
- Guideline: Guideline: Consultation in the course of preparing an environment plan (nopsema.gov.au); and
- Policy: Draft policy for managing gender-restricted information PL2098.pdf (nopsema.gov.au).

Feedback can also be made directly to me on the details below:

Woodside Energy Feedback@woodside.com or by calling 1800 442 977.

NOPSEMA - Australian Government's National Offshore Petroleum Safety and Environmental Management Authority to communications@nopsema.gov.au or (08) 6188 8700.

Please also feel free to forward this email and the attached documents to Nganhurra Thanardi Garrbu Aboriginal Corporation, Traditional Owners and other people and organisations who you think may be interested as required. Woodside would be happy to speak with Elders, office holders and other interested parties as requested.

I look forward to your response and please feel free to call and send through guidance on next steps.

Kind regards

2.29 Email sent to Buurabalayji Thalanyji Aboriginal Corporation (1 March 2024)

Hi [Individual 4]

I hope this email finds you well.

Please be advised that Woodside Energy is planning to submit a five-year revision of the Operations EP for the Pluto Facility Operations that commenced in 2012 Pluto Facility Operations EP

Overview

The Pluto platform is in 80 m water depth, and the associated subsea infrastructure is located in water depths ranging from ~80 m to 960 m, in Commonwealth waters around 160 km north-west of Dampier, Western Australia. The facility produces wet gas and condensate from the Pluto, Xena and Pyxis reservoirs. The gas and condensate are transported for processing at the onshore liquefied natural gas (LNG) Plant via a 180 km long export pipeline.
The Pluto platform is a not-normally-manned facility, with remote operation from the Pluto onshore Central Control Room.
The Pluto Facility Operations EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Xena-03 well into the existing Pluto production systems.

Woodside is seeking to understand the nature of the interests that BTAC and its members may have in the EMBA by this activity. The EMBA is the total area over which unplanned events could have environmental impacts. The EMBA is set out in the attached Summary Information Sheets and consultation information sheets. We are interested in hearing:

1. How could these activities impact your cultural values, interests, and activities - does protecting the environment do enough to protect your cultural values?

2. Do you have any concerns about the proposed activities and what do you think we should do about them?

3. Is there anything you would like considered in the Environmental Plans?

4. We will continue to take feedback from you for the life of the Environmental Plans.

5. We would like to understand how you would like to build a relationship with Woodside Energy.

6. Whether there are any other individuals, groups, or organisations you think we should talk to?

If you would like to speak with us, please let me know by Friday 29th March 2024 and please also advise of your preferred method of consultation. If there is any support or specific information that you require as part of our engagement, please let me know as soon as possible.

The National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) has published a brochure entitled Consultation on offshore petroleum

environment plans – Information for the Community to help community members understand consultation requirements for Commonwealth EPs and how to participate in consultation. Please click on the italicised text above to access this document.
Publications below (please see Document Hub | NOPSEMA):

- Brochure: Consultation on offshore petroleum environment plans brochure.pdf (nopsema.gov.au)
- Guideline: Guideline: Consultation in the course of preparing an environment plan (nopsema.gov.au); and
- Policy: Draft policy for managing gender-restricted information PL2098.pdf (nopsema.gov.au).

Feedback can also be made directly to Jo Lanagan (Included in this email):

Woodside Energy – Feedback@woodside.com by calling 1800 442 977.

NOPSEMA - Australian Government's National Offshore Petroleum Safety and Environmental Management Authority to communications@nopsema.gov.au or (08) 6188 8700.

Please also feel free to forward this email and the attached documents to BTAC Members and other people and organisations who you think may be interested as required. Woodside would be happy to speak with BTAC Members, the BTAC Board, elders and office holders and other interested parties.

I will be away on annual leave until 28-March-24, hence including Jo Lanagan in this email.

Kind regards,

2.30 Email sent to Yinggarda Aboriginal Corporation (26 March 2024)

Dear [Individual 5] and [Individual 6] I hope all is travelling well for you both.

I am writing to notify you that Woodside is planning to submit a five-year revision of the Operations Environment Plan for the Pluto Facility Operations that commenced in 2012. Please see further information in this link: Pluto Facility Operations EP

Overview:

The Pluto platform is in 80 m water depth, and the associated subsea infrastructure is located in water depths ranging from 80m to 960 m, in Commonwealth waters around 160 km north-west of Dampier, Western Australia.

Summary of activities:

- Routine production
- Routine inspection, monitoring, maintenance and repair (IMMR) of the platform and associated subsea infrastructure
- Commissioning and operation of the water handling unit
- Non-routine and unplanned activities and incidents associated with the above
  - The Xena-03 Drilling and Tie-Back project, which includes:
  - drilling one new well (Xena-03) in the Xena field

- tie back to the existing Pyxis Hub infrastructure and remotely operated Pluto platform
- pre-commissioning and commissioning activities

With reference to Yinggarda Aboriginal Corporation (YAC), Woodside is seeking to understand the nature of the interests that YAC Members may have in this activity. We are interested in hearing:

1. How could these activities impact your cultural values, interests, and activities - does protecting the environment do enough to protect your cultural values?

2. Do you have any concerns about the proposed activities and what do you think we should do about them?

3. Is there anything you would like considered in the Environmental Plans?

4. We will continue to take feedback from you for the life of the Environmental Plans.

5. We would like to understand how you would like to build a relationship with Woodside Energy.

6. Whether there are any other individuals, groups, or organisations you think we should talk to?

If you would like to speak with us, please let me know by Thursday 25 April 2024 and please also advise of your preferred method of consultation. If there is any support or specific information that you require as part of our engagement please also let me know.

The National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) has published a brochure entitled Consultation on offshore petroleum environment plans – Information for the Community to help community members understand consultation requirements for Commonwealth EPs and how to participate in consultation. Please click on the italicised text above to access this document.
Publications below (please see Document Hub | NOPSEMA):

- Brochure: Consultation on offshore petroleum environment plans brochure.pdf (nopsema.gov.au)
- Guideline: Guideline: Consultation in the course of preparing an environment plan (nopsema.gov.au); and
- Policy: Draft policy for managing gender-restricted information PL2098.pdf (nopsema.gov.au).

In addition to contacting me directly, you can also provide feedback directly to:

Woodside Energy Feedback@woodside.com or by calling 1800 442 977.

NOPSEMA - Australian Government's National Offshore Petroleum Safety and Environmental Management Authority to communications@nopsema.gov.au or (08) 6188 8700.

Please feel free to forward this email and the attached documents to Yinggarda Traditional Owners and other people and organisations who you think may be interested as required.

Woodside would be happy to speak with Elders, office holders and other interested parties as requested.

I look forward to your response and please feel free to call and send through guidance on next steps.

Kind regards

2.31 Email sent to Kariyarra Aboriginal Corporation (6 March 2024)

Good morning [Individual 7]

By way of Introductions. My name is [Individual 8] and am the First Nations Engagement Adviser with Woodside Energy and am emailing updates whilst [Individual 9] is on Leave.

Please be advised that Woodside Energy is planning to submit a five-year revision of the Operations EP for the Pluto Facility Operations that commenced in 2012 Pluto Facility Operations EP

Overview

The Pluto platform is in 80 m water depth, and the associated subsea infrastructure is located in water depths ranging from ~80 m to 960 m, in Commonwealth waters around 160 km north-west of Dampier, Western Australia. The facility produces wet gas and condensate from the Pluto, Xena and Pyxis reservoirs. The gas and condensate are transported for processing at the onshore liquefied natural gas (LNG) Plant via a 180 km long export pipeline.
The Pluto platform is a not-normally-manned facility, with remote operation from the Pluto onshore Central Control Room.
The Pluto Facility Operations EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Xena-03 well into the existing Pluto production systems.

Woodside is seeking to understand the nature of the interests that Kariyarra Aboriginal Corporation and its members may have in the EMBA by this activity. The EMBA is the total area over which unplanned events could have environmental impacts. The EMBA is set out in the attached Summary Information Sheets and consultation information sheets. We are interested in hearing:

1. How could these activities impact your cultural values, interests, and activities - does protecting the environment do enough to protect your cultural values?

2. Do you have any concerns about the proposed activities and what do you think we should do about them?

3. Is there anything you would like considered in the Environmental Plans?

4. We will continue to take feedback from you for the life of the Environmental Plans.

5. We would like to understand how you would like to build a relationship with Woodside Energy.

6. Whether there are any other individuals, groups, or organisations you think we should talk to?

If you would like to speak with us, please let me know by Wednesday 3rd April 2024 and please also advise of your preferred method of consultation. If there is any support or specific information that you require as part of our engagement, please let me know as soon as possible.

The National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) has published a brochure entitled Consultation on offshore petroleum environment plans – Information for the Community to help community members understand consultation requirements for Commonwealth EPs and how to participate in consultation. Please click on the italicised text above to access this document.
Publications below (please see Document Hub | NOPSEMA):

- Brochure: Consultation on offshore petroleum environment plans brochure.pdf (nopsema.gov.au)
- Guideline: Guideline: Consultation in the course of preparing an environment plan (nopsema.gov.au); and
- Policy: Draft policy for managing gender-restricted information PL2098.pdf (nopsema.gov.au).

Feedback can also be made directly to me on the details below:

Woodside Energy Feedback@woodside.com , by calling 1800 442 977.

NOPSEMA - Australian Government's National Offshore Petroleum Safety and Environmental Management Authority to communications@nopsema.gov.au or (08) 6188 8700.

Please also feel free to forward this email and the attached documents to Kariyarra Members and other people and organisations who you think may be interested as required. Woodside would be happy to speak with Kariyarra Elders, office holders and other interested parties.

Please feel free to call and send through guidance on next steps.

Kind regards

2.32 Email sent to Wirrawandi Aboriginal Corporation (5 March 2024)

Good morning WAC

Please be advised that Woodside Energy is planning to submit a five-year revision of the Operations EP for the Pluto Facility Operations that commenced in 2012 Pluto Facility Operations EP

Overview

The Pluto platform is in 80 m water depth, and the associated subsea infrastructure is located in water depths ranging from ~80 m to 960 m, in Commonwealth waters around 160 km north-west of Dampier, Western Australia. The facility produces wet gas and condensate from the

Pluto, Xena and Pyxis reservoirs. The gas and condensate are transported for processing at the onshore liquefied natural gas (LNG) Plant via a 180 km long export pipeline.
The Pluto platform is a not-normally-manned facility, with remote operation from the Pluto onshore Central Control Room.
The Pluto Facility Operations EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Xena-03 well into the existing Pluto production systems.

Woodside is seeking to understand the nature of the interests that Wirrawandi Aboriginal Corporation (WAC) and its members may have in the EMBA by this activity. The EMBA is the total area over which unplanned events could have environmental impacts. The EMBA is set out in the attached Summary Information Sheets and consultation information sheets. We are interested in hearing:

1. How could these activities impact your cultural values, interests, and activities - does protecting the environment do enough to protect your cultural values?

2. Do you have any concerns about the proposed activities and what do you think we should do about them?

3. Is there anything you would like considered in the Environmental Plans?

4. We will continue to take feedback from you for the life of the Environmental Plans.

5. We would like to understand how you would like to build a relationship with Woodside Energy.

6. Whether there are any other individuals, groups, or organisations you think we should talk to?

If you would like to speak with us, please let me know by Tuesday 2nd April 2024 and please also advise of your preferred method of consultation. If there is any support or specific information that you require as part of our engagement, please let me know as soon as possible.

The National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) has published a brochure entitled Consultation on offshore petroleum environment plans – Information for the Community to help community members understand consultation requirements for Commonwealth EPs and how to participate in consultation. Please click on the italicised text above to access this document.
Publications below (please see Document Hub | NOPSEMA):

- Brochure: Consultation on offshore petroleum environment plans brochure.pdf (nopsema.gov.au)
- Guideline: Guideline: Consultation in the course of preparing an environment plan (nopsema.gov.au); and
- Policy: Draft policy for managing gender-restricted information PL2098.pdf (nopsema.gov.au).

Feedback can also be made directly to me on the details below:

Woodside Energy - Feedback@woodside.com.au, by calling 1800 442 977.

NOPSEMA - Australian Government's National Offshore Petroleum Safety and Environmental Management Authority to communications@nopsema.gov.au or (08) 6188 8700.

Please also feel free to forward this email and the attached documents to WAC Members and other people and organisations who you think may be interested as required. Woodside would be happy to speak with the WAC, elders and office holders and other interested parties.

I look forward to hearing from you.

Kind regards

2.33 Email sent to Robe River Kuruma Aboriginal Corporation (5 March 2024)

Good morning [Individual 10]

Please be advised that Woodside Energy is planning to submit a five-year revision of the Operations EP for the Pluto Facility Operations that commenced in 2012 Pluto Facility Operations EP

Overview

The Pluto platform is in 80 m water depth, and the associated subsea infrastructure is located in water depths ranging from ~80 m to 960 m, in Commonwealth waters around 160 km north-west of Dampier, Western Australia. The facility produces wet gas and condensate from the Pluto, Xena and Pyxis reservoirs. The gas and condensate are transported for processing at the onshore liquefied natural gas (LNG) Plant via a 180 km long export pipeline.
The Pluto platform is a not-normally-manned facility, with remote operation from the Pluto onshore Central Control Room.
The Pluto Facility Operations EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Xena-03 well into the existing Pluto production systems.

Woodside is seeking to understand the nature of the interests that Robe River Kuruma Aboriginal Corporation and its members may have in the EMBA by this activity. The EMBA is the total area over which unplanned events could have environmental impacts. The EMBA is set out in the attached Summary Information Sheets and consultation information sheets. We are interested in hearing:

1. How could these activities impact your cultural values, interests, and activities - does protecting the environment do enough to protect your cultural values?

2. Do you have any concerns about the proposed activities and what do you think we should do about them?

3. Is there anything you would like considered in the Environmental Plans?

4. We will continue to take feedback from you for the life of the Environmental Plans.

5. We would like to understand how you would like to build a relationship with Woodside Energy.

6. Whether there are any other individuals, groups, or organisations you think we should talk to?

If you would like to speak with us, please let me know by Tuesday 2nd April 2024 and please also advise of your preferred method of consultation. If there is any support or specific information that you require as part of our engagement, please let me know as soon as possible.

The National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) has published a brochure entitled Consultation on offshore petroleum environment plans – Information for the Community to help community members understand consultation requirements for Commonwealth EPs and how to participate in consultation. Please click on the italicised text above to access this document.
Publications below (please see Document Hub | NOPSEMA):

- Brochure: Consultation on offshore petroleum environment plans brochure.pdf (nopsema.gov.au)
- Guideline: Guideline: Consultation in the course of preparing an environment plan (nopsema.gov.au); and
- Policy: Draft policy for managing gender-restricted information PL2098.pdf (nopsema.gov.au).

Feedback can also be made directly to me on the details below:

Woodside Energy - Feedback@woodside.com.au, by calling 1800 442 977.

NOPSEMA - Australian Government's National Offshore Petroleum Safety and Environmental Management Authority to communications@nopsema.gov.au or (08) 6188 8700.

Please also feel free to forward this email and the attached documents to Robe River Kuruma Aboriginal Corporation Members and other people and organisations who you think may be interested as required. Woodside would be happy to speak with Robe River Kuruma Aboriginal Corporation Members, the Robe River Kuruma Aboriginal Corporation Board, elders and office holders and other interested parties.

I look forward to hearing from you.

Kind regards

2.34 Email sent to Ngarluma Aboriginal Corporation (1 March 2024)

Wayiba [Individual 11]

Please be advised that Woodside Energy is planning to submit a five-year revision of the Operations EP for the Pluto Facility Operations that commenced in 2012 Pluto Facility Operations EP

Overview

The Pluto platform is in 80m water depth, and the associated subsea infrastructure is located in water depths ranging from ~80 m to 960 m, in Commonwealth waters around 160 km north-west of Dampier, Western Australia. The facility produces wet gas and condensate from the Pluto, Xena and Pyxis reservoirs. The gas and condensate are transported for processing at the onshore liquefied natural gas (LNG) plant via a 180 km long export pipeline. The Pluto platform is a not-normally-manned facility, with remote operation from the Pluto onshore central control room.

The Pluto Facility Operations EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Xena-03 well into the existing Pluto production systems.

Woodside is seeking to understand the nature of the interests that Ngarluma Aboriginal Corporation (NAC) and its members may have in the environment that may be affected (EMBA) by this activity. The EMBA is set out in the attached Summary Information Sheets and consultation information sheets. We are seeking information and guidance from NAC in relation to the following:

1. How could these activities impact your cultural values, interests, and activities - does protecting the environment do enough to protect your cultural values?

2. Do you have any concerns about the proposed activities and what do you think we should do about them?

3. Is there anything you would like considered in the Environmental Plans?

4. Whether there are any other individuals, groups, or organisations you think we should talk to?

If you would like to speak with us, please let me know by Friday 29th March 2024. We sent you a draft consultation agreement today for your review. Jeff has mentioned previously that NAC do not wish for any consultation to take place until this agreement is in place. That being said we will be guided by NAC as to how consultation may proceed in the interim. If there is any support or specific information that you require as part of our engagement, please let me know as soon as possible. Please note, Woodside will continue to take feedback from you for the life of the Environmental Plans.

Consultation Information
The National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) has published a brochure entitled Consultation on offshore petroleum environment plans – Information for the Community to help community members understand consultation requirements for Commonwealth EPs and how to participate in consultation. Please click on the italicised text above to access this document.
Publications below (please see Document Hub | NOPSEMA):

- Brochure: Consultation on offshore petroleum environment plans brochure.pdf (nopsema.gov.au)
- Guideline: Guideline: Consultation in the course of preparing an environment plan (nopsema.gov.au); and
- Policy: Draft policy for managing gender-restricted information PL2098.pdf (nopsema.gov.au).

Feedback can also be made directly to me or via the details below:
Woodside Energy - Feedback@woodside.com, by calling 1800 442 977.
NOPSEMA - Australian Government's National Offshore Petroleum Safety and Environmental Management Authority to communications@nopsema.gov.au or (08) 6188 8700.
Please also feel free to forward this email and the attached documents to NAC members and other people and organisations who you think may be interested. Woodside would be happy to speak with NAC members, the NAC Board, Elders and office holders and other interested parties.
I look forward to hearing from you.

Kind regards

2.35 Email sent to Yindjibarndi Aboriginal Corporation (6 March 2024)

Good morning [Individual 12]

By way of Introductions. My name is [Individual 8] and am the First Nations Engagement Adviser with Woodside Energy and will be sending through Environment Plans whilst [Individual 13] and [Individual 9] are on Leave.

Please be advised that Woodside Energy is planning to submit a five-year revision of the Operations Environment Plan for the Pluto Facility Operations that commenced in 2012 Pluto Facility Operations EP

Overview The Pluto platform is in 80 m water depth, and the associated subsea infrastructure is located in water depths ranging from 80m to 960 m, in Commonwealth waters around 160 km north-west of Dampier, Western Australia.

Summary of activities:

- Routine production
- Routine inspection, monitoring, maintenance and repair (IMMR)of the platform and associated subsea infrastructure.
- Commissioning and operation of the water handling unit
- Non-routine and unplanned activities and incidents associated with the above
    - The Xena-03 Drilling and Tie-Back project, which includes drilling one new well (Xena-03) in the Xena field tie back to the existing Pyxis Hub infrastructure and remotely operated Pluto platform pre-commissioning and commissioning activities.

Regarding Ngarluma Yindjibarndi Foundation Ltd. Woodside is seeking to understand the nature of the interests that Members may have in this activity. We are interested in hearing:

1. How could these activities impact your cultural values, interests, and activities - does protecting the environment do enough to protect your cultural values?

2. Do you have any concerns about the proposed activities and what do you think we should do about them?

3. Is there anything you would like considered in the Environmental Plans?

4. We will continue to take feedback from you for the life of the Environmental Plans.

5. We would like to understand how you would like to build a relationship with Woodside Energy.

6. Whether there are any other individuals, groups, or organisations you think we should talk to?

If you would like to speak with us, please let me know by Wednesday 3rd April 2024 and please also advise of your preferred method of consultation. If there is any support or specific information that you require as part of our engagement.

The National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) has published a brochure entitled Consultation on offshore petroleum environment plans – Information for the Community to help community members understand consultation requirements for Commonwealth EPs and how to participate in consultation. Please click on the italicised text above to access this document.
Publications below (please see Document Hub | NOPSEMA):

- Brochure: Consultation on offshore petroleum environment plans brochure.pdf (nopsema.gov.au)
- Guideline: Guideline: Consultation in the course of preparing an environment plan (nopsema.gov.au); and
- Policy: Draft policy for managing gender-restricted information PL2098.pdf (nopsema.gov.au).

Feedback can also be made directly to me on the details below:

Woodside Energy Feedback@woodside.com or by calling 1800 442 977.

NOPSEMA - Australian Government's National Offshore Petroleum Safety and Environmental Management Authority to communications@nopsema.gov.au or (08) 6188 8700.

Please also feel free to forward this email and the attached documents to Ngarluma and Yindjibarndi Traditional Owners and other people and organisations who you think may be interested as required. Woodside would be happy to speak with Elders, office holders and other interested parties as requested.

I look forward to your response and please feel free to call and send through guidance on next steps.

Kind regards

2.36 Email sent to Wanparta Aboriginal Corporation (28 February 2024)

Hi [Individual 14]

Please be advised that Woodside Energy is planning to submit a five-year revision of the Operations EP for the Pluto Facility Operations that commenced in 2012 Pluto Facility Operations EP

Overview

The Pluto platform is in 80 m water depth, and the associated subsea infrastructure is located in water depths ranging from ~80 m to 960 m, in Commonwealth waters around 160 km north-west of Dampier, Western Australia. The facility produces wet gas and condensate fromthe Pluto, Xena and Pyxis reservoirs. The gas and condensate are transported for processing at the onshore liquefied natural gas (LNG) Plant via a 180 km long export pipeline.
The Pluto platform is a not-normally-manned facility, with remote operation from the Pluto onshore Central Control Room.
The Pluto Facility Operations EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Xena-03 well into the existing Pluto production systems.

Woodside is seeking to understand the nature of the interests that Wanparta Aboriginal Corporation and its members may have in the EMBA by this activity. The EMBA is the total area over which unplanned events could have environmental impacts. The EMBA is set out in the attached Summary Information Sheets and consultation information sheets. We are interested in hearing:

1. How could these activities impact your cultural values, interests, and activities - does protecting the environment do enough to protect your cultural values?

2. Do you have any concerns about the proposed activities and what do you think we should do about them?

3. Is there anything you would like considered in the Environmental Plans?

4. We will continue to take feedback from you for the life of the Environmental Plans.

5. We would like to understand how you would like to build a relationship with Woodside Energy.

6. Whether there are any other individuals, groups, or organisations you think we should talk to?

If you would like to speak with us, please let me know by Friday 29th March 2024 and please also advise of your preferred method of consultation. If there is any support or specific information that you require as part of our engagement, please let me know as soon as possible.

The National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) has published a brochure entitled Consultation on offshore petroleum environment plans – Information for the Community to help community members understand consultation requirements for Commonwealth EPs and how to participate in consultation. Please click on the italicised text above to access this document.
Publications below (please see Document Hub | NOPSEMA):

- Brochure: Consultation on offshore petroleum environment plans brochure.pdf (nopsema.gov.au)
- Guideline: Guideline: Consultation in the course of preparing an environment plan (nopsema.gov.au); and

- Policy: Draft policy for managing gender-restricted information PL2098.pdf (nopsema.gov.au).

Feedback can also be made directly to me on the details below:

Woodside Energy - Feedback@woodside.com.au, by calling 1800 442 977.

NOPSEMA - Australian Government's National Offshore Petroleum Safety and Environmental Management Authority to communications@nopsema.gov.au or (08) 6188 8700.

Please also feel free to forward this email and the attached documents to Wanparta Aboriginal Corporation Members and other people and organisations who you think may be interested as required. Woodside would be happy to speak with Wanparta Aboriginal Corporation Members, the Wanparta Aboriginal Corporation Board, elders and office holders and other interested parties.

I look forward to hearing from you.

Kind regards

2.37 Email sent to Yamatji Marlpa Aboriginal Corporation (20 March 2024)

Good afternoon

Please be advised that Woodside Energy is planning to submit a five-year revision of the Operations Environment Plan for the Pluto Facility Operations that commenced in 2012 Pluto Facility Operations EP

Overview The Pluto platform is in 80 m water depth, and the associated subsea infrastructure is in water depths ranging from 80m to 960 m, in Commonwealth waters around 160 km north-west of Dampier, Western Australia.

Summary of activities:

- Routine production
- Routine inspection, monitoring, maintenance and repair (IMMR)of the platform and associated subsea infrastructure.
- Commissioning and operation of the water handling unit
- Non-routine and unplanned activities and incidents associated with the above
    - The Xena-03 Drilling and Tie-Back project, which includes drilling one new well (Xena-03) in the Xena field. tie back to the existing Pyxis Hub infrastructure and remotely operated Pluto platform pre-commissioning and commissioning activities.

Regarding Nganhurra Thanardi Garrbu Aboriginal Corporation. Woodside is seeking to understand the nature of the interests that Members may have in this activity. We are interested in hearing:

1. How could these activities impact your cultural values, interests, and activities - does protecting the environment do enough to protect your cultural values?

2. Do you have any concerns about the proposed activities and what do you think we should do about them?

3. Is there anything you would like considered in the Environmental Plans?

4. We will continue to take feedback from you for the life of the Environmental Plans.

5. We would like to understand how you would like to build a relationship with Woodside Energy.

6. Whether there are any other individuals, groups, or organisations you think we should talk to?

If you would like to speak with us, please let me know by Thursday 18th April 2024 and please also advise of your preferred method of consultation. If there is any support or specific information that you require as part of our engagement.

The National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) has published a brochure entitled Consultation on offshore petroleum environment plans – Information for the Community to help community members understand consultation requirements for Commonwealth EPs and how to participate in consultation. Please click on the italicised text above to access this document.
Publications below (please see Document Hub | NOPSEMA):

- Brochure: Consultation on offshore petroleum environment plans brochure.pdf (nopsema.gov.au)
- Guideline: Guideline: Consultation in the course of preparing an environment plan (nopsema.gov.au); and
- Policy: Draft policy for managing gender-restricted information PL2098.pdf (nopsema.gov.au).

Feedback can also be made directly to me on the details below:

Woodside Energy Feedback@woodside.com or by calling 1800 442 977.

NOPSEMA - Australian Government's National Offshore Petroleum Safety and Environmental Management Authority to communications@nopsema.gov.au or (08) 6188 8700.

Please also feel free to forward this email and the attached documents to Nganhurra Thanardi Garrbu Aboriginal Corporation, Traditional Owners and other people and organisations who you think may be interested as required. Woodside would be happy to speak with Elders, office holders and other interested parties as requested.

I look forward to your response and please feel free to call and send through guidance on next steps.

Kind regards

2.38 Email sent to Ngarluma Yindjibarndi Foundation Ltd (6 March 2024)

Good morning [Individual 15]

By way of Introductions. My name is [Individual 8] and am the First Nations Engagement Adviser with Woodside Energy and will be sending through Environment Plans whilst [Individual 13] and [Individual 9] are on Leave.

Please be advised that Woodside Energy is planning to submit a five-year revision of the Operations Environment Plan for the Pluto Facility Operations that commenced in 2012 Pluto Facility Operations EP

Overview The Pluto platform is in 80 m water depth, and the associated subsea infrastructure is located in water depths ranging from 80m to 960 m, in Commonwealth waters around 160 km north-west of Dampier, Western Australia.

Summary of activities:

- Routine production
- Routine inspection, monitoring, maintenance and repair (IMMR)of the platform and associated subsea infrastructure.
- Commissioning and operation of the water handling unit
- Non-routine and unplanned activities and incidents associated with the above
    - The Xena-03 Drilling and Tie-Back project, which includes drilling one new well (Xena-03) in the Xena field tie back to the existing Pyxis Hub infrastructure and remotely operated Pluto platform pre-commissioning and commissioning activities.

Regarding Ngarluma Yindjibarndi Foundation Ltd. Woodside is seeking to understand the nature of the interests that Members may have in this activity. We are interested in hearing:

7. How could these activities impact your cultural values, interests, and activities - does protecting the environment do enough to protect your cultural values?

8. Do you have any concerns about the proposed activities and what do you think we should do about them?

9. Is there anything you would like considered in the Environmental Plans?

10. We will continue to take feedback from you for the life of the Environmental Plans.

11. We would like to understand how you would like to build a relationship with Woodside Energy.

12. Whether there are any other individuals, groups, or organisations you think we should talk to?

If you would like to speak with us, please let me know by Wednesday 3rd April 2024 and please also advise of your preferred method of consultation. If there is any support or specific information that you require as part of our engagement.

The National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) has published a brochure entitled Consultation on offshore petroleum environment plans – Information for the Community to help community members understand

consultation requirements for Commonwealth EPs and how to participate in consultation. Please click on the italicised text above to access this document.
Publications below (please see Document Hub | NOPSEMA):

- Brochure: Consultation on offshore petroleum environment plans brochure.pdf (nopsema.gov.au)
- Guideline: Guideline: Consultation in the course of preparing an environment plan (nopsema.gov.au); and
- Policy: Draft policy for managing gender-restricted information PL2098.pdf (nopsema.gov.au).

Feedback can also be made directly to me on the details below:

Woodside Energy Feedback@woodside.com or by calling 1800 442 977.

NOPSEMA - Australian Government's National Offshore Petroleum Safety and Environmental Management Authority to communications@nopsema.gov.au or (08) 6188 8700.

Please also feel free to forward this email and the attached documents to Ngarluma and Yindjibarndi Traditional Owners and other people and organisations who you think may be interested as required. Woodside would be happy to speak with Elders, office holders and other interested parties as requested.

I look forward to your response and please feel free to call and send through guidance on next steps.

Kind regards

2.39 Email sent to Save our Songlines (26 March 2024)

Hi there [Individual 16] and [Individual 17]

I'm forwarding this information as I understand all communication for [Individual 1] should be directed to you.

Please be advised that Woodside Energy is planning to submit a five-year revision of the Operations EP for the Pluto Facility Operations that commenced in 2012 Pluto Facility Operations EP

Overview

The Pluto platform is in 80m water depth, and the associated subsea infrastructure is located in water depths ranging from ~80 m to 960 m, in Commonwealth waters around 160 km north-west of Dampier, Western Australia. The facility produces wet gas and condensate from the Pluto, Xena and Pyxis reservoirs. The gas and condensate are transported for processing at the onshore liquefied natural gas (LNG) plant via a 180 km long export pipeline. The Pluto platform is a not-normally-manned facility, with remote operation from the Pluto onshore central control room.

The Pluto Facility Operations EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Xena-03 well into the existing Pluto production systems.

Woodside is seeking to understand the nature of the interests that Save Our Songlines (SoS) and its members may have in the environment that may be affected (EMBA) by this activity. The EMBA is set out in the attached Summary Information Sheets and consultation information sheets. We are seeking information and guidance from SoS in relation to the following:

1. How could these activities impact your members cultural values, interests, and activities - does protecting the environment do enough to protect your cultural values?

2. Do you have any concerns about the proposed activities and what do you think we should do about them?

3. Is there anything you would like considered in the Environmental Plans?

4. Whether there are any other individuals, groups, or organisations you think we should talk to?

If you would like to speak with us, please let me know by Friday 26th April 2024 and please also advise of your preferred method of consultation. If there is any support or specific information that you require as part of our engagement, please let me know as soon as possible. Woodside will continue to take feedback from you for the life of the Environmental Plans.

Consultation Information
The National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) has published a brochure entitled Consultation on offshore petroleum environment plans – Information for the Community to help community members understand consultation requirements for Commonwealth EPs and how to participate in consultation. Please click on the italicised text above to access this document.
Publications below (please see Document Hub | NOPSEMA):

- Brochure: Consultation on offshore petroleum environment plans brochure.pdf (nopsema.gov.au)
- Guideline: Guideline: Consultation in the course of preparing an environment plan (nopsema.gov.au); and
- Policy: Draft policy for managing gender-restricted information PL2098.pdf (nopsema.gov.au).

Feedback can also be made directly to me or via the details below:
Woodside Energy - Feedback@woodside.com, by calling 1800 442 977.

NOPSEMA - Australian Government's National Offshore Petroleum Safety and Environmental Management Authority to communications@nopsema.gov.au or (08) 6188 8700.

Please also feel free to forward this email and the attached documents to SoS members and other people and/or organisations who you think may be interested.

I look forward to hearing from you.

Kind regards

2.40 Email from FARA – 29 March 2024

fara
Friends of Australian Rock Art

Feedback@woodside.com

cc. communications@nopsema.gov.au

RE: FARA Relevant Person Consultation on Pluto Facility Operations Environment Plan

1) We refer to your correspondence received on 19 March 2024 regarding Woodside's intention to seek a 5-year extension to the Pluto Facility Operations Environment Plan (Pluto Operations EP) and your request for comment to be. received by 29 March 2024.

FARA's Functions, Interests and Activities

2) As you are aware, FARA's functions, interests and activities relate to the protection and preservation of the rock art and surrounding physical and cultural heritage landscape from the impacts of industrial development, including; direct impacts from industrial development; indirect impacts from industrial emissions; impacts on visitors to the area (including Aboriginal peoples, researchers, and recreational visitors); and future impacts of climate change to this heritage landscape.

3) FARA's current objectives and activities include support for:
   a) the Murujuga Aboriginal Corporation Cultural Management Plan action of "reducing the industrial footprint with an ultimate goal of zero industry on Murujuga";
   b) more recent calls from Traditional Custodians for a moratorium on further industrial development on Murujuga;
   c) urgent protection of the Murujuga cultural heritage landscape under the *Aboriginal and Tores Strait Islander Heritage Protection Act*;
   d) World Heritage Listing of the whole of the Burrup; and
   e) Traditional Custodians to exercise rights to Free, Prior and Informed Consent (FPIC) in relation to industrial development.

   FARA considers the ongoing operation of gas processing facilities, including the processing of Pluto gas contemplated by the Pluto Operations EP to be inconsistent with these objectives.

www.fara.com.au
c/o Conservation Council of W.A. Inc
1186 Hay St, West Perth WA 6005
email: contact@fara.com.au ABN 34 754 730 929

Indirect consequences of the Pluto Operations EP

4) While it is not clear from Woodside's consultation documents, FARA understands that gas and other hydrocarbons produced from the Pluto gas field will be processed at the Pluto LNG facility and North West Shelf LNG facilities on the Burrup Peninsula. Gas processing at these facilities is the primary cause of industrial air emissions on the Burrup Peninsula which FARA believes is causing irreversible harm to the Murujuga rock art. The physical presence of these facilities presents a significant and ongoing disruption to the cultural heritage landscape and its National and World heritage values. Fugitive emissions of methane, and downstream combustion emissions from gas produced from the Pluto field also contribute to anthropogenic climate change. These are examples of indirect consequences of the Pluto Operations EP.

5) Woodside is required, according to the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009* (Cth) (the Regulations) and the EPBC Act Indirect Consequences Policy, to consider and address the indirect consequences of the Pluto Operations in the EP.

Relevant person consultation with FARA on the Pluto Operations EP

6) As FARA's functions, interests and activities as described above and elsewhere are affected by these indirect consequences, FARA is a 'Relevant Person' for the purposes of consultation in accordance with regulations (Regulations). As such, FARA has a right to be consulted on the Operations EP for the Pluto Operations EP and seeks to exercise that right.

7) Woodside is required by regs 11A(2) and (3) of the Environment Regulations to:
   a. provide FARA with "sufficient information" to allow it to make an informed assessment of the possible consequences of the activities on its functions, interests or activities; and
   b. provide a "reasonable period" for consultation.

8) The information that has been provided to FARA on the Pluto Operations EP, and the 10-day period provided for feedback do not meet these requirements.

Information requirements for Relevant Person consultation with FARA

9) The Consultation Information Sheet on the Pluto Operations EP provided to FARA and other parties does not mention the impacts and consequences of processing gas and other hydrocarbons from the Pluto gas field on the Burrup Peninsula, or other indirect consequences of the proposed operations. There is no evaluation of the impacts or risks in the consultation document and no indication of what mitigation measures Woodside proposes in respect of these impacts.

10) FARA has previously described to Woodside the nature of information that FARA requires to assess possible consequences of Woodside's gas processing operations on its functions, activities and interests. The following list provides examples of the kinds of information that FARA requires in relation to the Pluto Operations EP.

a) Information on **how the precautionary principle has been applied** by Woodside in the assessment of impacts on the rock art and in developing and applying management responses
b) Information on what **pollution control measures and technology** will be utilised by Woodside at the Pluto and North West Shelf LNG facilities and how this has been selected, including independent feasibility studies and analysis relating to the application of best-available pollution control technology to Woodside's operations;
c) Information on what the **results and outcomes** of these measures will be on the pollution entering the Burrup airshed, including information on what the duration, concentration, and chemical composition of pollution entering to the air shed will be from Pluto gas processed at each facility.
d) Information on the **resultant airborne pollution concentrations** that Woodside expects will occur in the vicinity of petroglyphs which are potentially affected by this pollution, **and relevant exposure levels and duration**, taking into consideration cumulative and synergistic effects where this pollution is combined with pollution from other sources, and prevailing environmental conditions in the airshed.
e) Information detailing what Woodside believes or understands will be the **long-term physical consequences** of its operations on the Murujuga rock art, including the processing of Pluto gas on the Burrup **over the full duration of the proposed Pluto operations.**
f) Description of **what level of impact on the rock art Woodside considers to be as low as reasonably practicable and acceptable**, for the purpose of meeting the regulatory requirement, and how this level of acceptable impact has been determined by Woodside.
g) Information regarding **how Woodside is meeting or intends to meet its statutory obligations** under the WA Aboriginal Heritage Act for the Pluto and North West Shelf LNG facilities, and what authorisations exist under that Act for Woodside's indirect impacts on the Murujuga rock art as a consequence of industrial pollution.
h) Information and disclosure of **rock art monitoring or other studies** undertaken or commissioned by Woodside to investigate the impacts of industrial pollution on petroglyphs, and **any other scientific or technical information** which is relied upon by Woodside to reach the conclusion that ongoing Pluto operations will not have adverse consequences for the rock art.
i) Evidence of Woodside's **understanding and engagement with** peer-reviewed scientific research previously provided to Woodside by FARA and other parties demonstrating impacts of industrial pollution on rock art, and **evidence of consultation** with experts who have undertaken this research, including as Relevant Persons under the regulations.
j) Information on **what specific action will be taken** by Woodside if ongoing scientific monitoring of the rock art demonstrates that industrial pollution, including from the processing of Pluto gas on the Burrup is adversely impacting the rock art, and what the **outcome of this action** will be for the rock art.

k) Information on how current and proposed regulatory regimes for the Pluto and North West Shelf LNG facilities will include **enforceable measures that prevent impacts** from the processing of Pluto gas and other hydrocarbons on the Burrup.
l) Information on the **global and local climate scenarios Woodside expects to occur** if the Pluto operations continue as proposed.
m) Information on what **climate impact scenarios Woodside considers to be acceptable, and what specific verifiable and additional abatement measures** Woodside will take to meet emissions reduction targets to ensure that Woodside's climate impacts are managed to as low as reasonably practicable and acceptable levels.
n) Information on what other stakeholders with similar or overlapping functions, interests or activities to FARA's have been consulted and **how matters raised by such parties have been considered and addressed** by Woodside.
o) Information about how Traditional Owners and Custodians have been provided with opportunities to **exercise rights to Free Prior and Informed Consent** regarding the ongoing Pluto Operations.
p) Information on how ongoing processing of Pluto gas will occur in a way that does not **continue or perpetuate the physical disruption of the Murujuga cultural heritage landscape** (including National and World heritage values) which is currently occurring due to the presence and ongoing operation of Woodside's gas processing operations on the Burrup.
q) Information about **how concerns previously raised by FARA's have been addressed by Woodside** and what operational or other changes have been considered or contemplated in responding to those concerns and requests.

11) This information is required to enable FARA to be consulted as a Relevant Person under the Regulations, because it is essential to understanding the nature of impacts that may occur on the Murujuga rock art and broader physical and cultural landscape of the Burrup, what Woodside has determined are reasonably practicable and acceptable levels of impact, how Woodside has made these determinations, and how Woodside intends to manage its operations to ensure that these outcomes are met as required under the Regulations.

Reasonable period for Relevant Person consultation with FARA

12) In addition to these information requirements, once they are met FARA requires additional time to engage suitably qualified experts to analyse the information and advise FARA on the nature of impacts on FARA's functions, activities and interests. Because this area is a specialist field of science requiring interpretation of specific technical information, it is not reasonable to expect that informed assessment of the possible consequences of the activities on FARA's functions, interests or activities can have occurred within the timeframes that Woodside has stipulated for this EP, even if all information needs were met.

Information previously provided to Woodside by FARA

13) FARA has previously provided Woodside with a number of peer-reviewed scientific reports and other evidence demonstrating impacts on the Murujuga rock art resulting from atmospheric air pollution. Woodside's LNG processing

facilities are the primary source of this atmospheric pollution that is impacting the rock art, and the Pluto Operations EP will cause this pollution to continue for a longer duration and potentially a greater intensity. As such, the information previously provided by FARA to Woodside is relevant to the Pluto Operations EP.

14) FARA has not received satisfactory response to this information and evidence from Woodside in the context of other Relevant Person consultation processes. As such, it is our expectation that previously supplied information and evidence will be addressed by Woodside in the Pluto Operations EP, and that this information and Woodside's response will be made publicly available.

Next Steps

15) FARA reiterates that further consultation must be undertaken by Woodside prior to submitting a draft Scarborough Operations EP to NOPSEMA for approval. If a draft EP is submitted by Woodside, then it is FARA's expectation that the feedback contained in this document and previous submissions from FARA is included in full in the public section of the EP to allow for transparency regarding the inadequacy of consultation with FARA.

16) We look forward to Woodside providing FARA with sufficient information and a reasonable period of time to enable FARA to assess the possible consequences of the Pluto Operations EP on our functions, activities and interests, as part of the relevant person consultation process.

Yours sincerely,

Judith Hugo and
Friends of Australian Rock Art
M: 0439 090 321
E: j.hugo@fara.com.au

Susan Swain, Co-Convenors of FARA
M: 0439 641 227
E: susan.swain227@outlook.com

Cc: NOPSEMA

3. ADDITIONAL CONSULTATION

3.1 Email sent to Australian Border Force (ABF), Australian Hydrographic Office (AHO), Australian Maritime Safety Authority (AMSA) Marine Pollution, AMSA Marine Safety, Department of Agriculture, Fishery and Forestry (DAFF), Department of Defence (DoD), Department of Primary Industries and Regional Development (DPIRD), Western Australian Museum, Pilbara Ports Authority, Department of Climate Change, Energy, the Environment and Water (DCCEEW), Director of National Parks (DNP), Department of Industry, Science and Resources (DISR), Department of Energy, Mines, Industry Regulation and Safety (DEMIRS), Chevron, Osaka Gas Gorgon, Tokyo Gas Gorgon and JERA Gorgon, Western Gas, Exxon Mobil Australia, Shell Australia, BP Developments Australia, Carnarvon Energy, PE Wheatstone, Kyushu Electric Wheatstone, Eni Australia, Jadestone Energy, KUFPEC Australia, Vermilion Oil & Gas, Fox Resources, Bounty Oil and Gas, OMV Australia, KATO Energy / KATO Corowa, INPEX Alpha, Beagle No.1, JX Nippon O&G Exploration Australia, Australian Energy Producers (AEP) (18 March 2024)

Woodside previously consulted you on its plans to submit a five-year revision of the Pluto Facility Operations Environment Plan (EP).

The Pluto platform is in Production Licence WA-1-IL and WA-34-L, located in Commonwealth waters approximately 160 km north west of Dampier, Western Australia. In addition, Woodside proposes to conduct drilling, subsea installation and commissioning (tie-back), and production from the Xena-03 well into the existing Pluto production systems.

Information on the proposed activities is provided in the email below and in the Consultation Information Sheet which is available on our website.

If you have feedback specific to the proposed activities described under the proposed EP, we would welcome your feedback at Feedback@woodside.com or 1800 442 977 by **29 March 2024.**

Please let us know if you request that particular information that you provide in the consultation not be published. If so, we will make your request known to NOPSEMA so that the information is not included when the EP is published on NOPSEMA's website.

3.2 Email sent to North West Slope Trawl Fishery, Western Deepwater Trawl Fishery, Commonwealth Fisheries Association (CFA),

Australian Southern Bluefin Tuna Industry Association (ASBTIA) (18 March 2024)

Woodside previously consulted you on its plans to submit a five-year revision of the Pluto Facility Operations Environment Plan (EP).

The Pluto platform is in Production Licence WA-1-IL and WA-34-L, located in Commonwealth waters approximately 160 km north west of Dampier, Western Australia. In addition, Woodside proposes to conduct drilling, subsea installation and commissioning (tie-back), and production from the Xena-03 well into the existing Pluto production systems.

Further information on the proposed activities is provided in the email below and in the Consultation Information Sheet which is available on our website.

If you have feedback specific to the proposed activities described under the proposed EP, we would welcome your feedback at Feedback@woodside.com or 1800 442 977 by **29 March 2024.**

Please let us know if you request that particular information that you provide in the consultation not be published. If so, we will make your request known to NOPSEMA so that the information is not included when the EP is published on NOPSEMA's website.

Subject to EP acceptance, please let us know if you would like start and end of notifications for the proposed activity.

3.3 Email sent to Ningaloo Coast World Heritage Advisory Committee (NCWHAC), Shire of Exmouth, City of Karratha, Exmouth Community Liaison Group, Karratha Community Liaison Group, Onslow Chamber of Commerce and Industry, Shire of Ashburton, Australian Conservation Foundation (ACF), Australian Marine Conservation Society (AMCS), Conservation Council of Western Australia (CCWA), Greenpeace Australia Pacific (GAP), 350 Australia (350A), Australasian Centre for Corporate Responsibility (ACCR), Friends of Australian Rock Art (FARA), Market Forces, Cape Conservation Group (CCG), Protect Ningaloo, University of Western Australia (UWA), Curtin University, Edith Cowan University (ECU), Murdoch University, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Vocus, Gascoyne Recreational Marine Users, Recfishwest, Marine Tourism WA, WA Game Fishing Association (19 March 2024)

Woodside previously consulted you on its plans to submit a five-year revision of the Pluto Facility Operations Environment Plan (EP).

The Pluto platform is in Production Licence WA-1-IL and WA-34-L, located in Commonwealth waters approximately 160 km north west of Dampier, Western Australia. In addition, Woodside proposes to conduct drilling, subsea installation and commissioning (tie-back), and production from the Xena-03 well into the existing Pluto production systems.

Information on the proposed activities is provided in the email below and in the Consultation Information Sheet which is available on our website.

If you have feedback specific to the proposed activities described under the proposed EP, we would welcome your feedback at Feedback@woodside.com or 1800 442 977 by **29 March 2024.**

Please let us know if you request that particular information that you provide in the consultation not be published. If so, we will make your request known to NOPSEMA so that the information is not included when the EP is published on NOPSEMA's website.

3.4 Letter sent to Gascoyne and Pilbara/Kimberley Recreational Marine Users (18 March 2024)

Please direct all responses/queries to:

Woodside Energy (Australia) Pty Ltd
ACN 006 923 879
Mia Yellagonga
11 Mount Street
Perth WA 6000
Australia
T +61 8 9348 4000
www.woodside.com

18 March 2024

1

Woodside previously consulted you on its plans to submit a five-year revision of the Pluto Facility Operations Environment Plan (EP).

The Pluto platform is in Production Licence WA-1-IL and WA-34-L, located in Commonwealth waters approximately 160 km north west of Dampier, Western Australia. In addition, Woodside proposes to conduct drilling, subsea installation and commissioning (tie-back), and production from the Xena-03 well into the existing Pluto production systems.

Further information on the proposed activities is provided in the Consultation Information Sheet which is available via the QR code below.

If you have feedback specific to the proposed activities described under the proposed EP, we would welcome your feedback at Feedback@woodside.com or 1800 442 977 by **29 March 2024.**

Please let us know if you request that particular information that you provide in the consultation not be published. If so, we will make your request known to NOPSEMA so that the information is not included when the EP is published on NOPSEMA's website.

Subject to EP acceptance, please let us know if you would like start and end of notifications for the proposed activity.

Regards,

Woodside Energy Feedback

Woodside Energy
Mia Yellagonga
Karlak, 11 Mount Street
Perth WA 6000
Australia

T: 1800 442 977
E: feedback@woodside.com
www.woodside.com

3.5 Email sent to Recfishwest, Telstra, Pilbara Ports Authority, DBCA, AIMS, Santos, DPLH, Department of Transport, AFMA, Finder Energy, ACMA (27 March 2024)

Following our earlier correspondence, please be advised that 4 (four) well location coordinates have been updated as per the table below. There are no other changes to previously provided consultation information, including mitigation and/or management measures.

Structure	Approximate Water Depth (m)	Latitude	Longitude	Petroleum Titles
PYA01 well	~985 m	19°49'40.331"	115°10'34.942"	WA-34-L
PL-PYA02 well	~862 m	19°52'34.882"	115°09'00.645"	
XNA02 well	~180 m	19°57'49.130"	115°13'02.764"	
XNA03 well	~177 m	19°56’28.914”S	115°13’44.302”E	

The updated Consultation Information Sheet for this EP is available on our website and attached to this email. Should you require additional information or have feedback on the proposed activity, please let us know.

Your feedback and our response will be included in our EP which will be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for acceptance in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023* (Cth). Your feedback may also be used to support other regulatory processes associated with the planned activities (which may or may not be confidential)

Please let us know if you request that particular information that you provide in the consultation not be published. If so, we will make your request known to NOPSEMA so that the information is not included when the EP is published on NOPSEMA’s website.

3.6 Email sent to Marine Tourism WA, WA Game Fishing Association, Gascoyne Recreational Marine Users, Vocus, Cape Conservation Groug, Australian Conservation Foundation, FARA, 350A, GAP, AMCS, CCWA, ACCR, Market Forces, CSIRO, UWA, Murdoch, ECU, Curtin, Protect Ningaloo, Cape Conservation Group, Onslow CCI, Karratha CLG, Exmouth CLG, City of Karratha, Shire of Ashburton, Shire of Exmouth, NCWHAC, Australian Energy Producers, Chevron, Osaka Gas Gorgon, Tokyo Gas Gorgon and JERA Gorgon, Western Gas, Exxon Mobil Australia, Shell Australia, BP Developments Australia, Carnarvon Energy, PE Wheatstone, Kyushu Electric Wheatstone, Eni Australia, Jadestone Energy, KUFPEC Australia, Vermilion Oil & Gas, Fox Resources, Bounty Oil and Gas, OMV Australia, KATO Energy / KATO Corowa, INPEX Alpha, Beagle No.1, JX Nippon O&G Exploration Australia, North West Slope Trawl Fishery, Western Deepwater Trawl Fishery, Commonwealth Fisheries Association (CFA), Australian Southern Bluefin Tuna Industry Association (ASBTIA), DEMIRS, DISR, DNP, DCCEEW, Western

Australian Museum, DPIRD, Department of Defence, DAFF, AMSA, AHO, Australian Border Force, (27 March 2024)

Woodside previously consulted you (email below) on its plans to submit a five-year revision of the Pluto Facility Operations Environment Plan (EP).

Please be advised that 4 (four) well location coordinates have been updated as per the table below. There are no other changes to previously provided consultation information, including mitigation and/or management measures.

Structure	Approximate Water Depth (m)	Latitude	Longitude	Petroleum Titles
PYA01 well	~985 m	19°49'40.331"	115°10'34.942"	WA-34-L
PL-PYA02 well	~862 m	19°52'34.882"	115°09'00.645"	
XNA02 well	~180 m	19°57'49.130"	115°13'02.764"	
XNA03 well	~177 m	19°56’28.914”S	115°13’44.302”E	

The updated Consultation Information Sheet for this EP is available on our website and attached to this email. Should you require additional information or have feedback on the proposed activity, please let us know.

Your feedback and our response will be included in our EP which will be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for acceptance in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023* (Cth). Your feedback may also be used to support other regulatory processes associated with the planned activities (which may or may not be confidential)

Please let us know if you request that particular information that you provide in the consultation not be published. If so, we will make your request known to NOPSEMA so that the information is not included when the EP is published on NOPSEMA’s website.

3.7 Letter sent to Gascoyne and Pilbara/Kimberley Recreational Marine Users (28 March 2024)

Please direct all responses/queries to:
Woodside Energy Feedback
T: 1800 442 977
E: feedback@woodside.com

28 March 2024

Woodside Energy (Australia) Pty Ltd
ACN 006 923 879
Mia Yellagonga
11 Mount Street
Perth WA 6000
Australia
T +61 8 9348 4000
www.woodside.com

Dear Stakeholder

Woodside previously consulted you on its plans to submit a five-year revision of the Pluto Facility Operations Environment Plan (EP).

Please be advised that 4 (four) well location coordinates have been updated as per the table below. There are no other changes to previously provided consultation information, including mitigation and/or management measures.

Structure	Approximate Water Depth (m)	Latitude	Longitude	Petroleum Titles
PYA01 well	~985 m	19°49'40.331"	115°10'34.942"	WA-34-L
PL-PYA02 well	~862 m	19°52'34.882"	115°09'00.645"	
XNA02 well	~180 m	19°57'49.130"	115°13'02.764"	
XNA03 well	~177 m	19°56'28.914"S	115°13'44.302"E	

The updated Consultation Information Sheet for this EP is available on our website via the QR code below. Should you require additional information or have feedback on the proposed activity, please let us know.

Please let us know if you request that particular information that you provide in the consultation not be published. If so, we will make your request known to NOPSEMA so that the information is not included when the EP is published on NOPSEMA's website.

Regards,

Woodside Energy Feedback

Woodside Energy
Mia Yellagonga
Karlak, 11 Mount Street
Perth WA 6000
Australia

T: 1800 442 977
E: feedback@woodside.com
www.woodside.com

3.8 Email sent to WAMSI (2 April 2024)

Woodside previously consulted you on its plans to submit a five-year revision of the Pluto Facility Operations Environment Plan (EP).

Following our earlier correspondence, please be advised that 4 (four) well location coordinates have been updated as per the table below. There are no other changes to previously provided consultation information, including mitigation and/or management measures.

Structure	Approximate Water Depth (m)	Latitude	Longitude	Petroleum Titles
PYA01 well	~985 m	19°49'40.331"	115°10'34.942"	WA-34-L
PL-PYA02 well	~862 m	19°52'34.882"	115°09'00.645"	
XNA02 well	~180 m	19°57'49.130"	115°13'02.764"	
XNA03 well	~177 m	19°56’28.914”S	115°13’44.302”E	

The updated Consultation Information Sheet for this EP is available on our website and attached to this email. Should you require additional information or have feedback on the proposed activity, please let us know by 17 April 2024.

Your feedback and our response will be included in our EP which will be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth). Your feedback may also be used to support other regulatory processes associated with the planned activities (which may or may not be confidential)

Please let us know if you request that particular information that you provide in the consultation not be published. If so, we will make your request known to NOPSEMA so that the information is not included when the EP is published on NOPSEMA’s website.

4. ADVERTS AND SOCIAL MEDIA

NEWSPAPERS

Newspaper	Coverage	Publication dates
The Australian	National	28 February 2024
The West Australian	Regional (WA)	28 February 2024
Pilbara News	Local (WA)	28 February 2024
North West Telegraph	Local (WA)	28 February 2024
Koori Mail	Indigenous	28 February 2024
National Indigenous Times	Indigenous	26 February 2024

PLUTO FACILITY OPERATIONS ENVIRONMENT PLAN

For more than 35 years, Woodside has been developing and operating LNG and oil projects in Australia. Our focus is the safety, reliability, efficiency and environmental performance of our operations and activities.

Woodside consults so that feedback from relevant persons is considered and used to inform the revision of the Pluto Facility Operations Environment Plan.

Our activities

The Pluto facility is a not-normally-crewed facility that has been in production since 2012 and is located offshore in Commonwealth waters approximately 160 km north west of Dampier.

Woodside plans to continue producing wet gas and condensate from the Pluto, Xena and Pyxis reservoirs and is submitting a five-year revision to the operational Environment Plan. The Environment Plan for the Pluto facility will cover routine operations and integrate drilling, subsea installation, commissioning (drilling and tieback) and production from the Xena-03 well into the existing Pluto production systems.

We are seeking input from relevant persons whose functions, interests or activities may be affected by continued operations.

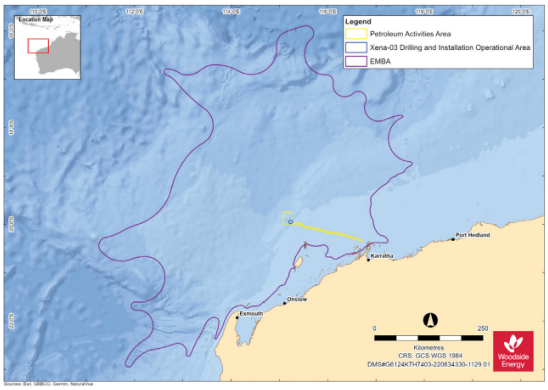
The environment that may be affected (EMBA)

The EMBA is the largest area where activities could potentially have a direct or indirect impact. The broadest extent of the EMBA takes into consideration planned and unplanned activities, and for this Environmental Plan, is determined by modelling a highly unlikely event of a hydrocarbon release to the environment.

The EMBA represents the merged area of many possible modelled paths that a highly unlikely hydrocarbon release could travel if left unmitigated and depending on the weather and ocean conditions at the time of the release. This means in the highly unlikely event a hydrocarbon release does occur, the whole EMBA will not be affected.

We want to hear from you

If you are an individual, organisation or community group and believe your functions, interests or activities may be impacted by our activities, we would like to hear from you by **Wednesday, 29 March 2024.**



Want to know more or provide input?

A feedback form and more information can be found at:
www.woodside.com/what-we-do/consultation-activities

You can also subscribe via our website to receive future information on upcoming activities.

E: Feedback@woodside.com
Toll free: 1800 442 977
woodside.com

Woodside Energy

4.1 The National Indigenous Times (26 February 2024)

Professor Andrew Gunstone.

Allies must be brave & push back

ANDREW GUNSTONE

On January 26, I had my most confronting speaking experience in more than three decades.

I had accepted an invitation from the Anglesea Lions Club to be a keynote speaker at their event.

I advised I would speak on "truth-telling" and provided information on my roles — including co-chair of Reconciliation Victoria and associate deputy vice- chancellor reconciliation at Federation University — and sent links to some of my publications written over several decades.

It was very clear what I would speak about.

I arrived looking forward to having some engaging conversations about truth-telling and reconciliation. Instead, midway through my speech, when I mentioned the word "invasion", many in the audience started aggressively booing and heckling me. These comments included "p... off", "shut up", and "f... off", and were so loud I was forced to halt my speech.

I was even more shocked, though, at the complete lack of support from the club. Rather than explaining to the audience I was an invited speaker, speaking on my area of expertise, and that they could either listen to me or leave, the club's president instead told me I could not continue my speech.

Even more concerningly, he pulled me from the microphone.

As I walked off the stage, I continued to be loudly booed and heckled. I was concerned for my personal safety, with people screaming at me from close quarters.

At no time during this ordeal did anyone from the club intervene to protect me by telling the audience to stop their appalling behaviour.

While several people approached me later, including members of the Anglesea Lions Club, to privately apologise for the actions of the crowd and the club's president, the only person who made a public apology was Peter Yates AM, the other keynote speaker. It was disappointing, though, that none of these people who apologised to me afterwards supported me at the time the crowd and organisers were preventing me from speaking. The club president also later came up to me to apologise for grabbing my arm, but then criticised me for being "political" by using the word "invasion".

This claim was repeated by him, and also made by the local Liberal MP, in news articles. What they both failed to understand, though, was I was not being "political", but simply stating the truth.

"Political", along with "woke", is often used to try to shut down discussions on truth-telling. There have been three news articles about this event. Only the first reached out to me for comment. Of the other two, one included several quotes from the local Liberal State MP, and the second was written by a journalist.

Despite both being at the event, neither talked to me, but instead made hurtful and inaccurate claims, minimised the crowd and organisers' behaviour, and sensationalised rather than sought understanding.

It is important to position this specific event in Anglesea within a broader context.

Several behaviours demonstrated at this event — racism, exclusion, silencing, violence, bystander apathy, white privilege, and white fragility — are directed towards Indigenous peoples every day of the year, very often in far, far worse circumstances.

Non-Indigenous allies must genuinely increase our efforts to strongly advocate against these disgusting, appalling practices. Further, these disgraceful behaviours have considerably worsened following the First Nations Voice to Parliament referendum in October. The Anglesea event is but one example of a clearly observable trend whereby many non-Indigenous opponents of the Voice are trying to create momentum from the referendum defeat to push back against hard-won transformational gains made over the past several decades in reconciliation, truth, and justice.

Local governments are abolishing Welcomes to Country and Acknowledgements of Country.

State political parties are backflipping on previous commitments to engage with treaties and truth-telling.

Patriotic fervour is being whipped up against any organisations that fail to jingoistically support "Australia Day".

Appalling levels of structural and individual racism towards Indigenous peoples, both online and in person, continue to increase.

Indigenous peoples across the country are undertaking inspirational and transformational work on Voice, Treaty, and Truth, including the First Peoples Assembly of Victoria with Treaty, and the Yoorrook Justice Commission with truth-telling.

This extraordinary work, though, along with our ongoing national reconciliation journey, is under considerable threat from these racist and divisive practices.

I strongly urge all non-Indigenous allies to genuinely help push back against these practices, and continue to have brave conversations about reconciliation, truth, and justice.

Professor Andrew Gunstone is a leading authority on reconciliation. He is associate deputy vice-chancellor reconciliation and Professor of Indigenous Studies at Federation University, where he established and leads the National Centre for Reconciliation, Truth, and Justice. He is also co-chair of Reconciliation Victoria and sits on several national reconciliation committees.

4.2 The Koori Mail (28 February 2024)

news

Aurukun honours top citizens

KOOLKAN Aurukun State School principal Baressa Frazer was awarded the Aurukun Citizen of the Year and Police Liaison Officer Chantelle Walmbeng was awarded Junior Citizen of the Year at a ceremony in the community on February 17.

Aurukun Mayor Keri Tamwoy said the annual Aurukun Shire Council awards recognised people who had shown community leadership for the Wik, Wik Waya and Kugu people.

"I congratulate Baressa and Chantelle who are outstanding role models for the youth of Aurukun and are determined that our younger generation will have a better future on their homelands," Mayor Tamwoy said.

"Baressa is a strong, elegant and passionate Wik woman who is a tireless advocate for Aurukun's children.

"She has returned to her community to lead local education as the principal of Koolkan Aurukun State School where she connects teachers and employees to culture and community.

Koolkan Aurukun State School principal Baressa Frazer.

Aurukun's Young Citizen of the Year Chanelle Walmbeng receives her award from Deputy Mayor Craig Koomeeta.

Passion

"Her passion and knowledge of culture, language and community is invaluable, and she teaches both children and adults with a gentle strength.

"Baressa has researched, designed and is implementing a Wik pedagogy at Koolkan Aurukun State School, collaborating with the Language Group, Elders and the APN Rangers to bring this theory into action.

"The work is monumental and is creating a pathway for Aurukun students to successfully learn while keeping their culture alive.

"Chantelle was an active founding member of the PCYC Kang Kang Youth Leadership team where she volunteered her time and was a part of many community initiatives.

"She became the Police Liaison Officer for PCYC Aurukun in March 2023 while completing Year 12, becoming the youngest PLO in Queensland.

"In this role Chantelle has demonstrated a commitment to learn and shows up every day for work on time.

"In her free time she has been attending Koolkan Aurukun State School to assist in the mornings and to support the young people of Aurukun in achieving an education.

"The young leader is speaking at the Say NO to Domestic Violence conference in Cairns this month about her life experiences and the support to reduce domestic violence in the community.

"Chantelle's leadership and willingness to take on new challenges such as the Bronze Duke of Edinburgh Award will ensure she is a force for change in the Aurukun community for years to come."

4.3 The North West Telegraph (28 February 2024)

NORTH WEST Telegraph
Wednesday, February 28, 2024
northwesttelegraph.com.au

AMA backing for Kimberley stance on drink register

SARAH CRAWFORD

WA's peak body for doctors has backed the Kimberley's biggest primary healthcare provider that has decided to not refer patients to the Banned Drinkers Register against their will.

Australian Medical Association WA president Michael Page said he supported, "in general" the stance by Kimberley Aboriginal Medical Service to not refer patients to the BDR.

"Fundamentally our view is that the role of the doctor is to provide judgment-free care and patients should be safe in the knowledge that anything they share with the doctors will be kept confidential," Dr Page said.

"If patients are not secure in the knowledge that the relationship they have with their doctor is sacrosanct it undermines our practice. I think that would be bad for the health of the community."

A revamped BDR was introduced to parts of regional WA in December and gave new powers to police, medical practitioners and social workers to refer people on to the BDR which prohibits them from purchasing takeaway alcohol for three months or more.

Latest figures show 843 people have been placed on the BDR in the Kimberley, Goldfields, Pilbara, Carnarvon and Gascoyne Junction.

Police have placed 586 people on the BDR for alcohol-related offences while a further 257 Banned Drinking Orders have been issued by the Director of Liquor Licensing through barring notices, prohibition orders and voluntary referrals. However, no doctor or social worker has so far referred a patient to Liquor Licensing for a BDO.

Dr Page said there had been "very little to no consultation" with the medical profession before the legislation was introduced. "There are very few if any genuine medical reasons that someone would need to go on a register like that. It is a very heavy-handed way of treating what is a medical problem," he said.

Meanwhile KAMS medical director Dr Lorraine Anderson questioned if Aboriginal people were being disproportionately targeted by the BDR because they were more likely to socialise and drink in public and therefore attract the attention of police.

Dr Anderson stopped short of saying the BDR was racist but said it did not reflect the real nature of problem drinking.

"We are talking about banned drinkers being a reflection of the population of the Kimberley, but we know that's not right. This is targeting the people who are sitting outside and drinking where people can see them and that's, on average, that is the Aboriginal people of the Kimberley."

Dr Anderson said KAMS did not oppose alcohol restriction but that alone was not the answer.

"If if there's a Banned Drinkers Register, it needs to be backed up with a whole pile of infrastructure and a whole pile of money that goes with preventing people from having withdrawals from alcohol," she said.

Kimberley Aboriginal Medical Service director Dr Lorraine Anderson.

Dr Anderson said current alcohol and drug services were already over-stretched including Broome-based Milliya Rumurra, which has 22 beds but needs 12 more to keep up with demand.

"Forget about the Banned Drinkers Register they are already operating at capacity," she said.

"They need funding for more beds, they need capital funding for a bigger building and ongoing funding to run the rehab and provide wrap-around support. They are well-placed to be able to provide low to medium-level detox services but they need the funding to do it."

The Broome Advertiser recently reported on a woman placed on the BDR who had resorted to drinking hand sanitiser because she not buy alcohol.

Minister for Racing and Gaming Paul Papalia said the Government was working on a suite of strategies to combat the problem.

4.4 The Pilbara News (28 February 2024)

Pilbara NEWS
Wednesday, February 28, 2024
pilbaranews.com.au

New digital newspaper, out Nightly

Seven West Media has this week launched Australia's new national digital newspaper, The Nightly.

With a focus on politics and business, The Nightly will be free and publish each weeknight at 6pm AEDT. It will also have a 24/7 news website and app with breaking news alerts and subscriber emails.

SWM WA chief executive Maryna Fewster said the landmark digital news platform would bring quality journalism to Australians for free.

Run from WA and using our time difference, it will have the full backing of the media company, with contributors including Seven stars such as David Koch, Mark Riley, Michael Usher and Gemma Acton.

Sporting stars including AFL great Leigh Matthews and cricketing icons Justin Langer and Mitchell Johnson, will also write for The Nightly.

In an Australian first, every edition of The Nightly's evening digital newspaper will feature two pages of content produced by editors of The New York Times International Report, a branded publication featuring the best articles from The New York Times. Ms Fewster said the free publication had been developed in response to a clear need.

www.thenightly.com.au

Previous Roebourne post shop licensee Garry Bailey retired after more than three decades at the helm. Picture: Pilbara News

NBAC bid to save service

SAM JONES

In a move aimed at preserving essential services for locals, Ngarliyarndu Bindirri Aboriginal Corporation has announced plans to take over the Roebourne post office service effective March 5.

The decision comes in the wake of the post shop's closure on February 28 due to the retirement of its licensee, leaving a void in vital services for Roebourne residents.

NBAC chief executive Francois Langlois told Ngaarda Media the post shop was a vital service for many in the community. "Our plan is to co-locate the post office counter next to our Centrelink offices in the front office and our office," he said.

"We need to do a little bit of refurbishment and redo some work to our premises before that can start.

"Australia Post has been very kind to us in relocating what they call a mobile van which will be able to operate the post office services for the next eight weeks or so until we're finalised and finish all the refurbishment we need to do in preparation for having everything within our premises."

The closure of the post office raised concerns in the community, given its role as a hub for various essential services.

Roebourne residents relied on the post office for banking services, purchasing pay-as-you-go electricity cards, mobile phone transactions, bill payments and receiving crucial government communications.

With the closure, many residents, particularly those less tech savvy, faced challenges accessing these services locally. The transition extends beyond preserving essential services.

NBAC, a 98 per cent self-funded organisation, aims to not only sustain the post office but also contribute to the local economy.

Through its social enterprises, Brida and Handy Hands, NBAC has created more than 200 local jobs, with Indigenous employees making up more than 55 per cent of the workforce. In the last eight years, NBAC has injected more than $60 million in wages directly into the City of Karratha.

4.5 The Australian (28 February 2024)

Putin 'ordered Navalny killed to prevent swap'

THOMAS GROVE

Russian opposition leader Alexei Navalny's death in an Arctic penal colony followed a proposal to trade him and two unnamed American citizens held by Moscow for a Russian hit man imprisoned in Germany, Navalny's foundation said on Monday.

In a video posted on the official YouTube channel of Navalny's Anti-Corruption Foundation, Maria Pevchikh, the group's head of investigations, said he was killed after Russian President Vladimir Putin became aware of the potential swap and acted to prevent it.

Ms Pevchikh said the foundation had been involved in efforts to win Navalny's freedom but didn't provide evidence to back her assertions in her seven-minute statement.

Among the US citizens being held in Russia are Wall Street Journal reporter Evan Gershkovich and former US marine Paul Whelan, both of whom have been designated as wrongfully detained by the US government, which has said it is working to negotiate their release.

Ms Pevchikh said Putin couldn't "tolerate Navalny being free". Navalny, who died on February 16, was Putin's most ardent critic and spent years investigating and exposing alleged corruption by the Kremlin elite. He had a large following across Russia.

US President Joe Biden has said Putin was responsible for Navalny's death, but the Kremlin has denied state involvement.

Kremlin spokesman Dmitry Peskov told the Financial Times that he wasn't aware of any swap agreement. Privately, US and German officials said they made no offer to Putin.

The Journal said in a statement: "We know the US government is taking the efforts to free Evan seriously, and we cannot comment further."

A Whelan family spokesman said he didn't have enough information to comment on what Navalny's foundation had said.

In an interview with former Fox News host Tucker Carlson earlier this month, Putin indicated that he was seeking a swap deal that would allow the repatriation of Vadim Krasikov, an agent of Russia's Federal Security Service, or FSB, who was convicted in 2021 of killing a Chechen dissident in Berlin. After Carlson asked about the possible return of Gershkovich, who was detained by FSB officers last year, Putin said he would consider a swap for an unnamed "patriot" who had killed "a bandit" in a European capital, widely seen as describing Krasikov.

Gershkovich, who was accredited as a foreign correspondent by Russia's Foreign Ministry at the time he was detained, has been held for nearly a year on an FSB allegation that he was engaged in espionage – an accusation the Journal, the US government and his family vehemently deny.

Mr Whelan, a corporate security executive has been held in Russia since late 2018 on espionage charges that he, his family and the US government also vehemently deny. He was convicted in 2020 and sentenced to serve 16 years in a penal colony.

"Putin was clearly told that the only way to get Krasikov is to exchange him for Navalny," Pevchikh said.

She said Putin decided "Since they are willing to offer Krasikov in principle, then I just need to get rid of the bargaining chip. Then offer someone else when the time comes." She said possible deals were being discussed since last year, and referenced a report in the Journal that said Navalny could be part of hostage-exchange talks with the Kremlin.

Pevchikh said she had information that on February 15, talks were in "their final stage". The next day, Russia's prison service said Navalny lost consciousness and later died after he had been let out of his cell in the prison known as Polar Wolf. Authorities later said he had died of natural causes.

On Monday, Navalny spokeswoman Kira Yarmysh said they were in the process of arranging a public memorial event for the politician. After Navalny's body was returned to his mother at the weekend, the question remains whether the Kremlin will allow a public outpouring of sentiment.

Navalny's foundation said the proposal to swap the opposition leader for Krasikov was taken to Putin by Roman Abramovich, a sanctioned Russian oligarch who has acted as a middleman in other prisoner exchanges between Russia and Ukraine.

THE WALLST JOURNAL

Sweden joins NATO, sending a clear message to Russia

GETTY IMAGES

A British soldier during a simulated attack in a NATO military exercise at Drawsko Pomorskie, Poland, on Monday

AFP

Hungarian Prime Minister Viktor Orban in parliament in Budapest; and Swedish leader Ulf Kristersson after the vote

ANNE BEADE
ANDRAS ROSTOVANYI
STOCKHOLM AND BUDAPEST

Hungary has ratified Sweden's bid to join NATO, clearing the final obstacle for an enlargement of the military alliance spurred by Russia's invasion of Ukraine.

The parliamentary vote ends more than a year of delays that left fellow NATO partners furious as Ukraine battled Russian troops.

Swedish Prime Minister Ulf Kristersson hailed a "historic day", while NATO chief Jens Stoltenberg said Sweden would make the alliance "stronger and safer".

Russia's invasion two years ago prompted Sweden and neighbouring Finland to apply to join the bloc, ending a longstanding stance of non-alignment in both countries.

Speaking about Russia's potential reaction at a press conference, Mr Kristersson said: "The only thing we can expect with any certainty is that they don't like Sweden becoming a member of NATO, nor Finland."

While Finland became the 31st member of the alliance last April, Sweden's bid had been held up. Turkey only ratified it last month. Overnight on Monday, Hungary finally followed, with 188 members of parliament voting in favour and six against Sweden's accession.

"Today is a historic day ... Sweden stands ready to shoulder its responsibility for Euro-Atlantic security," Mr Kristersson said on X. Mr Stoltenberg welcomed Sweden as the 32nd NATO ally, saying its "membership will make us all stronger and safer".

People in Sweden also cheered the approval. Jimmy Dahlfof, 35, said Sweden would be "safer ... bringing us closer to our European neighbours".

Earlier on Monday, Hungarian Prime Minister Viktor Orban had asked MPs to approve Sweden's bid. "The Swedish-Hungarian military co-operation and Sweden's accession to NATO will strengthen Hungary's security," he told parliament.

Only the far-right Our Homeland movement was against the ratification. Now that parliament has approved the Nordic nation's bid, the President is expected to sign it in the coming days. Sweden will then be invited to accede to the Washington Treaty and officially become NATO's 32nd member.

"Nordic countries will have a common defence for the first time in 500 years ... we remain friends, and we become allies", Mr Kristersson said.

Though repeatedly saying it supported Swedish membership in principle, Hungary kept prolonging the process by asking Stockholm to stop "vilifying" the Hungarian government. Budapest accused Swedish officials of being "keen to bash Hungary" on rule-of-law issues. After a meeting on Friday between Mr Orban and Mr Kristersson in Budapest, the nationalist Hungarian leader announced that the two had clarified "our mutual good intentions".

Hungary also signed a deal to acquire four Swedish-made fighter jets, expanding its existing fleet of 14 Jas-39 Gripen fighters.

After Russia's invasion of Ukraine, most NATO members were keen to quickly approve the membership bids of both Finland and Sweden. For Sweden, Ankara cited security concerns, before moving ahead with the ratification.

In Hungary's delay, some experts saw a strategy to wring concessions from Brussels to unlock billions of euros in frozen funds.

Others argued it underlined Mr Orban's closeness to the presidents of Russia and Turkey.

AFP

Macron doesn't exclude sending troops to Ukraine

PARIS: French President Emmanuel Macron on Monday announced new steps to boost Ukraine in its fight against the Russian invasion, saying not even the sending of Western ground troops was ruled out to achieve Europe's goal of defeating Moscow.

Speaking after hosting a meeting of two dozen European leaders to discuss Ukraine, Mr Macron painted a grim picture of a Russia whose positions he said were "hardening" both at home and on the battlefield.

"We are convinced that the defeat of Russia is indispensable to security and stability in Europe," he said.

Russia, he said, was showing a "more aggressive attitude not just in Ukraine but in general".

While there was "no consensus" on the sending of Western ground troops to Ukraine, "nothing should be excluded. We will do whatever it takes to ensure that Russia cannot win this war," he said.

Mr Macron said the new coalition would be set up to supply Ukraine with "missiles and bombs of medium and long range to carry out deep strikes".

There was a "broad consensus to do more and quicker", he added. "Nothing can be excluded to achieve our objective. Russia cannot win that war."

German Chancellor Olaf Scholz and Polish President Andrzej Duda were among some 25 European heads of state and government at the conference. Other states sent ministers, with Foreign Secretary David Cameron in Paris for Britain.

AFP

Milei bans they-them from military

BUENOS AIRES: The government of President Javier Milei, a conservative libertarian, has banned gender-inclusive language in Argentina's armed forces.

The purpose of the ban was to "eliminate incorrect language use which can lead to misinterpretation ... affecting the execution of orders and the conduct of military operations," said a resolution published on the defence ministry's X account.

So-called inclusive language was never officially approved in the military, but in 2020 then defence minister Agustin Rossi vowed the government would not disregard "cultural changes in gender relations." This led to such unofficial distinctions as "soldado" for male members of the military and "soldada" for female ones, in line with the Spanish language rule of attaching a gender to every noun – with words ending in "o" generally masculine and in "a" feminine.

There has been a recent trend in Spanish-speaking countries towards more gender inclusive language, for example in the use of plural nouns which are masculine even if a group is composed of mixed genders – think "amigos" (friends) now often referred to as "amig@s" or "amigxs."

The new government directive states that in the military, Spanish must be used "according to the rules fixed by the Royal Spanish Academy and the regulations and manuals in force in the armed forces".

Mr Milei who has described himself as an ultra-libertarian "anarcho-capitalist", holds conservative stances on issues such as abortion and climate change.

He has railed against so-called "gender ideology", a term loosely used by conservatives worldwide to oppose same-sex social rights, abortion and transgender rights. His government has shut down its anti-discrimination agency.

AFP

Anger as Dior runs from HK catwalk

RICHARD LLOYD PARRY

Christian Dior has cancelled a catwalk show in Hong Kong, in another blow to the territory's efforts to re-establish itself as a business and cultural destination following anti-government protests, the arrest of democracy activists and economic difficulties in China.

The fashion show to be held on March 23 at the site of Hong Kong's old airport, Kai Tak, was "indefinitely postponed" on Friday.

"We have just received notification from the organiser that the event will be postponed," a government spokesperson told Reuters. "Postponements of large-scale events often happen. We continue to welcome large-scale events to be held in Hong Kong."

But with no new date set, the abrupt change of plan suggests a loss of confidence by a major luxury brand at a time when Hong Kong's pro-Beijing government is trying to return to normal after five years of political tumult and the pandemic.

Although no reason was given for the cancellation, Dior has had a chequered past with China. Last year it was accused of being racially insensitive after a model using her fingers to pull back her left eye, which was widely interpreted as a "slanted-eye pose".

"If Dior truly respects the Asia market, it should have the basic respect and humbleness, instead of trying to weather publicity crises by pretending it didn't know," state newspaper Global Times said in an editorial. "Such an attitude will eventually cause irreparable damage to its reputation. We hope Dior can face the mistake and give a sincere apology and response to the Asian society and make some clear explanations how it would prevent similar mistakes in the future."

'It's like Hong Kong is being fooled. This will generate a lot of speculation'

DOREEN KONG
HONG KONG POLITICIAN

The crisis came less than two years after Dior angered the Chinese market by running a photo featuring a stern-looking Asian woman with a Dior bag. Critics said then the woman had "spooky eyes" and a "gloomy face". Chinese photographer Chen Man apologised for her "lack of consideration", and Dior, which removed the photo, said it had always respected the feelings of the Chinese people.

Dior was also accused of cultural appropriation when it introduced a skirt and claimed it was an original creation even though it resembled a traditional Chinese design, drawing protests from Chinese consumers.

In November, Louis Vuitton held a similar show for 1000 guests. The Dior show was meant to have been on a similar scale, and to have presented the brand's men's autumn collection designed by Kim Jones, its artistic director.

It had been presented by the government as one of 80 "mega events" intended to impart "joy and pride" to Hongkongers and to increase the territory's prominence as a business and tourist destination, following the pandemic and the suppression of political opposition under the National Security Law.

This month another event in the program, a friendly match featuring Inter Miami football team, ended in anger and controversy after Lionel Messi, the team's main attraction, failed to take part in a match.

Fans paid as much as $HK4880 ($955) for tickets for the game, which was promoted using Messi's image. But after he was ruled out on ground of injury the club's owner, David Beckham, was booed by a jeering crowd.

"Why would there be a delay at such a critical moment?" Hong Kong politician Doreen Kong said to the South China Morning Post of the Dior show.

"The lack of an explanation is not good for Hong Kong. It's like Hong Kong is being fooled. This will generate a lot of speculation. If Hong Kong wants to be a hub of mega events but they are all postponed or the stars don't make an appearance, who will visit Hong Kong for its events?"

THE TIMES

4.6 The West Australian (28 February 2024)

Robert and Penelope King are building their son Julian a granny flat at their home in Claremont.
Picture: Ian Munro

WHY NEW BUILDING BOOST IS A GRAN SLAM

EXCLUSIVE JAKE DIETSCH

Interest in granny flats has exploded, with inquiries increasing 500 per cent since the State Government relaxed rules about building them in a bid to tackle Perth's housing shortage.

Planning Minister John Carey last month announced granny flats will, from April, no longer require council planning approval, can be built on blocks smaller than 350sqm and will be allowed on homes with strata titles.

Council-issued building permits to ensure safety must still be obtained.

Granny Flats WA managing director Mike Nicholls said there had already been uptick of "at least 500 per cent" in inquiries, with 300 per cent the usual number of people signing contracts.

"People who had expressed interest but were concerned about the approval process time, have now been buoyed by the thought that it could be a much faster turnaround," Mr Nicholls said.

"There were perceived barriers and those announcements did spur people towards making the decision to build a granny flat where previously they thought they couldn't."

Mr Nicholls said his company was looking at increasing builds from 80 to 250 a year in the next 12 months — and would hire more staff to do so.

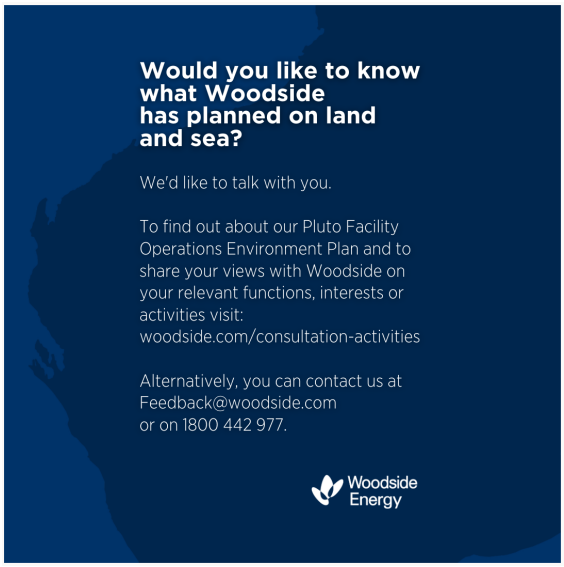
The changes allowing homes with strata to have granny flats and rent them out had especially fuelled demand, he said.

"There has also been a lot of inquiries from people looking

SOCIAL MEDIA

4.7 Facebook tile

4.8 Instagram tile

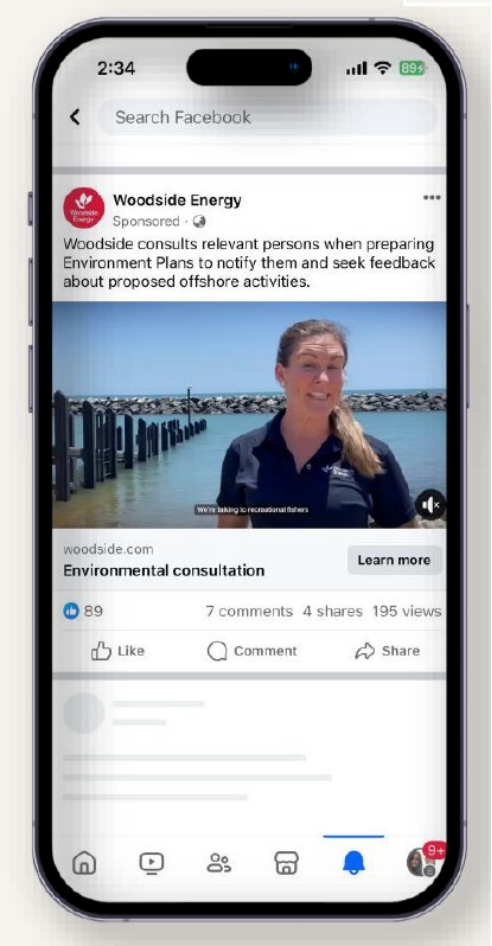


4.9 Social media campaign results

Placement	Impressions	Reach	Frequency	Clicks	CTR
Facebook	823,073	225,402	3.22x	1,554	0.16%
Instagram	309,273	116,860	2.65x	229	0.07%
Total	**1,132,346**	**334,460**	**3.39x**	**1,783**	**0.16%**

4.10 Are you a Relevant Person Social Media Campaign

Are you a Relevant Person Facebook and Instagram - October 2023 onwards



Are you a relevant person?

You may be a relevant person if you or your organisation have functions, interests, or activities that may be affected by an offshore petroleum activity proposed under an environment plan. Watch the short clips below to find out more.

5. COMMUNITY ENGAGEMENT

5.1 Roebourne, Karratha and Dampier Roadshow (22 March – 24 March 2024)

Location	Roebourne, Karratha and Dampier Roadshow
Activity	Community information sessions
Location	22 March 2024 - Woodside Roebourne office 23 March 2024 - Karratha Shopping Centre 24 March 2024 - Dampier Beachside Markets
Date	22 - 24 March 2024
Description of the consultation	Woodside hosted community consultation sessions in Roebourne, Karratha and Dampier to enable community members to understand Woodside's proposed activities and how it may affect them, ask questions, and provide their feedback. Woodside Corporate Affairs, First Nations and Environment representatives were available to answer questions. A number of Environment Plan Consultation Information Sheets were available to attendees including the Pluto Facility Operations Environmental Plan Consultation Information Sheet. An iPad with consultation/feedback subscription prompt was made available with approximately 12 signs people subscribing.
Advertising and invitations	Woodside advertised the sessions to enable individuals to self-identify, become aware of the community consultation, and enable individuals to provide feedback on proposed activities, through the following: • Advertisement in the Pilbara News on 13 March and 20 March (Record of Consultation, reference 5.1.1). • Social - Geotargeted social media campaign advertising in Karratha (Reach 22,095), Port Hedland (reach 26,487), and Roebourne (reach 22,134) (+80 kms) from 6 to 16 September 2023 (Record of Consultation, reference 5.1.3). • Social - organic • An EP consultation banner with QR code (linked to the Consultation Activities page on the Woodside website), Scarborough Project banner were displayed stand along with current EP factsheets. • Hard copy posters were also put up at high traffic areas including Lo's Café in Karratha and the Ieramugadu Store Maya in Roebourne. (Record of Consultation, reference 5.1.2 and 5.1.5).
Estimated number of individuals / organisations consulted	Woodside spoke to many community members, recording 32 meaningful conversations. Over 500 community members (Dampier Community Association) attended the event
Summary of Feedback, Objection or Claim	
• General queries about employment and local content opportunities. • General interest in Pluto Train 2 progress and Scarborough project and trunkline location. • Comments on Red Dog Village accommodation. Woodside staff discussed that the average local economy spend was $120 per person, per week. • Positive commentary to see Woodside active in the community and good sentiment toward the company as a respected local employer. • Interest in taking further information such as the Karratha Community Update (newsletter) and EP newsletter (Let's Talk). Approximately 25 copies of each were distributed over the 3 days. • Woodside social investment activities and community funding opportunities. • Environment Plan awareness building with multiple conversations on "What is an Environment Plan?" and "What is an EMBA?".	

- Query around impacts to whales due to noise from drilling and seismic surveys. Woodside staff discussed whale migration research, vessel whale spotters and the controls that Woodside puts in place during drilling and seismic activities. Community member took consultation information sheets and was referred to the consultation page on the Woodside website for further information and opportunity to provide feedback.
- Query on the location of the Scarborough Energy Project and proximity to the Montebello Islands. Woodside staff discussed that the FPU would be located 201 km from the Montebello Marine Park using the potential risks and controls as per the Scarborough Trunkline Operations (State Waters) Environment Plan consultation information sheet.
- General comment on climate change and the impacts from fossil fuels. Woodside staff advised that Woodside are working on emissions reduction and new energy options including solar power and carbon capture.
- Comment from a Woodside employee partner about Karratha Gas Plant hosting a family day for employees.

Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response

Whilst feedback was received, there were no objections or claims.
The community information sessions were part of Woodside's broader consultation approach to enable self-identification, and provide relevant persons with the opportunity to assess any impacts on their functions, interests or activities, and provide feedback on proposed activities, which is consistent with the intended outcome of consultation (see **Section 5.2**).

5.1.1 Pilbara News (13 and 20 March 2024)

Chance to argue case in political processes

The duo at WA's Parliament House.

KATYA MINNS

Young people in the Pilbara are being called to become the next generation of youth leaders in an opportunity to represent their electorate and participate in democratic processes.

In its 29th year, the 2024 Y WA Youth Parliament program has opened applications for people aged 15-25 who wish to gain experience in government and policy development.

Participants will have the opportunity to draft, debate and advocate for mock youth-focused legislation on topics they're passionate about and present to Members of Parliament.

In 2022, Port Hedland local Erin Hayes joined Karratha's Emer O'Brien to represent the Pilbara electorate, travelling to Perth to present their Bill focusing on sex-based discrimination. "I was in the women's committee and we wrote a Bill on education and health reform talking about menstrual justice, such as providing free period products at a higher standard than what we currently have, and menstrual leave," Ms Hayes said.

"It's an apolitical program so you don't have to express what side of politics you're on, you're more focused on the issues that you're passionate about.

"It's kind of like a really respectful way to have debates."

After first hearing about the program through a teacher's forum at the school where she taught politics, Ms Hayes applied for the 2023 Y WA Youth Parliament and encourages other young people to do the same.

"It was amazing, I got to meet people that were like-minded and got to talk about things we're really passionate about," she said.

"It's given me more experience as I still want to work in politics in some aspects. I think it would be really great if more local people from the Pilbara could participate." More information on how to apply can be found on the Y's Youth Parliament website.

Applications close on March 24.

Emer O'Brien and Erin Hayes during the 2023 Y WA Youth Parliament.

Pilbara NEWS
Wednesday, March 20, 2024
pilbaranews.com.au

Monitoring upped at KHC

The Karratha Health Campus is among the hospitals trialling new security measures.

New 24/7 security support at campus

ROSS MCRAE

The Karratha Health Campus has been selected as one of the pilot sites for the WA Government's $434,000 investment in a state-of-the-art security hub for regional hospitals.

The new security hub, operating out of a State-wide CCTV operations room co-located within the WA Country Health Service Command Centre in Perth, will provide 24/7 real-time monitoring and support for some of the most isolated hospitals in regional WA, including Karratha.

It aims to enhance safety, deter anti-social behaviour, and provide greater support for frontline healthcare staff.

"Any kind of aggressive behaviour towards healthcare staff is completely unacceptable, and the State Government remains committed to doing all we can to keep staff safe at work," WA Health Minister Amber-Jade Sanderson said.

WACHS chief executive Jeff Moffet acknowledged the concerning rise in violence and aggressive incidents against healthcare workers in regional areas, with an average of two assaults a day occurring.

"It's important we continue to do all we can to keep staff and patients safe," he said.

WACHS noted that the pilot sites, such as Karratha, were chosen based on their overall risk profile for incidents at the site, local crime rates, proximity to immediate police response and isolation.

"This specialised technology will be operated around the clock by security specialists and will provide another layer of security for our frontline healthcare workers," Ms Sanderson said.

Mr Moffet said the new advanced security monitoring will complement existing measures such as on-the-ground CCTV, security personnel, duress alarms and access control systems.

Other pilot sites include Hedland, Kununurra, Meekatharra, Collie, Bridgetown and Halls Creek with further sites to be added throughout 2024.

The inclusion of Hedland Health Campus comes in the wake of a high-profile incident in July 2022, when an Aboriginal woman, who was a known suicide risk and had been receiving mental health treatment, took her own life inside the hospital after being left alone in a room, despite staff being aware of her high risk.

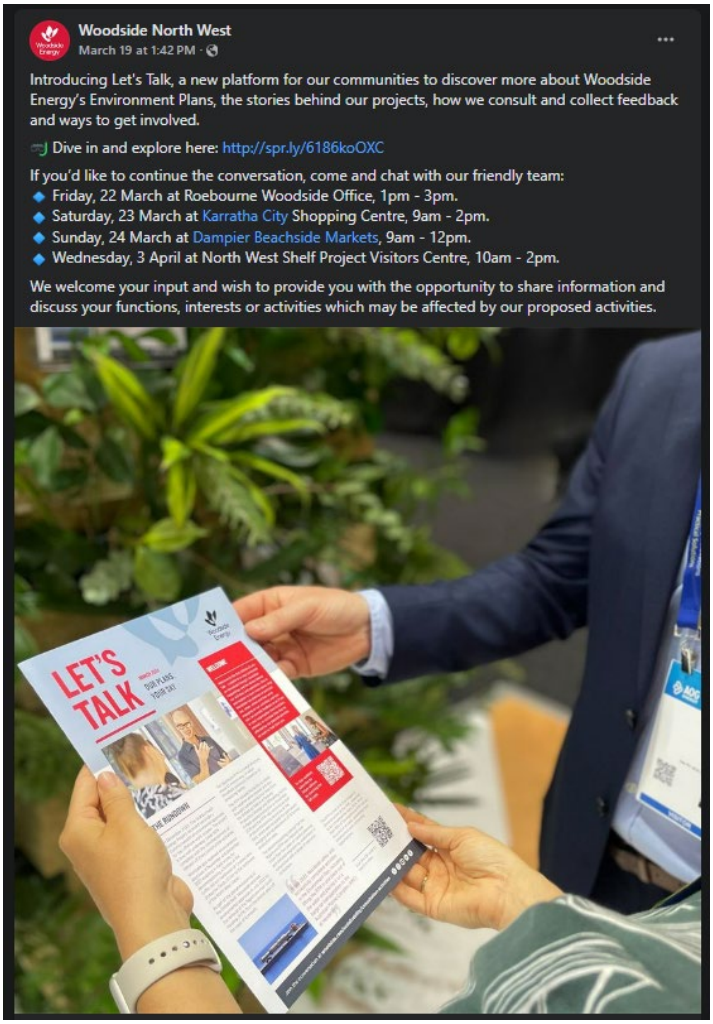
Rural Link AH mental health: 1800 552 002 (toll free) or 1800 720 101 (TTY)
Lifeline: 13 11 14


WACHS chief executive Jeff Moffet.


Health Minister Amber Jade Sanderson.

5.1.2 Poster promotion at Lo's Café (7 March 2024)

5.1.3 Social Media Campaign (19 – 30 March 2024)



Woodside North West
March 30 at 7:00 AM ·

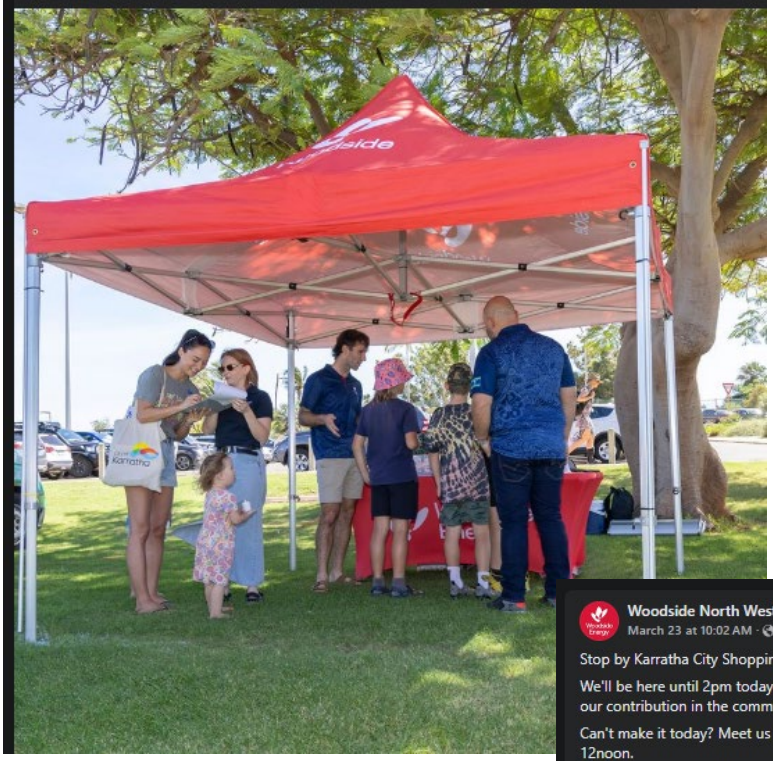
👀 Did you see us out and about last weekend?

We enjoyed chatting with many locals about our planned and proposed activities and operations, our community contribution and employment pathways.

If you have questions about our activities on land and sea, we will be at the North West Shelf Visitor Centre on Wednesday, April 3.

We welcome your input and wish to provide you with opportunities to share information and discuss your functions, activities or interests which may be affected by our proposed activities. Your information could assist us in developing our Environment Plans.

The North West Shelf Visitor Centre will be open from 10am - 2pm Tuesday to Friday these school holidays.



Woodside North West
March 23 at 10:02 AM ·

Stop by Karratha City Shopping Centre and say hello to our friendly team.

We'll be here until 2pm today to share information about our planned and proposed activities, our contribution in the community and employment pathways.

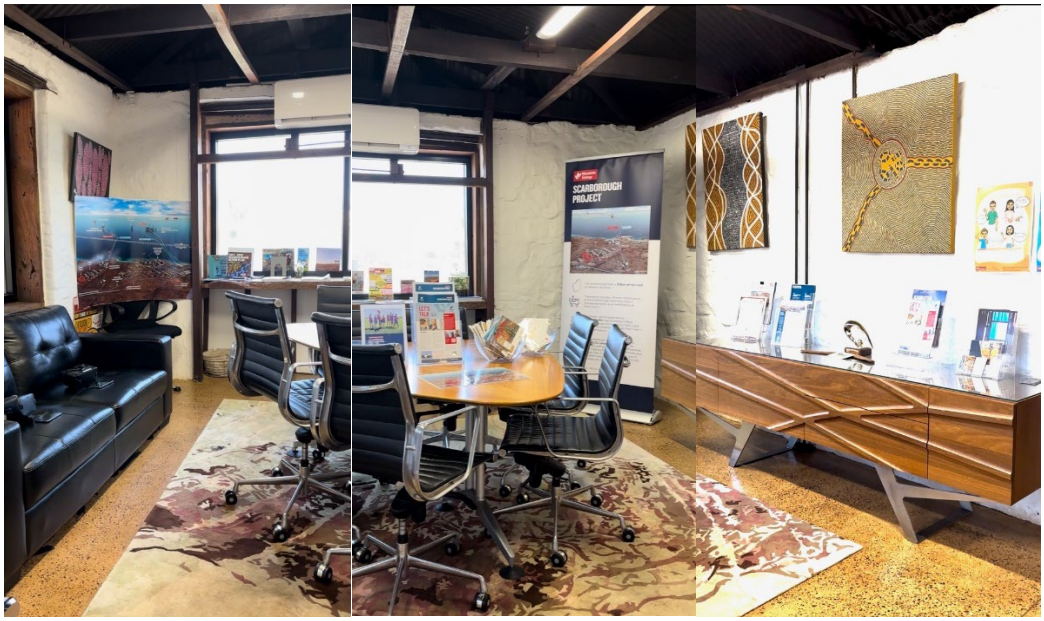
Can't make it today? Meet us at Dampier Beachside Markets tomorrow, Sunday 24 March 9am - 12noon.

We'd like to consult relevant persons in the course of preparing our Environment Plans to notify them, obtain their input and to assist Woodside to confirm current measures or identify additional measures, if any, that may be taken to lessen or avoid potential adverse effects of the proposed activity on the environment.

We welcome your input and wish to provide you with the opportunity to share information and discuss your functions, activities or interests which may be affected by our proposed projects.

5.1.4 Woodside Energy Roebourne Office (22 March 2024)

Inside:



Outside:

5.1.5 Poster promotion at Ieramugadu Store Maya (7 March 2024)

5.1.6 Karratha City Shopping Centre (23 March 2024)

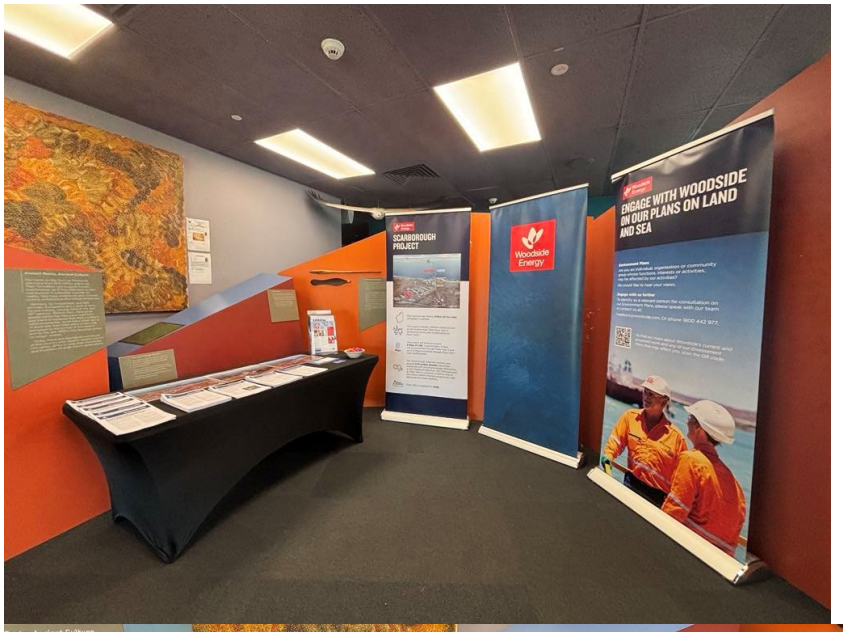
5.1.7 Dampier Seaside Markets (24 March 2024)

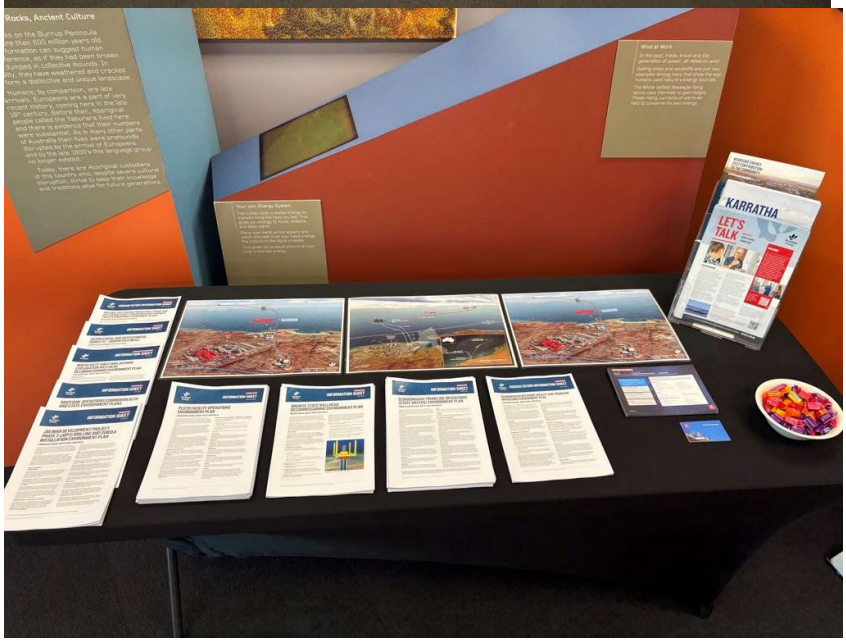
5.2 North West Shelf Visitor Centre (3 and 10 April 2024)

Location	North West Shelf Visitor Centre
Activity	Community information sessions
Location	North West Shelf Visitor Centre
Date	3 April 2024 and 10 April 2024
Description of the consultation	Woodside hosted community consultation at the North West Shelf Visitor to enable community members to understand Woodside's proposed activities and how it may affect them, ask questions, and provide their feedback. Woodside Corporate Affairs representatives were available to answer questions. A number of Environment Plan Consultation Information Sheets were available to attendees including the Pluto Facility Operations EP.
Advertising and invitations	Woodside advertised the sessions to enable individuals to self-identify, become aware of the community consultation, and enable individuals to provide feedback on proposed activities, through the following: • Social - organic • An EP consultation banner with QR code (linked to the Consultation Activities page on the Woodside website), Scarborough Project banner were displayed stand along with current EP factsheets.
Estimated number of individuals / organisations consulted	Woodside spoke to many community members, recording 7 meaningful conversations.
Summary of Feedback, Objection or Claim	
• General queries about gas production by Woodside operated Karratha Gas Plant. • Environment Plan awareness building with multiple conversations on "What is an Environment Plan?" and "What is an EMBA?". • Awareness of the Scarborough Energy Project with queries around location of the FPU, exclusion zones and impacts to marine life.	
Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response	

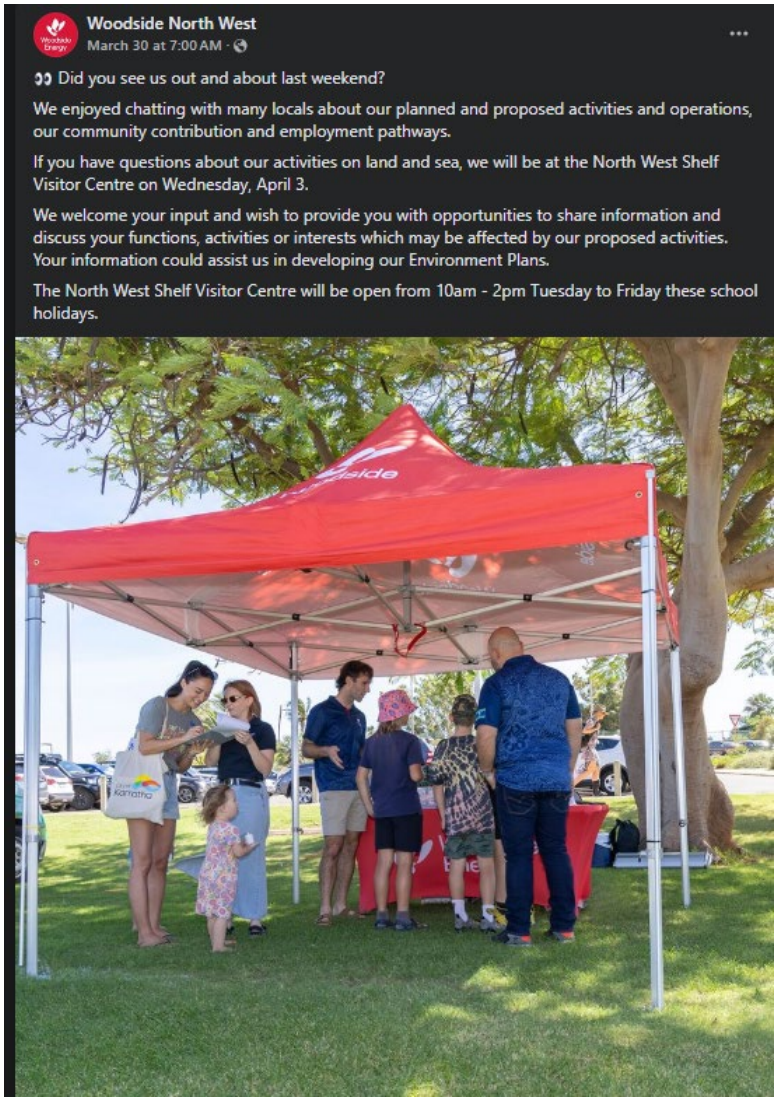
Whilst feedback was received, there were no objections or claims.
The community information sessions were part of Woodside's broader consultation approach to enable self-identification, and provide relevant persons with the opportunity to assess any impacts on their functions, interests or activities, and provide feedback on proposed activities, which is consistent with the intended outcome of consultation (see **Section 5.2**).

5.2.1 North West Shelf Visitor Centre pop-up (3 April 2024)

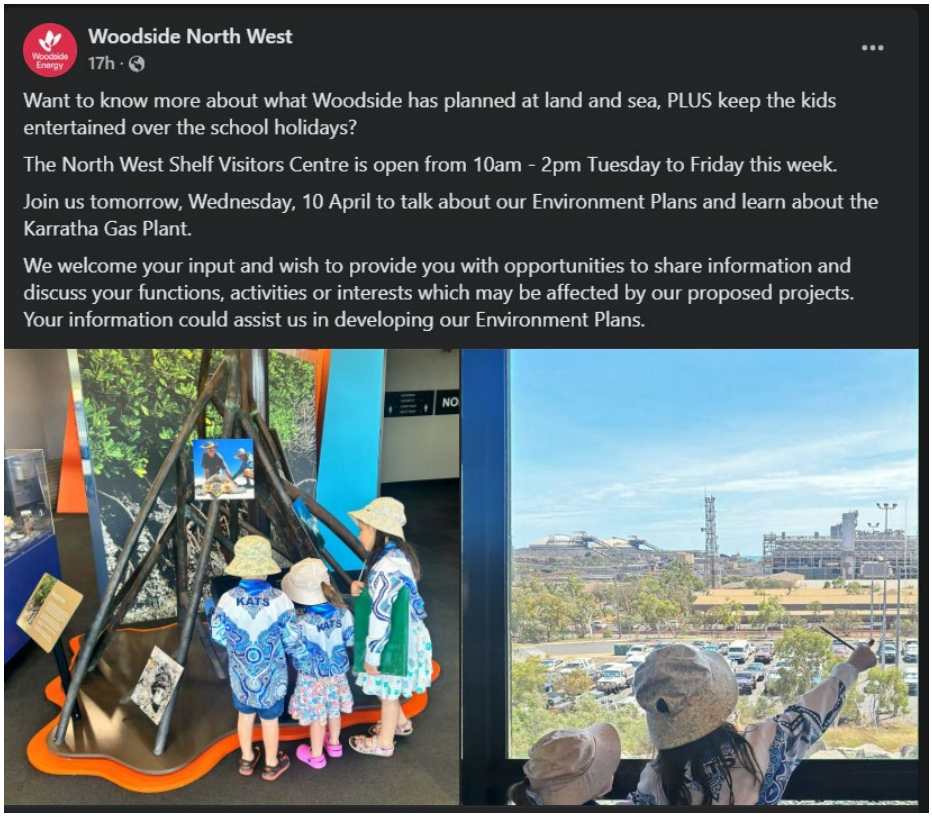




5.2.2 Facebook North West post (30 March 2024)



5.2.3 Facebook North West post (9 April 2024)



5.3 Dampier Beachside Markets (5 May 2024)

Location	Dampier
Activity	Dampier Beachside Markets
Date	5 May 2024
Description of the consultation	Woodside hosted a stand at the Dampier Beachside Markets a community event bringing together local businesses selling local products, a variety of food vendors and community groups. The stand was staffed by members from Woodside's Corporate Affairs and First Nations. Woodside displayed a QR code on the stand, linked to the consultation activities page of the Woodside website. A number of Environment Plan Consultation Information Sheets were available to attendees including the Pluto Facility Operations EP. An iPad with consultation/feedback subscription prompt was made available
Advertising and invitations	Woodside advertised the sessions to enable individuals to self-identify, become aware of the community consultation, and enable individuals to provide feedback on proposed activities, through the following: • Advertisement in the Pilbara News on 24 April and 1 May 2024 (**Appendix F, reference 5.3.1 and 5.3.2**). • Social media posts were published inviting public to attend on Woodside North West Facebook page (**Appendix F, reference 5.3.3 and 5.3.4**). • Advertisement was displayed on community noticeboard at Lo's Café, Karratha • An EP consultation banner with QR code (linked to the Consultation Activities page on the Woodside website), and Scarborough Project banner were displayed at Woodside's stand along with current EP factsheets. (**Appendix F, reference 5.3.6**).
Estimated number of individuals /	Over 1000 community members (Dampier Community Association) attended the event Woodside spoke to many community members, recording 10 meaningful conversations

organisations consulted	
Summary of Feedback, Objection or Claim	
• General queries around employment and volunteer opportunities. • General commentary from community members working at Woodside or on Woodside projects. All positive. • General interest in Browse progress and the future of gas in the energy transition. • Discussion with City of Karratha Councillors. • EP approval process discussed and why we want to talk to community.	
Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response	
Whilst feedback was received, there were no objections or claims. The community information sessions were part of Woodside's broader consultation approach to enable self-identification, and provide relevant persons with the opportunity to assess any impacts on their functions, interests or activities, and provide feedback on proposed activities, which is consistent with the intended outcome of consultation (see **Section 5.2**).	

5.3.1 Pilbara News (24 April 2024)

Pilbara NEWS
Wednesday, April 24, 2024
pilbaranews.com.au
NEWS 13

Woolies admits to underpaying

EMILY WOODS

Woolworths has lauded itself as an "exemplary employer" and "a model accused" in court as the supermarket giant admitted underpaying more than $1 million to about 1200 workers.

Two days after Woolworths' boss was threatened with jail for holding the Senate in contempt, the company faced Melbourne Magistrates Court where it pleaded guilty to more than 1000 charges.

Woolworths is facing a maximum penalty of more than $10 billion over the offending, prosecutors said last week. Barrister Kathleen Crennan, acting for the Wage Inspectorate Victoria, said the regulator was contacted in February 2022 by lawyers for Woolworths after it undertook a review of its payroll systems.

The supermarket chain discovered it was not paying some employees their long service leave entitlements after they left Woolworths, due to discrepancies in how those payments were being calculated.

Ms Crennan said the inspectorate investigated and found the underpayments occurred for former Woolworths and Woolstar workers on 3617 occasions between January 2020 and July 2022. The regulator took the case to court and charged Woolworths for those who were underpaid sums of more than $250, which resulted in about $1m in unpaid leave for 1237 former Victorian staff.

Woolworths' barrister Saul Holt KC admitted it was an "interesting week" to be discussing the supermarket in open court. "But Woolworths is much more than some headlines and a senate inquiry," he said.

He said Woolworths was described as "a model accused" by the prosecution, as it had self-reported and self-investigated the underpayments to the regulator.

"Woolworths is an exemplary employer," he said, adding it was a major employer of young people aged under 25.

Mr Holt said the proposed $10b maximum penalty was "extraordinary" and asked the magistrate not to dole out such a penalty as it could discourage other employers from self-reporting.

Woolworths has since paid back most of the underpaid after alerting them via text message, email and post, and paid those they could not get in contact with into their last known bank account, he said.

Magistrate Nahrain Warda asked why it took so long for Woolworths to discover the payroll issues, given it had changed systems in 2016. "Why is it not until 2020 that the testing is, in essence, to ensure there are no anomalies? One would think that would be ongoing," she said.

"Woolworths can't escape from the fact that over that period those anomalies were not picked up, that should not have occurred and would not have occurred now because we know more," Mr Holt replied. Woolworths will be sentenced April 24.

5.3.2 Pilbara News (1 May 2024)

4 NEWS pilbaranews.com.au Pilbara NEWS Wednesday, May 1, 2024


Gerry Georgatos.

Campaign to let children in care tell their stories

NATASHA CLARK

Suicide prevention expert Gerry Georgatos says it is critical that children in State care are allowed to share their stories with the public through the media.

The death by suicide of a 10-year-old Indigenous boy from the Kimberley in State care earlier this month has prompted Mr Georgatos to pioneer the Let Them Speak campaign.

"The power of the media is second to none; without it, we can't effect change," Mr Georgatos said.

"Governments cannot be swayed unless the narrative is in the public domain."

Under the Children and Community Services Act (2004), it is illegal to broadcast or publish anything that could identify any child who is, or has been, the subject of a protection order.

Though the 10-year-old's death has been widely reported, critical details, such as the child's name, cannot be revealed.

"We can't have deaths happening that we can't speak to, and we skirted the line with this one," Mr Georgatos said.

"We've come close to breaking the law by speaking with publications."

He has been working with the boy's grieving family every day since the loss of their beloved brother and son.

Mr Georgatos said the child's parents had returned clean drug and alcohol samples over the past year. Despite this, he had no contact with his parents for eight months before his death.

"As a suicide prevention researcher, I can argue that a year clean is a powerful protective factor," he said.

"The usual practice is to return kids to their families after the parents have returned clean drug and alcohol testing samples for three to six months.

> My focus is on keeping children safely at home, where this is possible. A recommendation to bring a child into the care of the State is only made as a last resort.
> Sabine Winton

"If that had happened in this case, at the six-month mark, that boy would still be alive today."

However, Early Child Protection and Prevention of Family and Domestic Violence Minister Sabine Winton said it would be inappropriate for a minister to provide comment on an individual case.

"The safety and wellbeing of children is always the highest priority of the Cook Government," she said.

"My focus is on keeping children safely at home, where this is possible.

"A recommendation to bring a child into the care of the State is only made as a last resort and a final decision rests with the Children's Court of Western Australia."

When asked for a response to demands by advocates that the Children and Community Services Act be reformed, Ms Winton said: "It is reviewed every five years."

For Mr Georgatos, the minister's response is unacceptable. He knows the ripple effect that publishing such stories can have.

In 2019, Mr Georgatos obtained permission from the then director-general of the Department of Communities, Michelle Andrews, for a young woman he was supporting, Tah-Shae, to share her experience of being placed in 72 foster homes in a 12-year period with the West Australian.

Tah-Shae detailed the sexual abuse, bullying and neglect she experienced while in State care.

The impact of her story sparked a wider public conversation about the merits of placing children, specifically Indigenous children, in State care.

"The impact of her telling her experiences while in care was an eye-opener to the dire circumstances many endure," Mr Georgatos said.

"Public consciousness gained insight. Without the public understanding (regarding) the gaps and unmet needs, there is less likelihood of addressing systemic disarray."

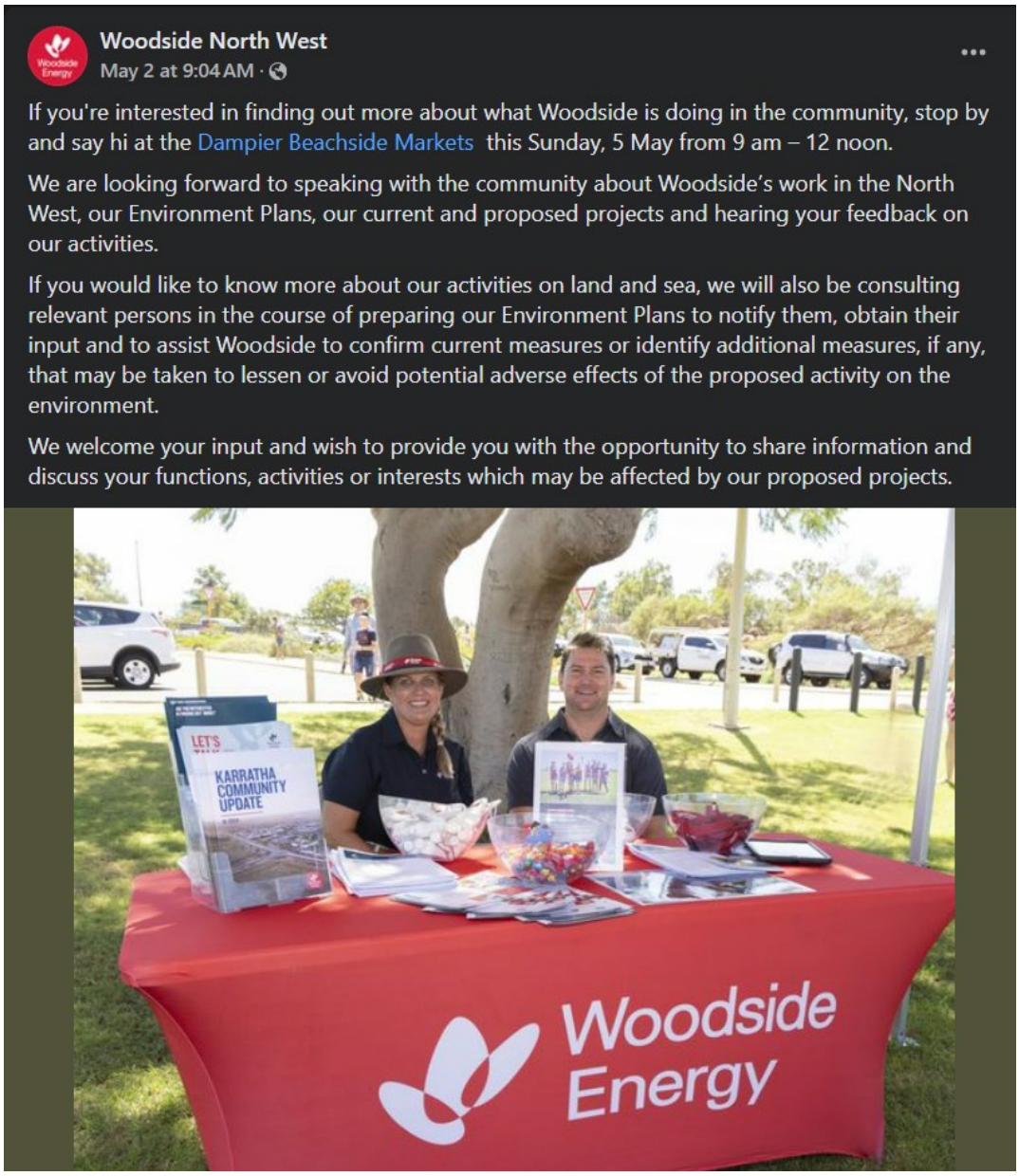
Mr Georgatos remains optimistic about his campaign to open up the State care system to more public scrutiny but admits it needs more support from powerful figures to gain traction.

"The Let Them Speak campaign is in its infancy but has begun," he said. "The next steps must be backed by a multitude of voices across the nation, calling for every State and Territory to reform their laws and guarantee unfettered rights for those affected to speak to the media.

"Everyone should be able to tell their story if they want to. I refuse to accept censorship by omission."

Lifeline 13 11 14

5.3.3 Social Media post (2 May 2024)



5.3.4 Social Media story (3 May 2024)

5.3.5 Lo's Cafe Community notice board (26 April 2024)

5.3.6 Market stand (5 May 2024)

5.4 Exmouth Community Markets (19 May 2024)

Location	**Exmouth**
Activity	**Community markets – Woodside stand**
Date	Sunday, 19 May 2024 (8am to 12pm)
Description of the consultation	Woodside hosted a stand at the Exmouth Community Markets, held at Federation Park. The stand was staffed by Woodside Environment and Corporate Affairs representatives. Woodside displayed a QR code on the stand, linked to the consultation activities page of the Woodside website. Woodside's 'Let's Talk' – a monthly information sheet on the company's Australian activities. In addition, information on the Scarborough Energy Project, Browse to NWS Project, Browse Carbon Capture and Storage (CCS) concept, Woodside's Climate Transition Action Plan, leaflets providing QR codes to Woodside's

	Annual Report and Sustainability , as well as our Reconciliation Action Plan were available. Environment Plan Consultation Information Sheets available to attendees included: • Pluto Facility Operations EP
Advertising and invitations	Woodside advertised the sessions to enable individuals to self-identify, become aware of the community consultation, and enable individuals to provide feedback on proposed activities, through the following: • Geotargeted social media campaign advertising in Exmouth and surrounding areas (+80 kms) from 4 May to 18 May. • Directly inviting local Community Liaison Group • An EP consultation banner with QR code (linked to the Consultation Activities page on the Woodside website) was displayed at Woodside's stand along with the EP factsheets and Project information sheets mentioned above. A selection of images are in this email.
Estimated number of individuals / organisations consulted	Over 300 people attended the markets. Woodside had meaningful conversations with approximately 30 people. These people identified as being Exmouth community members, visitors to Exmouth (residents of the East Coast of Australia, residents of Perth, residents of Karratha), and a few transient backpackers from various overseas locations.

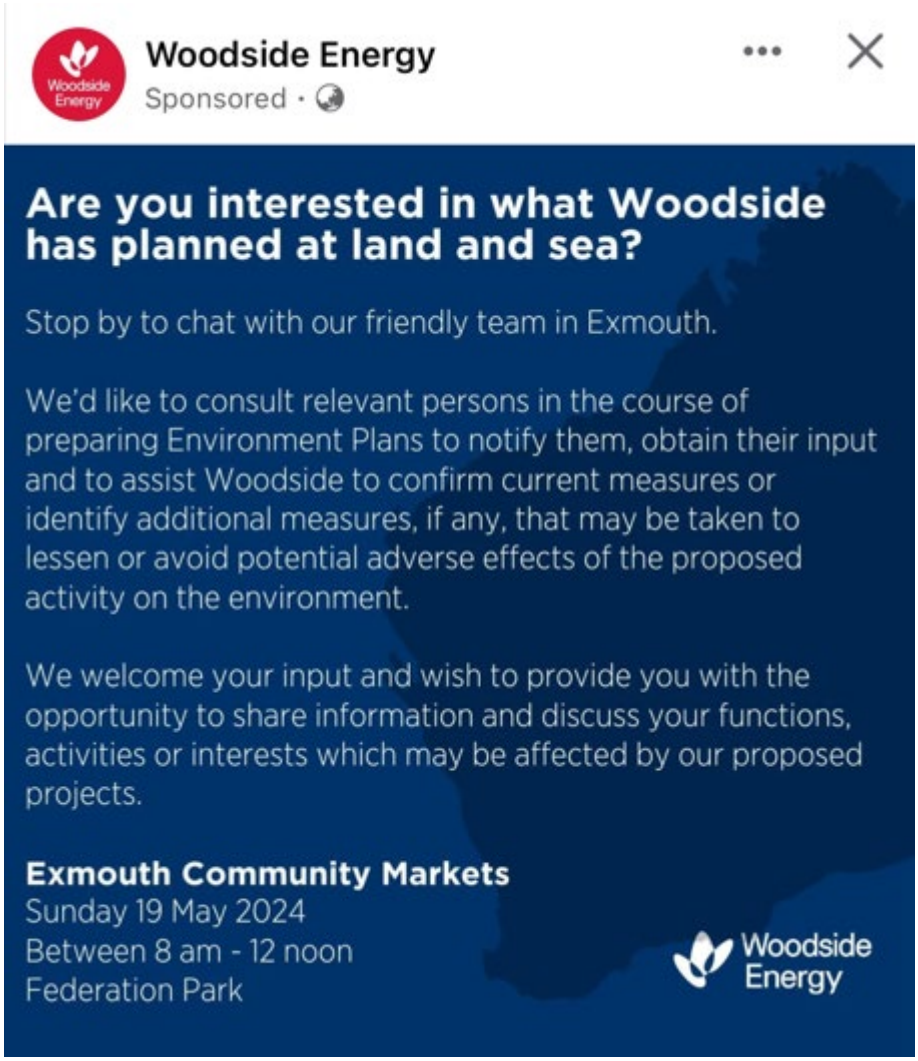
Summary of Feedback, Objection or Claim

- Community members were able to engage with Woodside representatives to understand the proposed activity and how it may affect them, ask questions, and provide their feedback.
- General interest in Woodside activities.
- No specific queries on the EPs.
- Stakeholders identifying themselves as Woodside shareholders interested in project updates, particularly on Scarborough, Browse to NWS Project, as well as the company's climate strategy and climate transition plans.
- Queries from Exmouth residents around employment and local content opportunities.
- General queries on the progress of the Scarborough Energy Project and Browse to North West Project, with two stakeholders seeking more information on Browse CCS
- Queries on Western Australia's domestic gas reservation policy and the existing domestic gas commitments for Woodside's activities.
- Concern from one Exmouth resident with business links to Eastern Australia over the costs of flights between Exmouth and the East Coast.
- General queries on the location of Woodside assets in relation to Exmouth and Woodside's footprint in Exmouth.
- Local residents interested in understanding current social investment programs and opportunities.
- Interest to understand how Woodside undertakes community consultation.
- A transient worker and an Exmouth local expressed a preference for the sunscreen giveaway to be made with reef-safe ingredients.(This feedback has been forwarded to the Woodside focal point)
- One stakeholder expressed their opposition to oil and gas and voiced a desire for companies like Woodside to invest in geo-thermal energy instead.

Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response

Whilst feedback was received, there were no specific objections or claims to a particular Woodside project or activity.

Objections to the resources industry was expressed by two stakeholders.
The community information sessions were part of Woodside's broader consultation approach to enable self-identification, and provide relevant persons with the opportunity to assess any impacts on their functions, interests or activities, and provide feedback on proposed activities, which is consistent with the intended outcome of consultation.

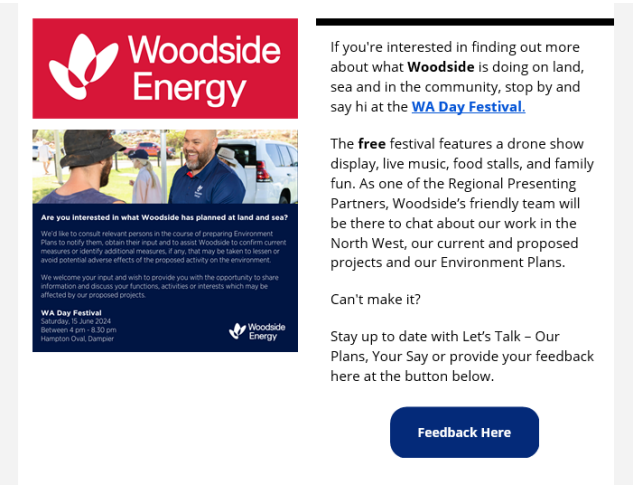


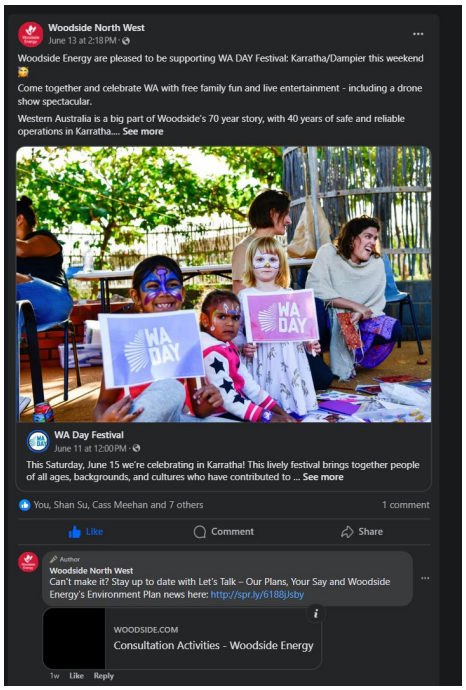
5.5 WA Day Festival (15 June 2024)

Location	Dampier
Activity	WA Day Festival
Date	15 June 2024
Description of the consultation	Woodside hosted a stand at the WA Day Festival organised by Celebrate WA. The event featured a drone show, food stalls, live music, sideshow stalls and interactive exhibits. The stand was staffed by members from Woodside's Corporate Affairs, First Nations and Environment team. Woodside displayed a QR code on the stand, linked to the consultation activities page of the Woodside website. A number of Environment Plan Consultation Information Sheets were available to attendees including the Pluto Facility Operations EP.
Advertising and invitations	Woodside advertised the sessions to enable individuals to self-identify, become aware of the community consultation, and enable individuals to provide feedback on proposed activities, through the following: • Advertisement in the KDCCI e-newsletter distributed 5 June 2024. • Social media posts were published inviting public to attend on Woodside North West Facebook page (**Appendix F, reference 5.4.1**). • Celebrate WA advertised the event via TV commercials, radio advertisement and in print. • An EP consultation banner with QR code (linked to the Consultation Activities page on the Woodside website) was displayed at Woodside's stand along with current EP factsheets. (**Appendix F, reference 5.4.2**).
Estimated number of individuals / organisations consulted	Over 2000 community members (Celebrate WA) attended the event. Woodside spoke to many community members, recording 15 meaningful conversations.
Summary of Feedback, Objection or Claim	
• General queries around employment and volunteer opportunities. • General positive commentary from community members working at Woodside or on Woodside projects. • General interest in Scarborough and Browse progress and the future of gas in the energy transition.	

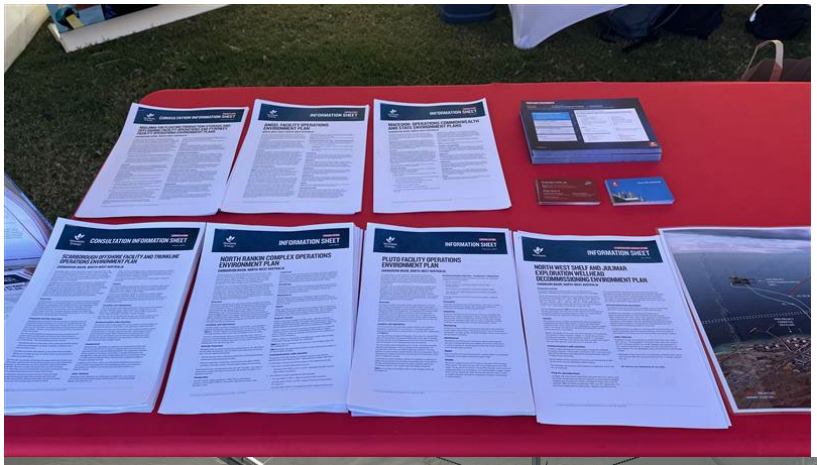
• General query around tax contributions. • EP approval process discussed and why we want to talk to community. No concerns raised.
Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response
Whilst feedback was received, there were no objections or claims. The community information sessions were part of Woodside's broader consultation approach to enable self-identification, and provide relevant persons with the opportunity to assess any impacts on their functions, interests or activities, and provide feedback on proposed activities, which is consistent with the intended outcome of consultation (see **Section 5.2**).

5.5.1 Social media posts



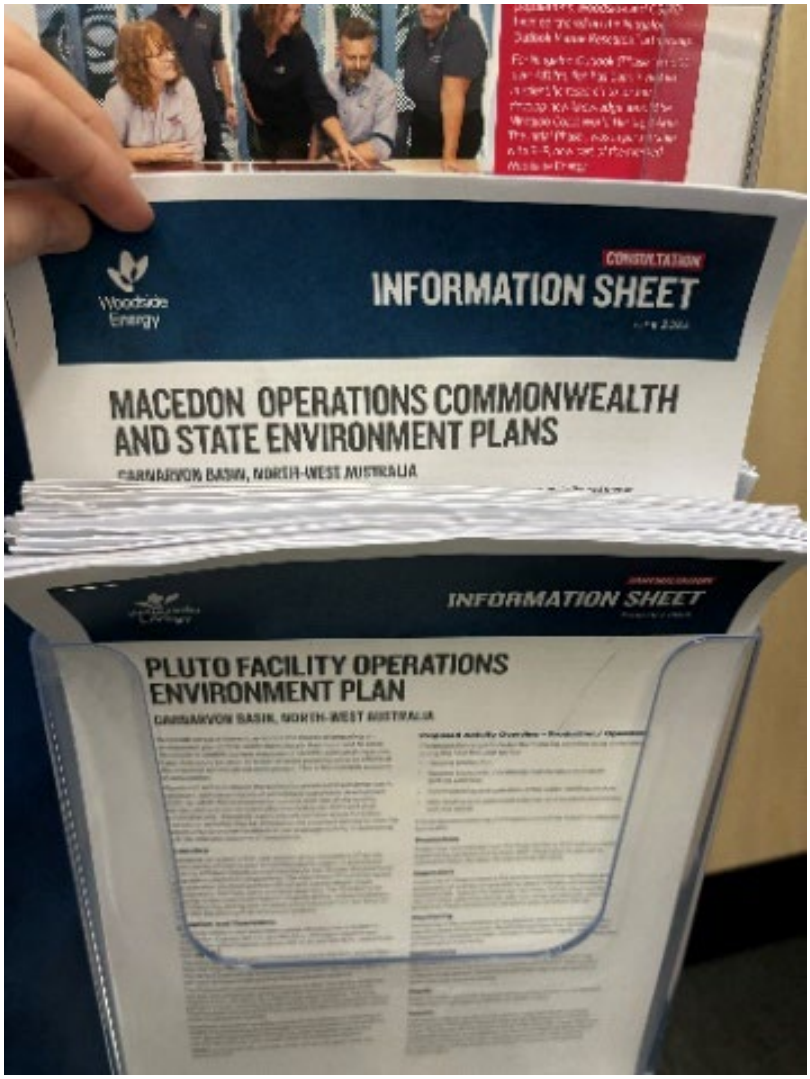


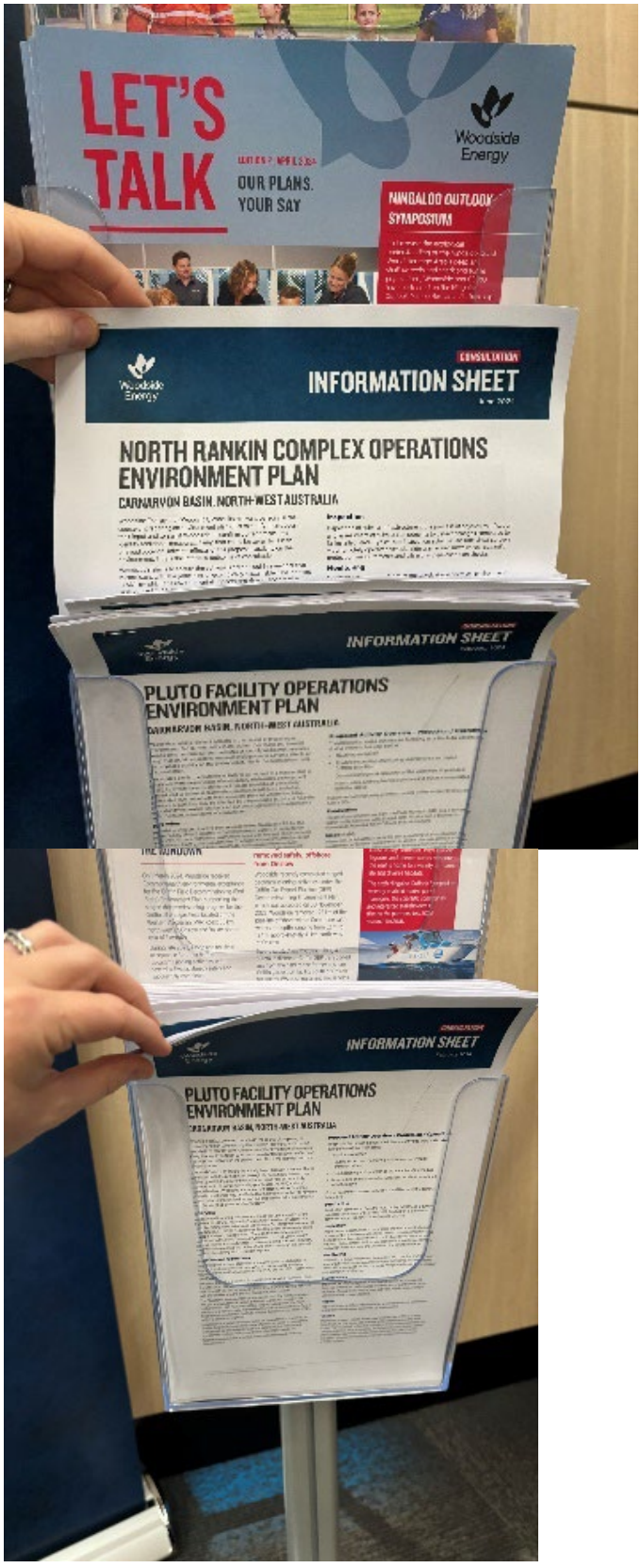
5.5.2 Market stand



5.6 Pilbara Summit (26-27 June 2024)

Location	Karratha
Activity	Pilbara Summit 2024
Date	25-26 June 2024
Description of the consultation	Woodside hosted a stand at Pilbara Summit 2024, a sold-out conference established to raise the profile of issues and opportunities in the Pilbara region. The event provides the opportunity for the Pilbara region's industry, investors, businesses, community, and government representatives to connect. The stand was staffed by members from Woodside's Corporate Affairs, Government Affairs, First Nations, Supply Chain and New Energy teams. Woodside displayed a QR code on the stand, linked to the Let's Talk EP newsletter on the Woodside consultation page of the website. A pull-up banner was on display focusing on engagement on our plans at land and sea with a QR code to the consultation page on the Woodside website. A number of Environment Plan Consultation Information Sheets were available to attendees including the Pluto Facility Operations EP.
Advertising and invitations	No advertising was undertaken. The Vice President for North West Shelf delivered a speech during the conference, which highlighted the important role the that Woodside will continue to play in the energy transition. In addition a presentative from Woodside's CCS team was part of a panel discussion on Decarbonisation – moving to net zero discussing the role of CCS, opportunities for growth, new business and the best approach to renewable and lower carbon industries. Attendees were invited to find out more about Woodside's projects, developments or environment plans by speaking team members on the Woodside conference stand or to visit Woodside's town office based in The Quarter.
Estimated number of individuals / organisations consulted	Over 600 people attended in person event over 2 days
Summary of Feedback, Objection or Claim • Approximately 10 conversations occurred around new energy opportunities and plans, local content, social investment, EMBAs (relating to EPs) and approvals in general. • No feedback was received regarding Woodside's Environment Plans.	
Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response	
This session forms part of Woodside's broader consultation approach to enable self-identification, and provide relevant persons with the opportunity to assess any impacts on their functions, interests or activities, and provide feedback on proposed activities, which is consistent with the intended outcome of consultation (see **Section 5.2** of the EP).	





5.7 Let's Talk – Our Plans, Your Say

Let's Talk Newsletter Hard Copy Distribution – March 2024 Edition

Date	Location	Event (if applicable)
28 February 2024	Karratha	KDCCI Business Breakfast
6 March 2024	Exmouth	Exmouth Chamber of Commerce and Industry office Exmouth Community Liaison Group
7 March 2024	Exmouth	Gascoyne Development Commission office Exmouth Shire office
8 March 2024	Karratha	KDCCI International Women's Day
13 – 15 March 2024	Perth	AOG Energy Conference
22-24 March 2024	Karratha, Dampier, Roebourne	Regional Woodside Environment Plan consultation roadshow
3 April 2024	Karratha	Employees at the Woodside Karratha Gas Plant
10 April 2024	Perth	Meeting with WAFIC
17 April 2024	Karratha	KDCCI Business After Hours
24 April 2024	Perth	Employees at the Woodside MY Building Woodside Annual General Meeting

LET'S TALK

MARCH 2024

OUR PLANS, YOUR SAY

Woodside Energy

WELCOME

Welcome to the first edition of Let's Talk – a platform to stay connected on Woodside Energy's Australian happenings and the stories behind our activities and operations. Dive in and explore to learn more about what Woodside has planned on land and sea; when, where and how we're engaging on our activities; and how you can provide feedback to us. If you or your organisation have functions, interests, or activities that may be affected by our planned activities, we want to hear from you.

To stay updated, subscribe for future editions click here or visit

www.woodside.com/what-we-do/consultation-activities

THE RUNDOWN

In December 2023, The Scarborough Energy Project received secondary Commonwealth environmental approvals for key offshore work scopes. The project is now well underway (over 50% complete) with the commencement of relevant offshore construction activities.

Woodside also received environmental approvals in November and December 2023 enabling in-field works for decommissioning activities at the Griffin (65 km northwest of Onslow) and Stybarrow fields (51 km to the northwest of the North West Cape).

As part of the decommissioning of the Enfield field, Woodside received environmental approvals in July 2023 for the removal of the Nganhurra riser turret mooring (RTM) from the permit area off the coast of Exmouth.

The Nganhurra RTM is a metal structure, about 83 metres long, on which Woodside previously moored an oil producing facility.

The RTM allowed the facility to rotate with weather while moored and also brought subsea production lines from the Enfield oil field to a Floating Production Storage and Offloading facility. Enfield ceased production in November 2018 and the RTM was removed as part of decommissioning activities at the field, which also included the permanent plugging and abandonment of 18 former production wells.

The decommissioning concept for the Nganhurra RTM was matured over more than two years of careful planning and detailed engineering, undertaken in conjunction with a range of specialist contractors.

> In late 2023, Woodside safely and successfully completed activities in the Environment Plan, including lifting the RTM in one piece out of the water and placing it on a barge for transportation to the Australian Marine Complex (AMC) at Henderson.

The RTM is now in its final stages of deconstruction at the AMC, expected to be completed by April 2024. More than 95% of the Nganhurra RTM will be recycled or re-used, supporting local employment and contracting opportunities.

Click here to view the safe removal of Nganhurra Riser Turret Mooring

Join the conversation at **woodside.com/sustainability/consultation-activities**

LET'S TALK

TALKING POINT

Woodside safely completes marine survey

A marine seismic survey conducted by Woodside Energy in December 2023 applied controls to avoid interaction with whales as part of the environment planning process.

Once the Environment Plan for the activity was accepted by the Regulator, Woodside conducted the survey from 2 December to 31 December 2023.

The survey was undertaken with a range of standard and project-specific controls designed to reduce interactions with marine fauna including a dedicated spotter vessel with trained Marine Fauna Observers operating during daylight hours and the use of a Passive Acoustic Monitoring system to detect the presence of vocalising whales.

A shut down zone was in place for whales detected within 2 km of the acoustic source and for sea turtles spotted within 100 m of the acoustic source.

There were also specific controls in place relating to whale species of potential cultural significance, such as pygmy blue whales and humpback whales.

This included an extended 'limits of visibility' shutdown zone if these whale species or large unidentified whales were detected by observers, within their limits of vision.

Weekly project update reports were published on the Woodside website during the survey to provide information on cetacean or marine turtle observations. These reports confirmed that marine fauna continued to move through the area during the survey. They also confirmed that no pygmy blue whale or sea turtles were sighted during the survey.

COMMUNITY SPOTLIGHT

The Scarborough Energy Project

The Scarborough Energy Project will provide a boost to the WA economy and communities, growing jobs and bringing work through the supply chain, with a focus on the Pilbara region.

A second processing train, Pluto Train 2, is being constructed within the existing Pluto LNG facility located near Karratha in the Pilbara Region of Western Australia and is currently set to process about five million tonnes per annum of Scarborough gas. The project is providing various opportunities for local businesses in Karratha. To date, with collaboration from Woodside's construction partner Bechtel, the Scarborough Energy Project has injected more than $90 million locally and contracted over 65 Karratha businesses.

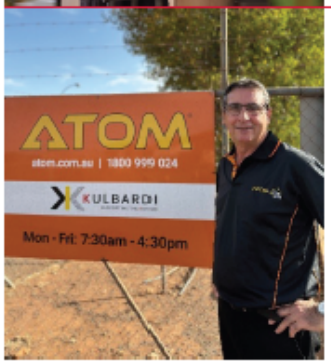
Local business spotlight: ATOM

We're spotlighting local, family-owned business: ATOM. The company name stands for Aqua Terra Oil & Mineral. ATOM has recently been contracted to supply industrial consumables, safety supplies and personal protective equipment products for the Pluto Train 2 construction.

ATOM believes locals serve locals best which is why its 22 employees supporting the project are all local to Karratha. Nearly half of the team are female and there is one Indigenous employee.

The contract has supported ATOM to expand its workforce increasing local employment opportunities.

Terry Klowss, Bechtel's Site Manager for Pluto Train 2 said, "ATOM's 100% local workforce helps us ensure our partnerships are benefiting local people – this is something that is very important to us at Bechtel."



> "Long-term, it's estimated Pluto Train 2 will sustain around 600 roles, once the project is operational, across Western Australia, including 70 residential positions in Karratha."

Like Woodside, ATOM is a nationwide company, with roots in Western Australia. ATOM opened its Karratha branch in 1980. In the same decade, Woodside commissioned the North West Shelf Project.

ATOM also shares Woodside's commitment to invest where we operate, building meaningful relationships and supporting our local community.

Phil Donders, National Team Leader ATOM said, "At ATOM, we believe in investing in the success and sustainability of the communities we operate within. This is why ATOM welcomed the opportunity to support the Pluto Train 2 Project through the supply of industrial consumables and PPE."

With access to more than one million products, ATOM is one of Australia's fastest growing industrial and safety supply business.

Join the conversation at **woodside.com/sustainability/consultation-activities**

COME CHAT WITH US

Woodside consults on our activities. Join us at local North West community events and at our offices so you can talk to us about our operations, decommissioning activities or proposed projects.

If you're interested in what Woodside has planned on land and sea, come and chat to our friendly team. You can find out more and share your feedback about Woodside's work in the North West, our Environment Plans and our current and proposed projects.

Upcoming engagement opportunities

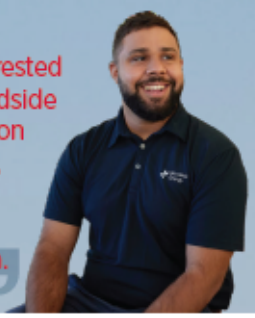
ROEBOURNE
22 March 2024 | 1:00pm – 3:00pm
Woodside Office
39 Roe Street, Roebourne, WA, 6718

KARRATHA
23 March 2024 | 9:00am – 2:00pm
Karratha City Shopping Centre
16 Sharpe Avenue, Karratha, WA, 6714

DAMPIER
24 March 2024 | 9:00am – 12:00pm
Dampier Beachside Markets
Hampton Oval, Dampier, WA, 6713

DAMPIER
3 April 2024 | 10:00am – 2:00pm
North West Shelf Project Visitors Centre
Burrup Road, Dampier, WA, 6713

"If you're interested in what Woodside has planned on land and sea, come and chat to our friendly team."



HAVE YOUR SAY

Woodside consults relevant persons in the course of preparing our Environment Plans. This is to notify them, obtain their input and to assist Woodside to confirm current measures or identify additional measures, if any, that may be taken to lessen or avoid potential adverse impacts of the proposed activity on the environment.

We welcome your input so please contact us if you'd like to discuss your functions, interests or activities which may be affected by our proposed activities.

Environment Plan	Activity Type	Location	Consultation Dates
Pluto Facility Operations	Operations	~190km north-west of Dampier	February – March 2024
North Rankin Complex Operations	Operations	~135 km offshore from Dampier	April – May 2024
Scarborough Trunkline Operations (State)	Operations	~30km north of Dampier	April – May 2024

You can access our consultation information, provide feedback and subscribe for updates by visiting **www.woodside.com/what-we-do/consultation-activities** or click **here.**

PROGRESS SNAPSHOT

You can view Environment Plans for approved projects and activities by visiting: **info.nopsema.gov.au/home/approved_projects_and_activities** or click **here**.

Environment Plan	Activity type	Date Accepted	Status
Stybarrow Decommissioning and Field Management	Decommissioning	8 January 2024	Work intended to commence in 2024
Stybarrow Plug and Abandonment	Decommissioning	21 December 2023	In progress
WA-34-L Pyxis Drilling and Subsea Installation (Revision)	Project	21 December 2023	Work intended to commence in 2024
Griffin State Pre-Decommissioning	Decommissioning	20 December 2023	Completed
Scarborough Seabed Intervention and Trunkline Installation	Project	13 December 2023	In progress
Scarborough WA-61-L and WA-62-L Subsea Infrastructure Installation	Project	8 December 2023	In progress
Scarborough Drilling and Completions	Project	1 December 2023	In progress
Scarborough 4D B1 Marine Seismic Survey	Survey	1 December 2023	Completed
Griffin Gas Export Pipeline Decommissioning	Decommissioning	30 November 2023	In progress
TPA03 Well Intervention	Project	28 November 2023	In scheduling
Griffin Decommissioning and Field Management	Decommissioning	21 November 2023	In progress
Nganhurra Operations Cessation	Decommissioning	27 July 2023	Completed

LET'S TALK

What's an Environment Plan?

A Titleholder must have an accepted Environment Plan (EP) in order to carry out certain petroleum activities. An EP sets out information about the proposed activity, how the activity may potentially impact the environment, measures to mitigate potential risks and impacts to as low as reasonably practical (ALARP) and acceptable levels, a record of consultation undertaken by the Titleholder, preparedness for emergencies and information on how environmental performance will be monitored and reported.

When an EP is being developed, a Titleholder:

- Engages in consultation with relevant persons and organisations.
- Provides information on its activities.
- Engages in dialogue with persons being consulted (where appropriate).
- Responds to claims or objections about the activity.

Consultation is an important part of environmental management.

Consultation on Environment Plans

Consultation provides an opportunity for persons who wish to provide feedback or raise concerns about:

- The potential adverse impacts of the activity on their functions, interests or activities, to seek information about the activity.
- How the Titleholder intends to manage the activity so that the risks and impacts are managed to ALARP and acceptable levels.

Information provided by the relevant person may assist the Titleholder to better put in place measures to manage the risks and impacts of an activity.

Commonwealth Waters

The National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) is Australia's independent regulator for health and safety, structural and well integrity, and environment management for offshore petroleum and greenhouse gas storage activities in Commonwealth waters.

EPs submitted to NOPSEMA for assessment are made available on the NOPSEMA website.

Woodside consults in the course of preparing Commonwealth EPs in accordance with section 25 of the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023*. Consultation methodologies are designed to:

- Identify relevant persons.
- Provide them with sufficient information and a reasonable period of time to allow them to make an informed assessment of the possible consequences of the proposed activity on their functions, interests or activities.
- Assist Titleholders to consider and adopt appropriate measures in response to claims or objections raised during consultation.

Woodside identifies relevant persons for consultation in accordance with section 25 of the Environment Regulations. Alternatively persons who wish to consult can self-identify, in accordance with regulation 25 of the Environment Regulations.

Environment That May Be Affected (EMBA)

The environment that may be affected (EMBA) is the largest area where a petroleum activity could potentially have an environmental consequence (direct or indirect impact). The broadest extent of the EMBA takes into consideration planned activities and unplanned events. Woodside's assessment of relevant persons is based on the EMBA assessed for the activity.

State Waters

The Department of Energy, Mines Industry Regulation and Safety (DEMIRS) is the regulator for activities in State waters in Western Australia. Woodside follows a similar process to identify relevant persons to consult for State EPs. However consultation for State EPs is based on activities in the operational area, not unplanned events in the EMBA. For State EPs, only EP summaries are made public on the DEMIRS website once the EP has been approved.

Are you a Relevant Person?

Recently, Woodside launched an information campaign online and on social media focusing on the Kimberley, Pilbara, Gascoyne and Murchison areas to build a greater understanding of how members of those communities can get involved in consultation and the environmental planning process.

A series of short videos were shared on Woodside's website and on social media with targeted information for different community members including commercial fishers, marine users and traditional custodians.

In the videos, Woodside tells community members about our EPs and asks viewers who might be relevant to our activities to self-identify and participate in consultation.

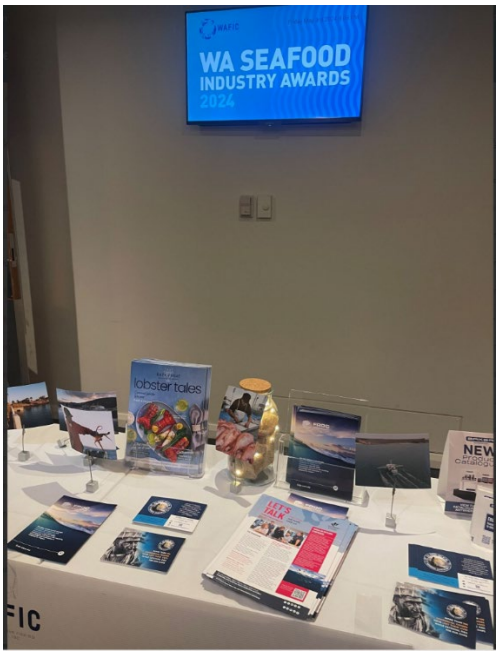
The campaign is still running and provides suggestions as to ways to get into contact with Woodside and learn more about our EPs.

Click here to learn more

Join the conversation at **woodside.com/sustainability/consultation-activities**

Let's Talk Newsletter Hard Copy Distribution – April 2024 Edition

Date	Location	Event (if applicable)
April 2024	Perth	Woodside AGM
April/May/June	Karratha	Woodside Visitor Centre
May 2024	Perth	WAFIC Award Night
May 2024	Karratha	KDCCI Business Breakfast Briefing
May 2024	Karratha	Community markets
May 2024	Karratha	Employees at the Woodside Karratha Gas Plant
May 2024	Onslow	Community information night
May 2024	Exmouth	Community markets
May/June 2024	Perth	Employees at the Woodside MY Building Woodside Annual General Meeting



LET'S TALK

EDITION 2 | APRIL 2024

OUR PLANS, YOUR SAY

Woodside Energy

THE RUNDOWN

On 1 March 2024, Woodside received Commonwealth environmental acceptance for the Griffin Field Decommissioning (End State) Environment Plan, supporting the staged decommissioning program for the Griffin oil and gas field, located off the Western Australian (WA) coast 65 km north-west of Onslow and 94 km north-east of Exmouth.

During late 2023, Woodside received acceptance for other Griffin decommissioning activities, with several activities already safely and successfully completed.

WHAT IS DECOMMISSIONING?

Decommissioning involves managing infrastructure that is no longer required in a timely, safe, and culturally and environmentally responsible manner.

GRIFFIN FIELD – FAST FACTS

- Field discovered 1989
- Production period 1994 – 2009
- Gas produced for the WA domestic gas market - 62 trillion cubic feet
- Barrels of oil produced - 167 million

Griffin gas export pipeline removed safely, offshore from Onslow

Woodside recently completed staged decommissioning activities under the Griffin Gas Export Pipeline (GEP) Decommissioning Environment Plan, which was accepted on 30 November 2023. Woodside removed ~25 km of the pipeline offshore within Commonwealth waters at depths ranging from 52 m to 127 m, approximately 41 km north-west of Onslow.

During production, the 62 km long and 30 cm in diameter Griffin GEP transported gas from the field to the former onshore Griffin gas export facility south of Onslow for use by WA businesses and households.

The decommissioning of the pipeline's WA State waters section and related onshore infrastructure requires separate state approvals. Woodside will engage local stakeholders to understand their views on potential decommissioning options for this pipeline portion.

Woodside is now undertaking a post-removal assessment of the Commonwealth section of the Griffin pipeline to inform future decommissioning activities in the region. Woodside will continue to assess decommissioning options case-by-case, guided by science, consultation, and legislative requirements.

NINGALOO OUTLOOK SYMPOSIUM

To increase the ecological understanding of the Ningaloo Coast World Heritage Area's deep and shallow reefs and shark and turtle populations, Woodside and CSIRO have partnered on the Ningaloo Outlook Marine Research Partnership.

For Ningaloo Outlook (Phase 1 and 2) over A$12million has been invested in scientific research to further develop new knowledge about the Ningaloo Coast World Heritage Area. The initial Phase 1 was in partnership with BHP, now part of the merged Woodside Energy.

The 300 km long Ningaloo Reef is the largest fringing coral reef on the west coast of any continent. With shallow lagoons and deeper waters offshore, the reef is home to a variety of marine life and diverse habitats.

The sixth **Ningaloo Outlook Symposium** recently enabled marine park managers, the scientific community and interested stakeholders to discuss the partnership's 2023 research findings.

Click here to view footage shown at the 2024 Ningaloo Outlook symposium.

To stay updated, subscribe for future editions at
woodside.com/what-we-do/consultation-activities

COMMUNITY SPOTLIGHT

Support for Murujuga

Woodside is proud to be a signatory of Murujuga Aboriginal Corporation's (MAC) Statement of Intent as part of our unwavering support for World Heritage Listing over the Murujuga Cultural Landscape, and our ongoing support for the protection and management of Murujuga's outstanding heritage values. We are committed to and support the protection of Aboriginal cultural heritage and continue to work closely with Traditional Custodians in the areas we operate.

Woodside was one of 11 signatories to the MAC Statement of Intent at a ceremony held at Hearson Cove on Murujuga Country. Other parties to the Statement of Intent included MAC (as the representative body for five Traditional Custodian groups, being Ngarluma, Yaburara, Yindjibarndi, Mardudhunera and Wong-Goo-tt-oo peoples), the Government (Premier, Environment Minister and Aboriginal Affairs Minister), Commonwealth Government (Environment Minister), Rio Tinto, Pardaman, Yara Pilbara, Horizon Power and the City of Karratha.

The Statement of Intent sets out the guiding principles for MAC, government and industry parties to work together to negotiate a cooperative Strategic Head Agreement in relation to the management, protection, and conservation of the Murujuga Cultural Landscape in support of the World Heritage nomination of this landscape.

Woodside takes its responsibility to protect and manage cultural heritage seriously, including through taking reasonable and practical measures across our operations and growth projects to minimise our emissions.

TALKING POINT

Supporting Science at Scott Reef

Out on the edge of Australia's continental shelf sits the north and south reefs and sandy islet of Scott Reef.

Located about 425 km north-west of Broome, to reach Scott Reef a boat would need to travel from the closest point on the WA coast for 270 km across the Indian Ocean.

Scott Reef and other reefs in the Pilbara and Kimberley were considered "poorly understood" by the Australian Institute of Marine Science (AIMS) three decades ago. However, over the last 30 years, more than 50 expeditions by numerous marine scientists have led to extensive research and understanding of Scott Reef.

In 1993, Woodside supported AIMS' extensive survey of coral and fish communities. This led to the establishment of a long-term monitoring program in 1994, which continues today. The Scott Reef coral reef monitoring program is globally one of the few continuous programs providing insight into the health and condition of resident corals and fish.

Woodside partnered with the WA Museum in 1998, contributing to research on oceanography and the biology and ecology of the resident species. The partnership has enabled long-term research to understand the reef's health and how it changes through time. WA Museum scientists visited Scott Reef in 1984 to carry out extensive surveys to sample fauna. Then, in 2006 returned with Woodside's support and catalogued 1,897 marine life species, including 262 new discoveries.

The WA Museum partnership included the Woodside Collection Project, focused on the marine life of the Dampier Archipelago and Kimberley. Over 55,000 specimens were collected and 700 new species were identified as part of the large Australian biodiversity project.

The wide-ranging Scott Reef research projects have revealed important insights into a complex ecosystem and have delivered a wealth of knowledge to support Woodside's long-term environmental planning and management.

Woodside is consulting on the Browse State Wellhead Decommissioning Environment Plan (EP), involving decommissioning options for three historical wellheads in WA State waters, approximately 430 km north of Broome. **View the consultation information sheet.**

In preparing the EP, Woodside's intent is to minimise environmental and social impacts and is seeking stakeholder input to inform Woodside's development of the EP.

Click here to watch Journeys of Discovery - Coral Reefs.

Join the conversation at **woodside.com/what-we-do/consultation-activities**

COMMUNITY CONVERSATIONS

Upcoming engagement opportunities

DAMPIER
5 May 2024 | 9:00am – 12:00pm
Dampier Beachside Markets, Hampton Oval

EXMOUTH
19 May 2024 | 8:00am – 12:00pm
Exmouth Community Markets, Federation Park

Dates and times subject to change.

Woodside is consulting with local communities at local events so you can easily come and chat us to us about our operations, decommissioning activities, or proposed projects.

Recently our team talked with community members at the Karratha Shopping Centre and the Dampier Beachside Markets about Environment Plans for the Scarborough State Trunkline Operations and Pluto Operations. We also meet quarterly with Community Liaison Groups in Karratha and Exmouth where we communicate updates and consult with community members on a range of relevant topics.

If you're interested in what Woodside has planned on land and sea, come and chat to our friendly team and follow the **Woodside North West Facebook page** for updates. You can also read our recent **Karratha Community Update here.**

HAVE YOUR SAY

Woodside consults relevant persons while preparing our Environment Plans to notify them, obtain their input and to assist Woodside to confirm current measures or identify additional measures, if any, that may be taken to lessen or avoid potential adverse impacts of the proposed activity on the environment.

We welcome your input so please contact us if you'd like to discuss your functions, interests or activities which may be affected by our proposed activities.

Environment Plan	Activity Type	Location	Consultation Dates
Browse State Wellhead Decommissioning	Decommissioning	430 km north of Broome	25 March – 3 May 2024
North Rankin Complex Operations	Operations	135 km offshore of Dampier	22 April – 22 May 2024
WA-550-P Exploration Drilling	Exploration	190 km north-west of Dampier	-May – June 2024
Angel Carbon Capture and Storage Geophysical and Geotechnical Surveys	Survey	125 km north-west of Dampier	-May – June 2024
North West Shelf Phase 1 Plug & Abandonment	Decommissioning	~117 km north-west of Dampier	-May – June 2024
Julimar Operations	Operations	160 km north-west of Dampier	-May – June 2024

You can access our consultation information, provide feedback and subscribe for updates by visiting **www.woodside.com/what-we-do/consultation-activities** or click **here.**

PROGRESS SNAPSHOT

Environment Plan	Activity Type	Date Accepted	Status
Griffin Field Decommissioning (End State) (Griffin Field Deviation / Griffin Leave In-situ)	Decommissioning	1 March 2024	In progress
Stybarrow Decommissioning and Field Management	Decommissioning	8 January 2024	In progress
Stybarrow Plug and Abandonment	Decommissioning	21 December 2023	In progress
WA-34-L Pyxis Drilling and Subsea Installation (Revision)	Project	21 December 2023	Drilling to commence around May 2024
Scarborough Seabed Intervention and Trunkline Installation	Project	13 December 2023	In progress
Scarborough WA-61-L and WA-62-L Subsea Infrastructure Installation	Project	8 December 2023	In progress
Scarborough Drilling and Completions	Project	1 December 2023	In progress
Griffin Gas Export Pipeline Decommissioning	Decommissioning	30 November 2023	Completed
TPA03 Well Intervention	Project	28 November 2023	In scheduling
Griffin Decommissioning and Field Management	Decommissioning	21 November 2023	In progress

You can view Commonwealth Environment Plans for approved activities and operations by visiting NOPSEMA's website info.nopsema.gov.au/home/approved_projects_and_activities

LET'S TALK

EMBAs AND OIL SPILL MODELLING

Let's talk about EMBAs – what they are, and just as importantly, what they're not.

When Woodside talks to community members about our activities, we're often asked about the areas marked on our consultation material referred to as the "Environment that May Be Affected" (EMBA).

EMBAs are an important part of preparing the environmental and emergency response strategies that underpin the planning for our offshore activities.

They are produced as part of our extensive oil spill modelling and response planning. They represent the largest spatial area where a petroleum activity could potentially have a direct or indirect environmental impact.

Understanding the EMBA

The EMBA represents the largest, merged area of many potential paths that a highly unlikely oil spill could travel based on predictions around weather, currents, and other conditions at the time. An EMBA is not a predicted impact of a single oil spill, which would be much smaller, and the extent and path of the impact would only be known at the time it occurred.

This means the area the EMBA covers includes locations where planned activities and unplanned events could potentially occur.

Oil Spill Modelling

While offshore oil spills are extremely rare, it is important oil and gas companies are still ready to prepare for and respond to them. There are several different approaches to oil spill modelling, and Woodside uses these in combination for information about where an oil spill could move, how quickly, and the possible effect of using methods to manage a potential oil spill.

To calculate this, our oil spill modelling involves running many (sometimes hundreds) computer simulations of the same scenario to predict the behaviour of oil under different conditions.

Each simulation is subject to a range of variables, including weather and sea conditions, tides, and times of year. In the model, the oil responds to these conditions and behaves differently in each individual simulation.

Every individual simulation is overlayed on top of the next, allowing statistical analysis of the possible area the oil spill could travel in the highly unlikely event that a spill occurs. The smooth boundary drawn around all these computer simulations of the spill creates the EMBA.

The models process the information based on an assumption there is no emergency response, which would of course not be the case in a real emergency.

Oil spill modelling helps us develop our oil spill emergency management plans and assists in preparedness and response planning. Woodside conducts regular emergency response training exercises involving multiple facets of the business so our teams are ready to respond should they ever need to.

The many simulations used to underpin our planning are estimates and predictions only. It is not possible to exactly predict the outcome until the exact weather and other conditions are known if an oil spill event occurs.

Emergency Management Plans

The emergency management plan informed by the oil spill modelling is submitted to both State and Commonwealth regulators for approval along with all other planning documents for our activities.

Woodside, in more than 60 years, has not experienced any significant uncontrolled release of oil or gas to the environment as a result of loss of well control.

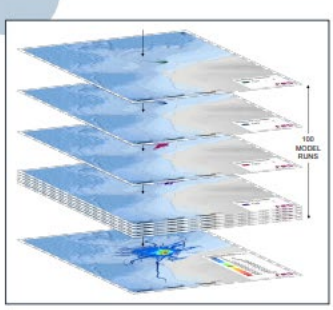


Figure 1: The first stage in EMBA creation is running computer simulations (model runs). Figure 1 shows the model runs for the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan.

Nevertheless, our extensive planning continues, drawing on international good practice, so the impacts and risks associated with our activities are detailed, evaluated and managed to a level that is as low as reasonably practicable.

We are committed to continuous improvement and share our expertise with our peers and take the lessons learned from other operators to incorporate into our management processes.

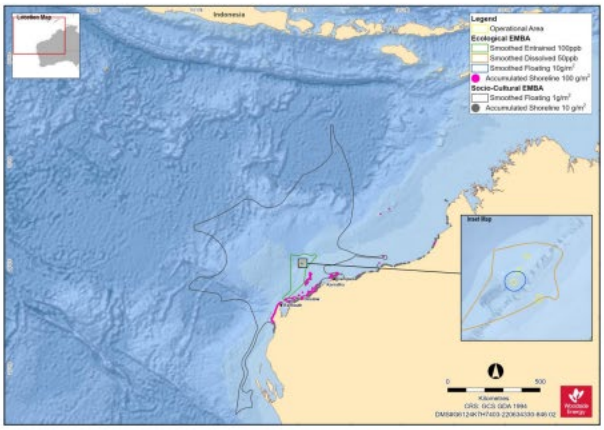


Figure 2: The EMBA is a culmination of all the computer simulations with a smooth boundary. Figure 2 shows the final EMBA for the WA-34-L Pyxis Drilling and Subsea Installation Environment Plan.

Join the conversation at **woodside.com/what-we-do/consultation-activities**

November 2024

Woodside Energy

Let's Talk

Our Plans, Your Say

Edition 4 | November 2024

The rundown

North West Shelf Visitors Centre welcomes Wanparta

The Ngarla people at the North West Shelf Visitors Centre.

We acknowledge the unique connection that First Nations communities have to land, waters and the environment and seek to consult them in relation to our operations and proposed projects.

As part of our ongoing consultation with First Nations groups, Woodside Energy recently hosted 13 Traditional Owners from Ngarla country at the North West Shelf Visitors Centre, so they could see our operations first hand.

The Ngarla people are the Traditional Owners of an area of land east of Port Hedland that covers the De Grey and Pardoo pastoral stations in Western Australia's North West.

Woodside Manager First Nations Engagements, Michael Roe said that Wanparta Aboriginal Corporation as the Prescribed Body Corporate for the Ngarla people, had been identified as a relevant person to consult with on previously submitted and present Environment Plans.

"The Ngarla people were interested in learning more about the world of gas, and as part of the consultation process were invited to Karratha for a visit to the North West Shelf Visitors Centre overlooking the Karratha Gas Plant."

"This provided an occasion to build trust and understanding whilst providing the opportunity to provide feedback on our activities. In this case we were consulting on the five-yearly review of the Pluto Facility Operations Environment Plan." said Michael.

An accepted Environment Plan is required in order for Woodside to carry out activities. Meaningful conversations with First Nations people are documented and make up part of an Environment Plan submitted to regulatory bodies for assessment ahead of continued operation.

Wanparta Aboriginal Corporation Chairperson, Mary-Jo Coppin said, "the trip was really informative with good consultation, well organised and we felt very welcome at the facility."

A key element of Woodside's consultation efforts is our willingness to be flexible and adaptable to suit the audience in our overall efforts to avoid or minimise potential impacts from our operations.

Munro's Mack10k Fishing Competition

Munro's Mack10k 2024 Fishing Competition, held in Onslow from 24-25 August 2024, saw hundreds of anglers and fishing enthusiasts from across Australia enter into the running for a chance to reel in $10,000.

The event doubles up as a research initiative, spearheaded by Recfishwest's Fishing for Science program and supported by Woodside Energy.

Working with the Department of Primary Industries and Regional Development, the Recfishwest science team collected biological samples from mackerel caught by competitors, providing insight into the health of the local fish population.

Read more about the annual competition, hosted by the Ashburton Angler Fishing Club by visiting: recfishwest.org.au

To stay updated, subscribe for future editions at
woodside.com/what-we-do/consultation-activities

Community spotlight

Wangarri Crane and Equipment Hire

Murujuga Commercial Limited's (MCL) first Pilbara business, Wangarri Crane and Equipment Hire (Wangarri), has been awarded the contract for supply and maintenance of cranes and forklifts for the Pluto Train 2 Project, the onshore component of the Scarborough Energy Project.

Established by MCL as a joint venture with Boddington's Hire, Wangarri provides a range of lifting equipment that includes cranes, forklift trucks, reach stackers and telehandlers for hire to the resource sector and other industrial clients across the Pilbara.

One of five commercial ventures managed by MCL, Wangarri forms a portfolio of businesses and commercial ventures that aim to provide a strong and economic future for its Murujuga members.

Wangarri means "Coming to Life" in Yindjibarndi, which represents MCL's journey as it moves from a start-up phase toward building business streams that align to the strategic goals and objectives of the Murujuga Aboriginal Corporation.

Bechtel, the appointed contractor for the Pluto Train 2 project, delivers engineering, procurement, construction and commissioning, has awarded contracts to local Indigenous businesses, such as Wangarri to deliver a variety of work scopes.

"We are very happy to be working with Wangarri on Pluto Train 2. We deeply value this local contract and appreciate their professionalism and dedication to providing safe and high-quality cranes and forklifts." said Bechtel Pluto Train 2 site manager Terry Klowss.

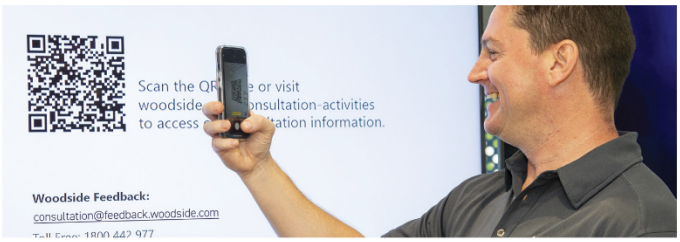
Jig Albert, MCL Managing Director said the contract with Bechtel on Pluto Train 2 had been an enormous stepping stone for their business.

"We have been contracted to provide a range of the smaller cranes for the project. Mostly this consists of Franna pick and carry cranes, however we are also providing a 160 tonne all-terrain crane and a small three tonne Maeda spider crane, as well as the ongoing maintenance of these machines," said Jig Albert.

"It has given our business the confidence to invest in our own equipment which will drive equity for the business and in turn provide a direct return to Murujuga Aboriginal Corporation members."

Learn more about Wangarri Crane and Equipment Hire and their work on the Scarborough Energy Project

The importance of consultation



"Like safety, consultation continues to be a core focus for NOPSEMA," Sue McCarrey, CEO, NOPSEMA *(Source: The Regulator, 2024, Issue 2)*

Consultation is a key component of Woodside's environmental planning and can involve a two-way process with relevant persons who wish to provide feedback on operations or proposed offshore activities.

Consultation enables Woodside to confirm current measures or identify additional measures, if any, that could be taken to lessen or avoid potential adverse effects of the proposed activity on the environment. It is a key requirement of Australia's offshore environmental management framework and Environment Regulations.

An appropriate consultation approach which meets regulatory requirements enables Regulators such as the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for Commonwealth activities, or the Department of Energy, Mines, Industry Regulation and Safety for state activities, to assess and accept Environment Plans (EP).

Woodside is committed to open and transparent consultation and does this by providing clear information on proposed activities, assessing and responding to objections or claims about the activity, and providing a reasonable period of time and opportunity for a relevant person to provide feedback.

If required due to the nature and scale of a proposed activity, Woodside undertakes additional consultation activities over a longer period to ensure a reasonable period of time period and sufficient information has been provided. This allows for an informed assessment of the possible consequences of the activity on stakeholders' (referred to as a 'relevant person' under Commonwealth regulations) functions, interests or activities.

Subscribe to stay up-to-date

On Woodside's website we enable members of the public to subscribe to receive information about EPs as it becomes available.

Subscribing is a great way to stay informed about updates and important information related to Woodside's activities. It also provides the public with timely notifications about new projects, environmental initiatives, community engagements, and consultation information sheets for proposed activities.

Woodside has updated its consultation email address to consultation@feedback.woodside.com

To subscribe to Woodside's consultation activities **click here** and enter your details on the page.

Join the conversation at **woodside.com/what-we-do/consultation-activities**

Community conversations

Woodside consults local communities at local events. If you see our friendly team out-and-about, please come and chat to us about our operations and projects.

Recently our team engaged with community members at pop-up Environment Plan information sessions in Karratha and Exmouth and participated in the Dampier Beachside Markets. Our teams also recently met with stakeholders in Broome, Onslow and Roebourne.

We also meet quarterly with Community Liaison Groups in Karratha and Exmouth where we communicate updates and consult with community members on a range of relevant activities.

If you're interested in what Woodside has planned on land and sea, come and chat to our friendly team and follow the Woodside North West Facebook page for updates including our Karratha Community Update newsletter.

Stay up to date on our continued contribution to the community we call home.

SEARCH ON FACEBOOK OR CLICK HERE

Woodside North West

Have your say

Woodside consults relevant persons while preparing our Environment Plans to notify them, obtain their input and to assist Woodside to confirm current measures or identify additional measures, if any, that may be taken to lessen or avoid potential adverse impacts of the proposed activity on the environment.

We welcome your input so please contact us if you'd like to discuss your functions, interests or activities which may be affected by our proposed activities.

Environment Plan	Activity Type	Location	Consultation Dates
NWS Phase 1 Well P&A and TPA03 Well Intervention	Decommissioning and Project	125 - 138 km north / north-west of Dampier	27 September to 30 October 2024
Angel Subsea Infrastructure Removal	Decommissioning	125km north of Dampier	30 September to 1 November 2024

You can access our consultation information, provide feedback and subscribe for updates by **clicking here**.

Progress snapshot

Environment Plan	Activity Type	Date Accepted	Status
Minerva Decommissioning and Field Management	Decommissioning	14 October 2024	In progress
NWS and Julimar Exploration Wellhead Decommissioning	Decommissioning	3 July 2024	In progress
Angel Operations (Lambert West Drilling)	Operations / Project	25 June 2024	In scheduling
Julimar Development Phase 3 Drilling and Subsea Installation	Project	10 June 2024	In scheduling
Stybarrow Decommissioning and Field Management / End State	Decommissioning	23 May 2024	In progress
Goodwyn Alpha Geophysical and Geotechnical Surveys	Project	30 May 2024	In progress
Griffin Field Decommissioning (End State) (Griffin Field Deviation / Griffin Leave In-situ)	Decommissioning	1 March 2024	In progress
Stybarrow Plug and Abandonment	Decommissioning	21 December 2023	In progress
Scarborough Seabed Intervention and Trunkline Installation	Project	13 December 2023	In progress
Scarborough WA-61-L and WA-62-L Subsea Infrastructure Installation	Project	8 December 2023	In progress
Scarborough Drilling and Completions	Project	1 December 2023	In progress
Griffin Decommissioning and Field Management	Decommissioning	21 November 2023	In progress

You can view Commonwealth Environment Plans for approved activities and operations by visiting:
info.nopsema.gov.au/home/approved_projects_and_activities

Milestone celebrations at FeNaCING Festival

The City of Karratha recently hosted the FeNaCING Festival, bringing together community and celebrating the region's key industries – iron (Fe), sodium chloride, commonly known as salt (NaCl), and natural gas (NG).

Woodside Energy, along with its joint venture partners, proudly supported the event, with a pavilion that featured Woodside's 70th anniversary as a company and 40th year of safe and reliable operations in the North West.

Woodside CEO Meg O'Neill made a special appearance at the festival, meeting local community members and helping with a range of giveaways on offer.

Meg praised the event organisers who successfully celebrated the community spirit that makes Karratha a great place to live and work.

"We know that such a significant milestone could only be achieved with the support of our people and the Karratha community," she said. "I was really thrilled to have the opportunity to join our team in the Woodside marquee as they engaged with the community about issues that matter to them and answered questions about our operations and growth projects."

Many attendees who visited the Woodside marquee expressed curiosity about Woodside's Environmental Plans and other topics including Carbon Capture and Storage, the Scarborough Energy Project and the development of Browse.

Woodside's active participation in events like the FeNaCING Festival supports our consultation approach to engage the community on our current business activities, including opportunity to provide feedback on our Environment Plans.

Woodside Energy CELEBRATE 70

Join the conversation at **woodside.com/what-we-do/consultation-activities**

March 2025

Woodside Energy

Let's Talk

Our Plans, Your Say

Edition 5 | March 2025

Heritage auditors walking along eastern outside boundary of Pluto LNG Plant on Murujuga Country

The rundown

Cultural Connections: Woodside's Commitment to Heritage Management

Woodside has operated on the Burrup Peninsula (Murujuga) in the Pilbara region of Western Australia for more than 40 years. We've matured our approach to heritage management considerably over this time, and are proud of the relationships we have built with Traditional Owners and Custodians.

Every year, Woodside works with Traditional Custodians undertaking audits of heritage sites around the perimeter of the Karratha Gas Plant and Pluto LNG Parks. These audits arose from our long-standing consultation with Traditional Custodians regarding Cultural Heritage Management at our onshore facilities.

Both assets operate near National Heritage and Tentative World Heritage listed sites, including Murujuga's petroglyphs (rock art).

The primary purpose of the audits is to monitor the condition of culturally and spiritually significant sites and invite recommendations if the potential for impacts are detected.

"The audits are also an opportunity for Traditional Custodians to connect to areas of a cultural landscape that stretch back tens of thousands of years, and for the community's reassurance that cultural heritage is being managed appropriately on Woodside's leases," said Daniel Thomas, Manager Global Heritage and Human Rights.

The most recent heritage audits were carried out last year over a two week period.

"The feedback from Traditional Custodians was that the sites inspected remain in generally good condition," said Daniel.

"Traditional Custodians did identify some areas in need of additional vegetation management, and that vegetation management was supervised by elders and Indigenous community members in November last year. Another issue identified was rubbish washing up on shore which is also now managed."

Learn more about Woodside's cultural heritage management **here**

A soaring community experience

Western Australia's Pilbara shorebirds undertake a remarkable migration journey of over 10,000 kilometres to breed in the northern hemisphere, sustained by the region's marine cuisine.

Around 70 participants recently attended an annual community event at Hearson's Cove featuring shorebird watching and information sessions, and a tour of the incredible petroglyphs at Nganjarli (Deep George).

The event aims to raise awareness about the significance of the Pilbara coast for shorebirds and the rich cultural heritage of the area. Participants gain insights into the birds' behaviour and contribute to conservation efforts within the community.

Woodside Energy thanks the collective support from co-hosts, Pilbara Ports, Rio Tinto, Yara Pilbara and the DBCA Parks and Wildlife Service who partnered with the Murujuga Aboriginal Corporation Rangers and Birdlife Australia.

Image credit: Murujuga Aboriginal Corporation

To stay updated, subscribe for future editions at
woodside.com/what-we-do/consultation-activities

Community spotlight

Impact felt locally in Karratha

Impact Digi is a Pilbara-based Indigenous owned and operated marketing agency with close to a decade of experience working with Woodside Energy.

A full-service marketing agency, Impact Digi has built relationships with government, industry, Indigenous organisations and businesses of all sizes helping them to build brands and reach stakeholders.

"The past couple of years have been extra rewarding as our reputation has grown within Woodside and we're getting to work with team members from other areas of their business," said Impact Digi Managing Director, Tamara Bin Amat.

Starting off by offering photography services when they first began, Impact Digi has transformed over time with a growing team, refined services and an expanded reach.

"Looking back, one of my favourite moments was when local Asset Manager for the Karratha Gas Plant, Breyden Lonnie presented our first ever award for Best Aboriginal Business at the 2015 Karratha and Districts Chamber of Commerce and Industry (KDCCI) Business Excellence Awards," said Tamara.

With Impact Digi recently winning the Business Excellence Award for Best Small Business at the 2024 Awards, among many other accolades, the recognition continues.

Tamara and her team understand the importance of supporting local and contributing to their community.

"Working with Woodside has not only boosted our business but also our reputation, opening doors to new opportunities across the state," said Tamara.

Continue reading about Impact Digi's experience working with Woodside **here**

Managing Director, Tamara Bin Amat left with her team.

Community partners playing a friendly game of lawn bowls during the sundowner event

Woodsiders ready to chat at Ross St Mall

Talking Point

Engaging Exmouth

Did you know that Woodside has been engaging with the Exmouth community for over 15 years? Woodside operates two Floating Production Storage and Offtake (FPSO) facilities around 50 kilometres off the coast of Exmouth, the Ngujima-Yin FPSO and the Pyrenees FPSO.

In November 2024, Woodside wrapped up the year with a series of engagements with stakeholders, community partners and the Exmouth community.

This included a Community Liaison Group meeting which is a forum co-hosted by Woodside and Santos. The joint approach stemmed from community feedback received around a decade ago, and the collaborative format has been retained to this day. The group meets three times a year and both Woodside and Santos provide updates on activities and community initiatives, inviting members to raise queries and provide feedback.

Woodside recently presented on our climate strategy and invited research partner, CSIRO to share updates on Ningaloo Outlook, a program furthering knowledge on the deep and shallow reefs of Ningaloo Coast World Heritage Area.

Woodside and Santos thanked community partners during a sundowner event at the Exmouth Bowling Club. This was a great opportunity to celebrate shared commitment to positive community outcomes over a friendly game of lawn bowls.

The following day, Woodside held a pop-up Environment Plan consultation stand at Ross Street Mall where locals (including the iconic Exmouth emus) and visitors dropped by to find out more about our activities and proposed plans.

Woodside's active engagement in community illustrates our commitment to open and transparent consultation.

Read about the Woodside supported programs focusing on the unique ecosystem along the Ningaloo Reef and Exmouth Gulf **here**

Join the conversation at **woodside.com/what-we-do/consultation-activities**

Community conversations

Open and transparent consultation is important to Woodside. Consulting firm GHD was recently in Karratha to speak with community stakeholders as part of Woodside's socio-economic impact assessments for communities that host Woodside's workforce and assets.

These insights assist Woodside to identify, assess, and manage social impacts and benefits that may arise from different operational and project scenarios in Karratha and aims to uncover new ways for Woodside to partner with the community in the future.

This informs Woodside's future strategies for impact management, community engagement, local content and social investment.

Further consultation will be taking place in April 2025.

If you're interested in what Woodside has planned on land and sea, come and chat to our friendly team and follow the Woodside North West Facebook page for updates, including our Karratha Community Update.

Stay up to date on our continued contribution to the community we call home.

Search on Facebook or click **here**

Woodside North West

GHD conducting on the ground consultation with key stakeholder, Yurra

Consultation opportunities

Environment Plan	Activity Type	Location	Consultation Dates
Goodwyn-Alpha Geophysical and Geotechnical Revision	Survey	~140 km north-west of Dampier	April 2025
Okha Floating Production Storage and Offloading (FPSO) Facility Operations	Operations	~119 km north-west of Dampier	April 2025
NWS Trunkline State Operations	Operations	~11 km northeast of Dampier	June 2025
Pluto Trunkline State Operations	Operations	~8 km northeast of Dampier	June 2025
NWS Phase 1 P&A and TPA03 Well Intervention	Decommissioning and Project	~125 km north of Dampier and 138 km north-west of Dampier	Previous consultation in September – October 2024
Angel Subsea Infrastructure Removal	Decommissioning	~125km north of Dampier	Previous consultation in September – October 2024

Progress snapshot

Environment Plan	Activity Type	Date Accepted	Status
Minerva Plug and Abandonment	Decommissioning	9 January 2025	In scheduling
Macedon Operations	Operations	24 December 2024	In progress
Ngujima-Yin Floating Production Storage and Offtake (FPSO) Operations	Operations	19 December 2024	In progress
Minverva Decommissioning and Field Management (State)	Decommissioning	27 November 2024	In progress
Minerva Decommissioning and Field Management (Commonwealth)	Decommissioning	14 October 2024	In progress
NWS and Julimar Exploration Wellhead Decommissioning	Decommissioning	3 July 2024	In progress
Angel Operations (Lambert West Drilling)	Operations / Project	25 June 2024	In scheduling
Julimar Development Phase 3 Drilling and Subsea Installation	Project	10 June 2024	In scheduling
Goodwyn Alpha Geophysical and Geotechnical Surveys Environment Plan	Project	30 May 2024	In progress
Stybarrow Decommissioning and Field Management / End State	Decommissioning	23 May 2024	In progress
Macedon Operations (State)	Operations	24 April 2024	In progress
Griffin Field Decommissioning (End State)	Decommissioning	1 March 2024	In progress
Stybarrow Decommissioning and Field Management	Decommissioning	8 January 2024	In progress

You can view Commonwealth Environment Plans for approved activities and operations by visiting:
info.nopsema.gov.au/home/approved_projects_and_activities

Environment planning continues to move forward

To undertake offshore petroleum or greenhouse gas activities, a titleholder is required to have an accepted Environment Plan, also referred to as an EP, in place.

In accordance with the objectives of the government regulations, the main purpose of an EP is to demonstrate two things. The first is that potential environmental impacts and risks from activities are identified and appropriate management and mitigation controls are implemented to a level that is 'as low as reasonably practicable' (ALARP) and acceptable.

The second ensures activities are carried out in a manner consistent with the principles of ecologically sustainable development set out in the *Environment Protection and Biodiversity Conservation Act 1999*.

It takes extensive work and time to develop an EP. A staged approach includes early planning of the proposed activity, defining the existing environment, consideration of potential impacts and risks to the environment, and identifying appropriate mitigation and control measures to manage risks to ALARP and an acceptable level.

Woodside Environment Plan Delivery Team Lead, Tim Mander, came into his role in 2023 following a number of legal challenges on the consultation processes under the Offshore Environment Regulations.

"Coming into the role was an interesting and challenging time. We navigated our way through this and in 2024, 12 Environment Plans were accepted with activities spanning ongoing operations, decommissioning, drilling, surveys, and installation of subsea infrastructure on the seafloor," Tim said.

"This year again, we have a number of Environment Plans kicking off across a range of different activities. We'll continue to focus on how we improve what we do to ensure our processes and management measures are appropriate to the nature and scale of these activities."

Environment Plans are required for both State and Commonwealth waters, with the National Offshore Petroleum Safety and Environmental Management (NOPSEMA) assessing and accepting Commonwealth EPs and the Department of Energy, Mines, Industry Regulation and Safety assessing and approving State EPs.

Woodside's Commonwealth EPs, currently under assessment and EPs that have been accepted can be viewed on NOPSEMA's website.

Several of the Scarborough Energy Project EPs were accepted in late 2023, including trunkline installation, with the work completed in October 2024

Upcoming engagement opportunities

Roebourne

Monthly Community Luncheon
- 26 March 2025, 11.00 am – 2.00 pm
Woodside Office, 39 Roe Street, Roebourne, WA, 6718

Dampier

Dampier Beachside Markets
- 6 April 2025, 9.00 am – 12 noon
- 4 May 2025, 9.00 am – 12 noon
Hampton Oval, Dampier, WA, 6713

Have your say

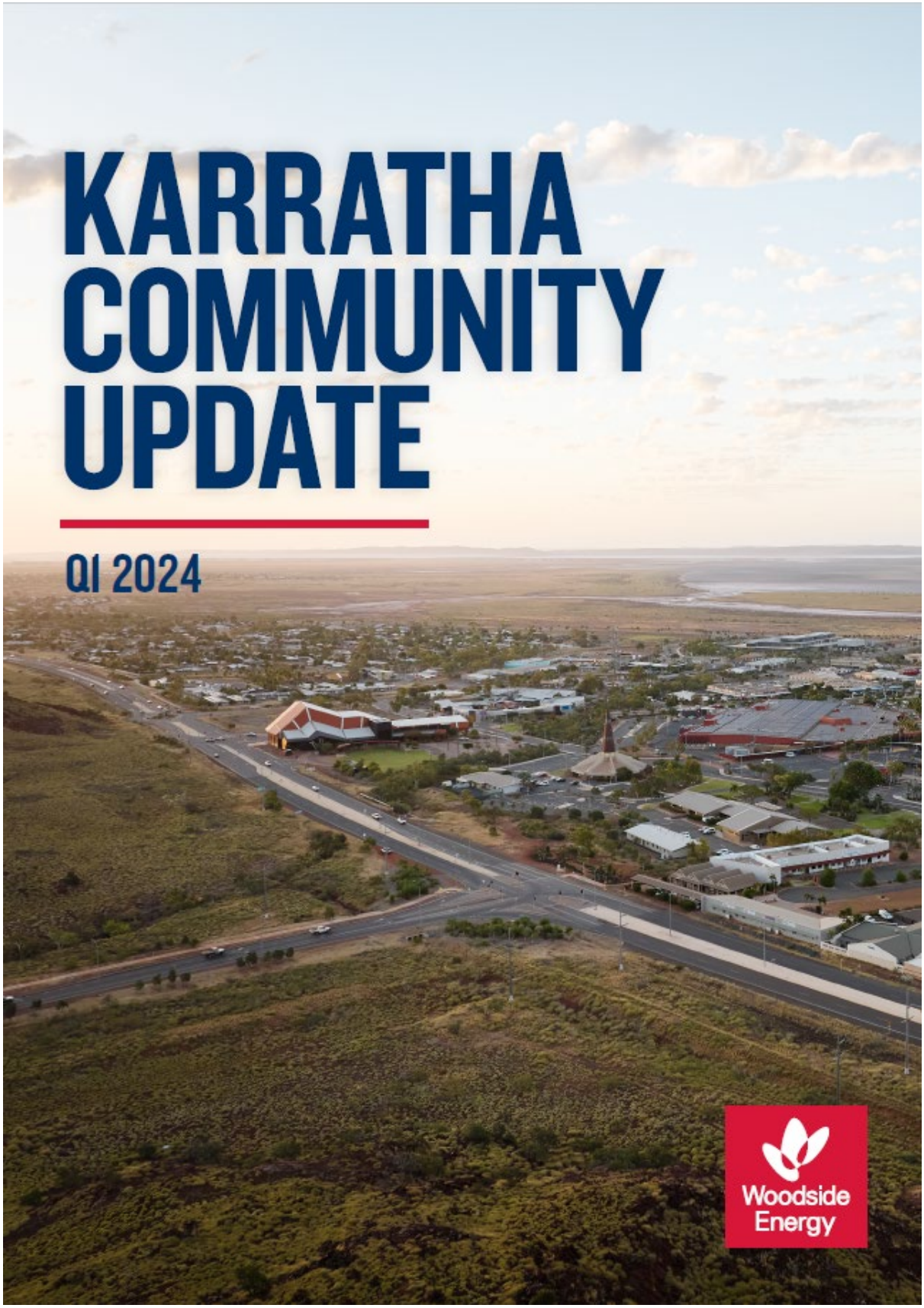
Woodside consults relevant persons while preparing our Environment Plans to notify them, obtain their input and to assist Woodside to confirm current measures or identify additional measures, if any, that may be taken to lessen or avoid potential adverse impacts of the proposed activity on the environment.

We welcome your input so please contact us if you'd like to discuss your functions, interests or activities which may be affected by our proposed activities.

You can access our consultation information, provide feedback and subscribe for updates by cicking **here**

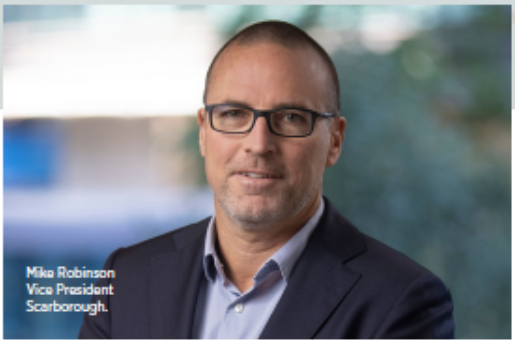
Join the conversation at **woodside.com/what-we-do/consultation-activities**

5.8 Karratha Community Update Newsletter



Woodside Energy recognises Aboriginal and Torres Strait Islander peoples as Australia's first peoples.

We acknowledge the unique connection of the Traditional Custodians to land, waters and the environment where we operate in the City of Karratha. We extend this recognition and respect to First Nations peoples and communities around the world.



Mike Robinson
Vice President
Scarborough.

Graduating apprentices and trainees at Red Earth Arts Precinct.

The Scarborough Energy Project will see gas from the Scarborough fields piped approximately 430 km to be processed onshore at the Pluto LNG facility, where Pluto Train 2 is currently under construction. Scarborough gas will also be processed through the existing Pluto Train 1 plant following modifications, which are expected to commence in late 2024.

The Project is now more than 55% complete[1], and in March 2024, Pluto Train 2 achieved a key milestone, the arrival of the first modules in Karratha. This year, a total of 51 modules will be delivered to Pluto for installation.

This year, Woodside also celebrates its 70th anniversary and the North West Shelf Project marks 40 years of domestic gas production and 35 years of LNG exports from Karratha. Over this period, we have provided reliable energy to Australia and the world from the community we continue to call home. Karratha is where the Woodside story began and the Scarborough Energy Project will build on the legacy of supporting the world's energy needs from this region.

We are proud of the Scarborough Energy Project and what it will deliver for the Karratha community and the nation.

Mike Robinson
Vice President Scarborough

[1] The completion percentage excludes the Pluto Train 1 modifications project.

Celebrating success: Woodside Training Academy Graduation and Awards

The Karratha Gas Plant-based Woodside Training Academy has seen more than 750 apprentices and trainees commence their learning journey with Woodside since it opened its doors in 2010.

The Academy plays an integral role in hosting those who are building their employable skills and experience, supporting the development of local workforce capabilities.

This March, Woodside welcomed 21 apprentices and trainees into roles across its Burrup assets. The Woodside Training Academy Graduation and Awards held at Red Earth Arts Precinct saw the graduating cohort celebrated for their achievements in completing their training. The event also recognised and awarded the outstanding performance of particular individuals throughout their training process. The award recipients were selected for their dedication, commitment and consistent demonstration of Woodside's values.

An additional 33 apprentices, trainees and pre-pathway trainees, including 17 school leavers from the Karratha area, have been recruited by Woodside's training partner, Programmed Training Services and are being hosted by Woodside in 2024. We're proud to have close to 100 apprentices and trainees learning their craft at the Woodside Training Academy and offshore assets this year.

Scan the QR code or click here to get to know a few of Woodside's new team members.

Woodside extends investment in education initiative

Woodside was recently joined in Karratha by the WA Minister for Education Dr. Tony Buti MLA and Kevin Michel MLA to share news of our ongoing collaboration with schools in the local community.

Together with our joint venture partners, we were pleased to announce our extended support for education in the City of Karratha after signing five-year community partnership agreements for the ongoing delivery of the Karratha and Roebourne Education Initiative (KREI).

The extension builds on more than 15 years of investment by the Woodside-operated North West Shelf Project to bridge the gap between the opportunities and resources available to students residing in the Pilbara and their metropolitan peers, and support students on their pathway to employment.

The renewed agreements with the Department of Education and St Luke's College increases funding provided for programming at local high schools and extends that support to primary schools in the community.

The funding will enable the delivery of quality educational opportunities, including ATAR revision seminars, additional STEM curriculum, student leadership programs, employment and career pathway planning, and teacher development.

Western Australia's Minister for Education, Hon Dr Tony Buti MLA, said he is thrilled support for the initiative will continue for years to come, benefitting even more students in the Pilbara.

"It has proved to be a very successful partnership over the years helping many students achieve their best and guiding them to a range of careers," Minister Buti said.

Woodside CEO, Meg O'Neill, said the renewed agreements reflected Woodside's commitment to improving capability and capacity in its host communities.

"The initiative has delivered strong educational outcomes and its success is a testament to what can be achieved when we work collaboratively with a student-centred approach," she said.

Baynton West Primary School Principal Lisa Ledger, WA Minister for Education Hon Dr Tony Buti MLA, Woodside Energy Corporate Affairs Manager North West Amanda Fuery, Pilbara Education Regional Office Program Coordinator Amanda Lawrence, Member for Pilbara Kevin Michel MLA and students from Baynton West Primary School.

Apprentice takes home Citizen of the Year

Meet Rhian. She's a fourth-year, Programmed Electrical Instrumentation Apprentice at Karratha Gas Plant and was recently named the City of Karratha's Citizen of the Year.

Rhian joined the Karratha Volunteer Fire and Rescue Service to meet people and make friends when she first moved to Karratha. She now holds a senior position and is on-call 24/7 with requests for jobs, including road crash rescues, house fires, HAZMAT incidents and assisting the local police.

But Rhian's contribution to the community doesn't stop at fire and rescue. Five years ago, she joined St John Ambulance as an Emergency Medical Technician volunteer.

She's attended more than 800 jobs in and around Karratha, and she also helped at the 2019-2020 Black Summer fire in QLD. Rhian also volunteers at community events like Speedway, Karratha's FeNaCING festival, Santa lolly runs, youth cadets and school visits.

"I just love giving back to the community and helping people in times of need. It's what I enjoy doing in my spare time. Some people play sport. I volunteer," said Rhian.

Electrical Instrumentation Apprentice and City of Karratha Citizen of the Year, Rhian

Indigenous Collegiate leads cargo loading

As the Woodside-operated North West Shelf Project prepares to mark 35 years of delivering LNG cargoes to our international customers, another achievement was recently recognised at Karratha Gas Plant.

In January, an LNG cargo was loaded at Karratha Gas Plant's berths by a team made up entirely of Indigenous employees.

The team consisted of nine members from Storage and Loading, including Operations Support Trainees through to Maintenance Technicians and Supervisors. The vessel was also piloted by Woodside and Australia's first Indigenous master mariner.

Woodside's Indigenous Liaisons Coach, Josh Hill, said the activity demonstrated the progress Woodside has made in creating employment opportunities for First Nation's people.

"It was inspiring to see and reflects Woodside's work to increase Indigenous recruitment and provide career support for members of the Indigenous Collegiate," he said.

Pluto Train 2 modules arriving in Karratha.

Making significant progress on the Scarborough Energy Project

The Scarborough Energy Project's Pluto Train 2 achieved a major milestone with the first three modules now safely installed on site in Karratha.

The modules, which arrived in February 2024, weigh a combined total of more than 4,000 metric tonnes, equivalent to the weight of 30 houses or 24 Boeing 787 Dreamliner aircraft. The modules were transported from Pilbara Ports to the construction site at the existing Pluto LNG facility using 21 specialised hydraulic transporters with 126 axles and 504 wheels.

Our CEO, Meg O'Neill, said the delivery of the first Pluto Train 2 module was a key milestone towards the delivery of the Scarborough Energy Project, which will help meet the growing demand for the low-cost, lower-carbon, reliable energy the world needs today and into the future.

"The safe and timely arrival of the module is a testament to the hard work and dedication of the Woodside team and our lead contractor Bechtel," she said.

The Scarborough Energy Project will contribute significantly to the Australian economy and create thousands of job opportunities during its construction phase.

The Project is already benefiting local Karratha businesses, including almost 30 Indigenous businesses that have been engaged. It is also supporting Woodside's investment in social contribution partnerships that provide positive impacts for those living in the Karratha community.

Scan the QR code or click here to see the arrival of the modules in Karratha .

Local businesses set to benefit from the Scarborough Energy Project

The Scarborough Energy Project, including Pluto Train 2 is providing opportunities for local businesses in Karratha. To date, with collaboration from Woodside's construction partner Bechtel, the Project has injected more than $90 million locally and contracted with close to 70 Karratha businesses.

Local, family-owned business, ATOM is one of these businesses. ATOM was recently awarded a contract to supply industrial consumables, safety supplies and personal protective equipment products for the Pluto Train 2 construction.

ATOM believes locals serve locals best, which is why their 22 employees supporting the project are all local to Karratha. Nearly half of the team are female and there is one Indigenous employee.

The contract has supported ATOM to expand its workforce increasing local employment opportunities.

Long-term, it's estimated Pluto Train 2 will sustain around 600 roles, once the project is operational, across Western Australia, including 70 residential positions in Karratha.

Like Woodside, ATOM is a nationwide company, with roots in Western Australia. ATOM opened its Karratha branch in 1980, where during the same decade, we commissioned the North West Shelf Project.

ATOM also shares Woodside's commitment to invest where we operate, building meaningful relationships and supporting our local community.

Phil Donders, National Team Leader of ATOM said, "At ATOM, we believe in investing in the success and sustainability of the communities we operate within. This is why ATOM welcomed the opportunity to support the Pluto Train 2 Project through the supply of industrial consumables and PPE."

Darren Wilson, ATOM Karratha Branch Manager.

Would you like to know what Woodside has planned on land and sea?

Click here or scan the QR code to subscribe to our newsletter Let's Talk – Our Plans, Your Say and to receive updates on our consultation activities.

Q2 – 2024

Woodside Energy recognises Aboriginal and Torres Strait Islander peoples as Australia's first peoples.

We acknowledge the unique connection of the Traditional Custodians to land, waters and the environment where we operate in the City of Karratha. We extend this recognition and respect to First Nations peoples and communities around the world.

Volunteering WA Regional Community Engagement Coordinator Kelly Nunn (left) with Woodside volunteers at Gumala Early Learning Centre.

This year, Woodside celebrates its 70th anniversary and four decades of operations in Karratha.

Over this time, we have provided the reliable energy our state needs to power homes and industry.

2024 also marks 35 years since the North West Shelf Project loaded its first liquefied natural gas (LNG) cargo. After delivering more than 6,500 cargoes from the Karratha Gas Plant and Pluto LNG, we continue to supply the gas our international customers require to continue their decarbonisation journeys.

Since 1984, Woodside and its joint venture partners have made lasting contributions to the Karratha community through valued social contribution partnerships, employment and training pathways and opportunities for local businesses. These important and positive impacts were front of mind 40 years ago, and they will be as we embark on a period of change across our North West operations.

As the North West Shelf reserves gradually decline, we are assessing our future infrastructure requirements. We have previously said that we will be retiring one LNG processing train at the Karratha Gas Plant, which could happen as early as this year. We also continue to pursue opportunities to process other resource owners' gas and are focused on remaining a world-class tolling facility, albeit one that may become smaller over time.

At the same time, we are progressing our Scarborough Energy Project and building a second train at our Pluto LNG facility. We are pursuing local new energy opportunities, including the proposed Woodside Solar facility and we are investigating a potential carbon capture and storage project to help decarbonise industry in the Pilbara.

While the North West Shelf will operate differently over the next 40 years, our commitment to the Karratha community remains strong.

Just as the North West Shelf marked itself in Australia's history books in 1984, as we start to write a new chapter in the North West, we will do so together with the Karratha community.

Breyden Lonnie
Vice President North West Shelf

WOODSIDE VOLUNTEERS MAKE VALUED CONTRIBUTIONS

At Woodside, we take pride in giving back to the communities in which we operate. One of the ways we do this is through our corporate volunteering program.

Since the launch of the program with Volunteering WA in 2010, Woodsiders have been lending a helping hand with all kinds of community projects. Most recently, volunteers have participated in a range of activities from cooking meals for The Salvation Army to building a sandpit at Gumala Early Learning Centre and assembling furniture for the redevelopment of Roebourne District High School.

Our program partner, Volunteering WA, plays a crucial role in the success of Woodside's volunteering efforts by connecting us with local organisations in need of assistance and facilitating the opportunities to participate.

Volunteering WA's Regional Community Engagement Coordinator, Kelly Nunn said the partnership has delivered some important outcomes for the local community.

"Corporate volunteering offers fantastic opportunities for community organisations to complete ongoing maintenance or projects with the help of Woodside's employees, allowing them to focus on what they do best - providing programs and events for our community," she said.

STAY UP TO DATE ON OUR CONTINUED CONTRIBUTION TO THE COMMUNITY WE CALL HOME.

SEARCH ON FACEBOOK OR CLICK BELOW.

WOODSIDE NORTH WEST

WORK READINESS PROGRAM CREATES CAREER PATHWAYS

A new Work Ready Program being run as part of the Pluto Train 2 Project is supporting skills development for local participants.

The latest round of the program commenced in February 2024, with participants offered the opportunity to build employable skills and industry experience. Participants complete Construction White Card, First Aid and site induction certifications. During the program, Bechtel offered job shadow placements of participants' choice which provided invaluable insights into the industry, helping them make informed decisions about their futures.

Gaining on the job experience with Bechtel also built work-life balance skills to prepare the graduates for full-time employment.

Sixteen individuals are now ready to commence full-time employment with Bechtel on the Pluto Train 2 site as Trade Assistants. The roles vary for these dedicated participants across various disciplines, including electrical, mechanical, warehousing and concreting.

A large part of the Work Ready Program's success is the camaraderie and culture that has been fostered within the group. As their skills have grown, so have integral and supportive relationships.

Woodside will continue to provide wrap-around support for these motivated participants, identifying long-term training and development opportunities such as apprenticeships, traineeships or roles within operations and projects.

Pluto Train 2 Project Manager, Tom Feutrill said the experience is creating pathways into fulfilling careers and building capability in the local community.

"Woodside's involvement in the program is aimed at establishing employment opportunities and providing successful and meaningful careers while developing critical life skills and confidence," he said.

Working with an experienced construction contractor such as Bechtel provides a unique opportunity to be involved in a program that supports meeting the growing demand for the low-cost, lower-carbon, reliable energy the world needs today and into the future.

The Work Ready Program is run by the Ngarliyarndu Bindirri Aboriginal Corporation (NBAC), supported by the Pluto Train 2 Project and the engineering, procurement and construction contractor, Bechtel.

NBAC team members with Work Ready Program graduates.

KARRATHA CENTRAL HEALTHCARE SOLAR INSTALL A SUCCESS

Social contribution plays an important role in building the capacity and capability of community partners to deliver positive impacts in the regions where we live and work. Together with our joint venture partners, Woodside is proud to support those who support others in the City of Karratha.

Allied health services provider, Karratha Central Healthcare is one of the valued organisations Woodside has proudly partnered with. In 2023, the Scarborough Energy Project assisted Karratha Central Healthcare to review its operations and strategies developed to support the not-for-profit's long-term sustainability. The review identified a reduction in operating costs as a key opportunity, with a particular focus on power expenditure.

The Pluto Train 2 Project was pleased to provide funding alongside the City of Karratha for the installation of a solar power system at Karratha Central Healthcare's premises. The system, which was installed by local business Coastal Electrical and Data, will go a long way in helping Karratha Central Healthcare to reduce its power costs.

Karratha Central Healthcare's Operations Manager, Kingsley Murray said the solar power system would help the organisation allocate resources into programs for the local community.

"The solar system has already made a notable difference to our operating costs; on a good day the system is supplying up to 95% of our power needs, and in overcast and lowlight conditions about 35-40%.

"These savings can then be used for our not-for-profit and charitable programs, it's a win for us and a win for our community," he said.

Karratha Central Healthcare clinic.

ACCOMMODATION INITIATIVE ACKNOWLEDGED AT EXCELLENCE AWARDS

In May 2024, the City of Karratha Service Worker Accommodation Initiative was recognised as a finalist in the Community Development category of the Australian Energy Producers' Excellence Awards.

The Service Worker Accommodation Initiative is a partnership between the City of Karratha, Woodside and industry that aims to provide additional affordable rental options for people working in critical service worker sectors in Karratha, like childcare and allied health.

Launched in 2021, the initiative established a pool of housing managed by the City of Karratha and Woodside, offering affordable rental options for service workers. Woodside and joint venture partners at Pluto LNG and the North West Shelf Project are pleased to now contribute 30 houses to the accommodation pool.

If you would like to find out more about the Service Worker Accommodation Initiative, visit the City of Karratha website.

GBSC Yurra team member working on one of the 20 new builds.

BUILDING MOMENTUM WITH LOCAL HOUSING CONTRACT

We understand that housing is an important issue for the Karratha community. And that's why Woodside is working closely with the City of Karratha and other stakeholders to help overcome this challenge.

Some initiatives established to support housing in Karratha include contributing 30 properties to the City of Karratha's Service Worker Accommodation Initiative, the incremental divestment of older housing stock as well as making a small number of properties available for lease on the open market.

Late last year, the Pluto LNG Project also entered into a long-term agreement with Traditional Owner business Karratha Housing Pty Ltd (a subsidiary of Yurra Pty Ltd) for the build and lease back of 20 houses in Karratha.

Under the agreement, 10 homes are being built by GBSC Yurra and another 10 will be constructed by Ngarluma Yindjibarndi Foundation Limited (NYFL) in partnership with Thomas Building.

Work is now well underway on the construction of these new homes, which will be leased back to Woodside for a period of 15 years and are targeted to be completed by the end of 2025.

All of the houses will be maintained by Karratha Housing Pty Ltd as part of the lease agreement that will provide long-term revenue and capital assets to support the Yurra business into the future.

Michael Woodley, Chief Executive Officer at Yindjibarndi Aboriginal Corporation and Yurra Founder said he is very proud of the Yurra team and the partnership that has been established with Woodside over recent years.

"Having long-term contracts such as this enables us to work collaboratively with Woodside Energy on mutually beneficial plans that will create real legacy for our community," he said.

Woodside is also investigating potential options to build up to 60 additional new homes in Karratha to address its future workforce needs.

Our partnership with the City of Karratha helps to support much-loved community events.

WOODSIDE JOINS THE FUN AT RED EARTH ARTS FESTIVAL

Woodside and some of our joint venture partners were pleased to support the City of Karratha's Red Earth Arts Festival (REAF) which featured over 70 performances, workshops, and experiences over four days in May 2024.

This year saw the introduction of REAF at The Quarter which offered a suite of free, family-friendly activities, activating and transforming the area into a hub of artistic and cultural activity.

The Plants of the Pilbara installation was a highlight, a pop-up flower dome sculpture invited viewers to experience the magic of Western Australia's native flora on a larger-than-life scale. Artists from Yinjaa-Barni Art Group painted and displayed art on site, welcoming the public to engage.

Locals were spoilt for dinner choices as part of Karratha City Eats, picnicking on the Quarter grass while enjoying an open-air performance featuring captivating handpan artist Sam Maher and Indigenous songwriter Frank Yamma, crossing cultural and musical boundaries.

The Community Development partnership between the City of Karratha and Woodside and our joint venture partners was extended last year, with support from the Scarborough Energy Project. This supports the continued provision of important and much-loved community events like REAFas well as liveability initiatives and significant City projects.

City of Karratha Mayor Daniel Scott said working together was an integral part of delivering high quality community programs and well-attended community events.

"This support is incredibly important, assisting City operations in the delivery of exceptional events, programming and projects for our residents to enjoy," he said.

LET'S TALK

OUR PLANS, YOUR SAY

Head to woodside.com/consultation-activities to read the latest edition of Let's Talk and our Environment Plan consultation information.

We welcome feedback on your relevant functions, activities or interests. Alternatively, you can contact us at feedback@woodside.com or on 1800 442 977.

Q3 – 2024

Woodside Energy

Karratha Community Update

Edition 3 | 2024

Woodside Energy recognises Aboriginal and Torres Strait Islander peoples as Australia's first peoples.

We acknowledge the unique connection of the Traditional Custodians to land, waters and the environment where we operate in the City of Karratha. We extend this recognition and respect to First Nations peoples and communities around the world.

Earlier this year, I relocated to Karratha and commenced as Asset Manager of the North West Shelf Project's Karratha Gas Plant.

It was a real pleasure to join Woodside's local team at a time when we were celebrating 70 years of Woodside and 40 years of operations right here in the North West.

Karratha is where our story began in Western Australia and Woodside has a proud history of contribution to the place we continue to call home. This year's milestones gave me insight into the longstanding partnerships and strong relationships we've developed with the community over this time.

The North West Shelf Project has contributed more than $300 million within the City of Karratha since our operations began. This investment in the local community and economy continues as we support partnerships and businesses like the ones you will read about in this update.

We are entering a period of change at the Karratha Gas Plant as we undertake work to prepare for the retirement of one of our LNG processing trains later this year. This is an important step in the journey ahead as we navigate the gradual decline of the North West Shelf reserves and continue to pursue opportunities to process other resource owners' gas.

As we manage the future of the North West Shelf alongside our Pluto LNG operations and the growth of the Scarborough Energy Project, we will continue to engage and collaborate with those we work with, partner with and live alongside. We look forward to engaging and involving the local community in the future of Woodside in Karratha, working together to create opportunities in the place we call home.

Derek Paulgaard
Asset Manager North West Shelf Onshore

Celebration sundowner

On the evening of 18 September, as the sun set over Karratha, we gathered with our local community partners to celebrate both Woodside's 70th year as a proud Australian company and 40 years of operations in the North West.

Our sundowner event, held at the Red Earth Arts Precinct, provided an opportunity to share our appreciation for the local community which has supported Woodside over its decades of operations in Karratha.

Woodside Executive Vice President and Chief Operating Officer Liz Wescott joined us at the event and expressed her gratitude for the role those in attendance continue to play in shaping Karratha into a thriving and connected community.

Liz also announced a one-off large grant round, supported by Woodside and its Joint Venture participants in the North West Shelf Project and the Scarborough Energy Project's Pluto Train 2.

With applications open throughout October, the Woodside Anniversary Grants will provide funding of up to $100,000 to community groups and not-for-profit organisations in the City of Karratha to support health, liveability, sustainability and environmental outcomes.

Thank you to all who joined us in marking such a special occasion.

Stay up to date on our continued contribution to the local community Woodside North West

Winyama awarded construction contract

This year, Woodside awarded its largest ever Traditional Owner construction contract to Karratha company Winyama Contracting Group (Winyama). The contract was awarded for the delivery of civil works for the Pluto Train 1 Modifications Project. Winyama will work alongside Kellogg Brown & Root Pty Ltd., the project's engineering, procurement and construction management contractor.

Winyama is a 100% Karratha-owned and 50% Indigenous-owned provider of civil, construction and mining services and renewable asset hire that prioritises spend with local and Indigenous suppliers. The name Winyama, meaning Sea Eagle in the Ngarluma language, symbolises the company's mission to provide economic opportunities and prosperity for local Aboriginal people. It is a bird that has held significance through the female line of Ngarluma majority owner Arthur Ramirez's family for generations.

Woodside Pluto Expansion Project Manager Paul Baker said Woodside was thrilled to be partnering with Winyama for the delivery of the civil works for the Pluto Train 1 Modifications Project and supporting the delivery of local business and employment outcomes for the Pilbara.

"By engaging a local Indigenous-led and owned contractor, we're securing the delivery of an important service while contributing to the local economy. The contract will also support the growth of Winyama, increasing the company's capacity to deliver services to other industries across the Pilbara," he said.

Arthur Ramirez, Winyama Chairman and Indigenous Business Manager, said the new supply agreement with Woodside was a major milestone for Winyama.

"This project will allow our team to grow by about another 65 new employees, with the majority being residential employees.

"Being engaged on the Pluto Train 1 Modifications Project will help fulfil Winyama Contracting Group's vision to increase its footprint in the region, which will enable us to increase our focus on outcomes for Aboriginal people through our reflection Reconciliation Action Plan.

"We are really proud that Woodside has chosen a local Karratha-based Indigenous business to execute a major portion of one of their largest current projects, showing they live their values and support local and Indigenous business growth in the region," he said.

Winyama, KBR and Woodside representatives at Pluto LNG.

Healing comes from Country

Roebourne-based start-up Warridahs of the Ngurra (WOTN) aims to build awareness and respect for traditional bush medicine and share cultural knowledge. Meaning 'Women of Country' in Ngarluma language, WOTN was founded in 2023 by Ngarluma and Banjima woman, Kylie Mowarin.

Kylie's years of dedication to exploring the uses and benefits of native plants have seen her experiment with the ingredients in teas and ointments. The healing properties of these plants have recently been reinforced by modern scientific research conducted in partnership with Griffith University.

"We are working with Griffith University, testing two traditional plants for their antimicrobial, antioxidant and anti-inflammatory properties. So far, we are seeing very positive results," said Kylie.

With support from Woodside, Kylie recently held a bush medicine workshop on Murujuga alongside local Elders, representatives from Murujuga Aboriginal Corporation, Griffith University and a leading archaeologist.

Students from Roebourne District High School were among the attendees at the workshop at Hearson's Cove. Kylie spoke with students about the scientific attributes of traditional medicines and their gathering methods.

"It's important to pass on our knowledge from our ancestors and for our young ones to understand our cultural connections to Country and how it can help with healing our bodies and minds," said Kylie.

Liz Ritchie, Roebourne District High School Principal, said the students' involvement in the workshop was part of Connected Learning, a program developed with support from the Karratha and Roebourne Education Initiative to link classroom curriculum with cultural knowledge and community.

"We are deeply committed to delivering education that is culturally respectful and meaningful. This work can only be achieved when we have the guidance, support and expertise of our families, community advisors, and Elders.

"Participating in the Warridahs of the Ngurra workshops enables our young people to demonstrate practical applications of the learning that occurs in class and on-Country throughout the term.

"The day was an authentic example of how curriculum delivery in a culturally responsive and connected way leads to deep two-way learning of skills and knowledge," she said.

Looking ahead, WOTN plans to create a healing hub in Roebourne, which aims to balance education, wellbeing, and a sustainable business by building upon a range of products Kylie has been developing with native plants.

"We also plan to provide on-Country tours, which will provide economic prosperity for our people through employment and educating women in how to run a business," said Kylie.


Kylie Mowarin with students from Roebourne District High School at Hearson's Cove.

Stay up to date on our continued contribution to the local community Woodside North West

KREI supports student revision seminars

For more than 15 years, Woodside and its Joint Venture participants have contributed to programs aimed at enhancing academic achievements among students in the City of Karratha. Since the establishment of the Karratha and Roebourne Education Initiative (KREI), a key focus has been to bridge the gaps in opportunities available to local students and their peers in metropolitan areas.

During the recent school holidays, the KREI supported a group of Year 12 students from St Luke's College to travel to Perth for a 10-day educational experience. The local students participated in a series of intensive revision seminars, designed to prepare them for their WACE examinations. With small class sizes and personalised help from specialist teachers, students were able to delve into the course material and discuss valuable exam strategies.

While in Perth, the students dedicated time outside the seminars to learn about life at university. They visited several campuses where they engaged in pre-arranged faculty workshops and met with student ambassadors to gain valuable insights into the university environment, academic workload, course offerings and entry pathways.

The students also took the opportunity to explore the university accommodation colleges, helping them to envision their potential future living arrangements and supporting their readiness for their upcoming transition to higher education.

St Luke's College Upper School Pathways Coordinator Carol Potter said this year's revision seminars were an outstanding success.

"We are very fortunate to have the support of the Karratha and Roebourne Education funding, which made both the revision seminars and university visits possible. Our students are now feeling more prepared ahead of their final examinations and transition into tertiary education, away from their family to a big city," she said.

Supporting local students from St Luke's College and Karratha Senior High School to travel to Perth for revision seminars is just one example of Woodside and its Joint Venture participants' contribution to schools in the City of Karratha. Earlier this year, Woodside announced the renewal of the KREI, with five-year community partnership agreements. The renewal builds on a strong history of collaboration and provides continued investment to help local high school and primary school students thrive.

Students from St Luke's College on KREI supported Perth visit.

Scarborough trunkline installation a success

This October, Woodside marked an important milestone as it announced the completion of the Scarborough Energy Project's trunkline installation. Once operational, the 433 km trunkline will transport gas from the offshore Scarborough field to the onshore Pluto LNG facility for processing.

Reaching depths of up to 1400 m, the trunkline took around 12 months to install and had numerous teams and contractors contributing to the successful work program.

Woodside Executive Vice President and Chief Operating Officer Australia Liz Westcott said the trunkline was a critical piece of infrastructure for the Scarborough Energy Project.

"The completion of installation is a significant accomplishment, reflecting the dedication of all involved in achieving this project milestone.

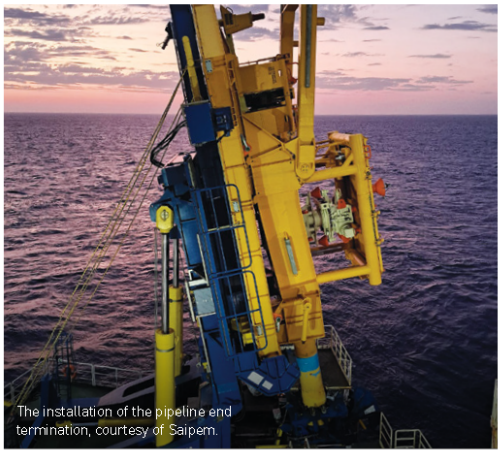
"With the last components of the trunkline in place, the focus will be maintained on safely executing the remaining project scopes to support the targeted first Scarborough LNG cargo in 2026," she said.

Following the successful installation of the trunkline, work will now commence on the pre-commissioning in preparation for hook-up of the subsea infrastructure.

The Scarborough Energy Project was 73% complete in October[1], and is set to help meet demand for the reliable energy the world needs today and into the future. This includes up to 225 terajoules a day of domestic gas supply into the Western Australian market from operations in Karratha.

These volumes will be processed by the recently delivered Pluto Train 2 domestic gas module. The important piece of infrastructure, which arrived in Karratha and was installed in early September, weighs over 1500 tonnes and will connect to the domestic gas export compressor. The domestic gas module is one of the 51 modules that is targeted to be delivered to site by the end of this year.

[1] Excluding Pluto Train 1 modifications.



The installation of the pipeline end termination, courtesy of Saipem.

Let's Talk

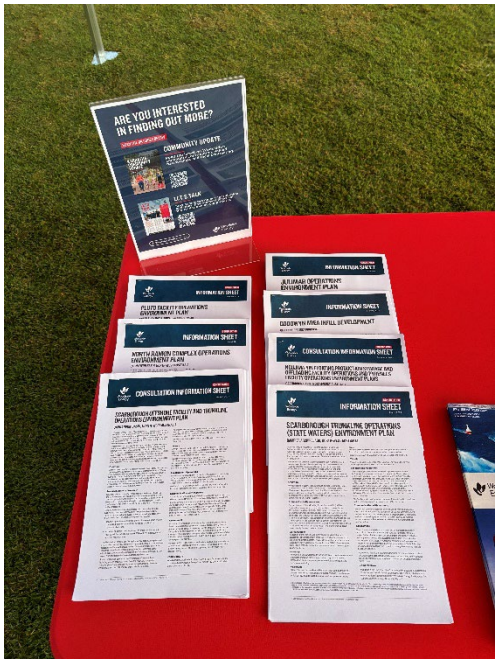
Our plans, Your say

Head to woodside.com/consultation-activities to read our latest edition and Environment Plan consultation information.

We welcome feedback on your relevant functions, activities or interests. Alternatively, you can contact us at consultation@feedback.woodside.com or on 1800 442 977.

5.9 Community pop-up at Lo's Cafe (26 July 2024)

Location	Karratha
Activity	Community pop-up at Lo's Cafe
Date	26 July 2024
Description of the consultation	Woodside hosted a stand in the community to coincide with Woodside's 70th birthday and 40 years of safe operations in Karratha. Members of Woodside's Corporate Affairs team actively engaged with the community to discuss proposed Environment Plan activities and general community engagement discussion. Woodside displayed a QR code on the stand, linked to the Let's Talk EP newsletter on the Woodside consultation page of the website. A pull-up banner was on display focusing on engagement on our plans at land and sea with a QR code to the consultation page on the Woodside website. Woodside made available printed consultation information sheets for this EP.
Advertising and invitations	Woodside advertised this engagement on social media only. • Social media post was advertised on Woodside North West Facebook page on 26 July 2024. • An EP consultation banner with QR code (linked to the Consultation Activities page on the Woodside website)was displayed at Woodside's stand along with current EP factsheets.
Estimated number of individuals / organisations consulted	Over 60 community members attended the event. Woodside spoke to many community members, recording 10 meaningful conversations.
Summary of Feedback, Objection or Claim • Approximately 10 conversations occurred around employment opportunities and pathways, social investment, the Environment Plan process and approvals in general. • No feedback was received regarding Woodside's Environment Plans.	
Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response	
This session forms part of Woodside's broader consultation approach to enable self-identification, and provide relevant persons with the opportunity to assess any impacts on their functions, interests or activities, and provide feedback on proposed activities, which is consistent with the intended outcome of consultation (see **Section 5.2** of the EP).	



Woodside North West is with **Woodside Energy.**
5 days ago ·

🎉 It's our birthday 😘

Today we're celebrating 70 years of Woodside, and this year, four decades of safe and reliable operations in Karratha.

To thank the community for their support over this time, we've been providing free morning coffees across the City of Karratha this past month.

Join us at just one of the participating local providers, Lo's this morning! Grab a coffee on us and let's talk about upcoming projects, ongoing operations and our role in the community we've proudly called home for forty years.

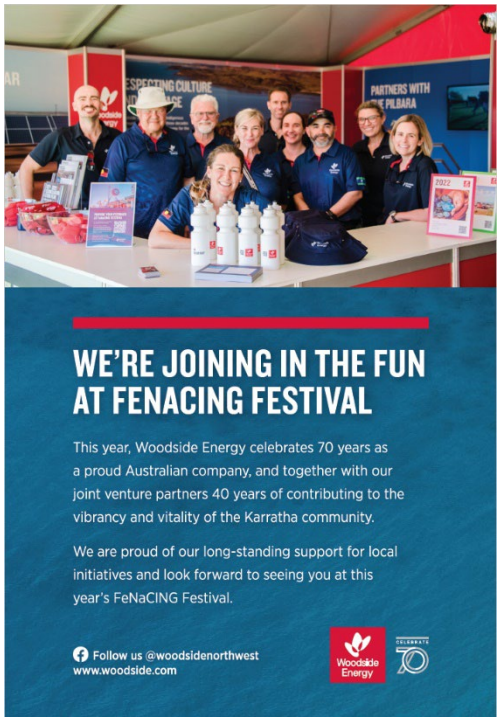
As we celebrate this significant milestone, we look forward to continuing to support the local community through our ongoing operations and growth projects. This includes the Scarborough Energy Project and Pluto Train 2, which has engaged more than 75 Karratha businesses since construction began.

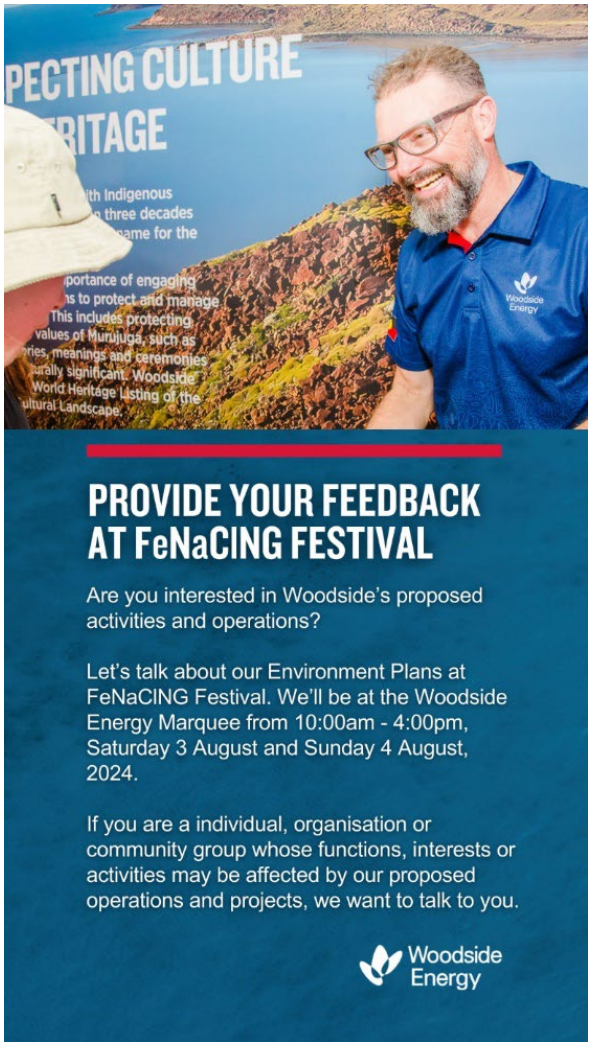
110 11 2

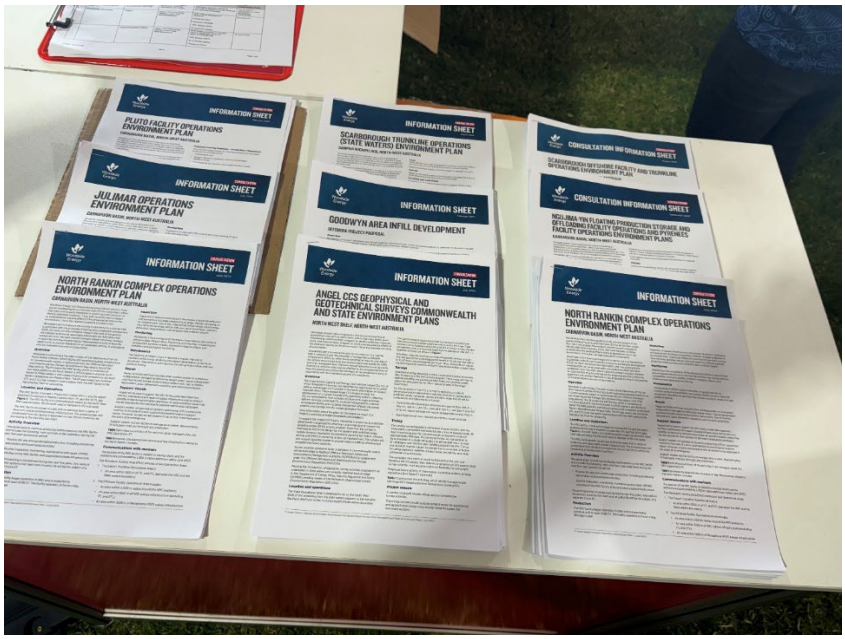
Like Comment

5.10 FeNaCING Festival (3 to 4 August 2024)

Location	Karratha
Activity	FeNaCING Festival
Date	3-4 August 2024
Description of the consultation	Woodside hosted a stand at the FeNaCING Festival 2024. Members of Woodside's Corporate Affairs, Environment and Operations teams actively engaged with the community to discuss proposed Environment Plan activities. Woodside displayed a QR code on the stand, linked to the Let's Talk EP newsletter on the Woodside consultation page of the website. A pull-up banner was on display focusing on engagement on our plans at land and sea with a QR code to the consultation page on the Woodside website. Woodside made available printed consultation information sheets for this EP.
Advertising and invitations	Woodside advertised the sessions to enable individuals to self-identify, become aware of the community consultation, and enable individuals to provide feedback on proposed activities, through the following: • Social media post was advertised on the City of Karratha and FeNaCING Festival Facebook page on 18 July 2024.). • Social media post was advertised on the Woodside North West Facebook page. • FeNaCING Festival lift-out in the Pilbara News on 31 July 2024. • An EP consultation banner with QR code (linked to the Consultation Activities page on the Woodside website) was on display outside the Woodside Marquee, and EP factsheets were displayed, and provided in the Woodside Marquee.
Estimated number of individuals / organisations consulted	Over 10 000 community members (City of Karratha) attended the event. Woodside spoke to many community members, recording 30 meaningful conversations.
Summary of Feedback, Objection or Claim • Approximately 10 conversations occurred around new energy opportunities and plans. • Other conversations included: o Local content o Social investment o General understanding of an EMBA o Approvals status for Browse and Scarborough o The future of the Karratha Gas Plant assets future o How oil and gas is produced o Tax and royalties. • No feedback was received regarding specific Environment Plans.	
Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response	
Woodside's participation at FeNaCING forms part of Woodside's broader consultation approach to enable self-identification and provide relevant persons with the opportunity to assess any impacts on their functions, interests or activities, and provide feedback on proposed activities, which is consistent with the intended outcome of consultation (see **Section 5.2** of the EP).	







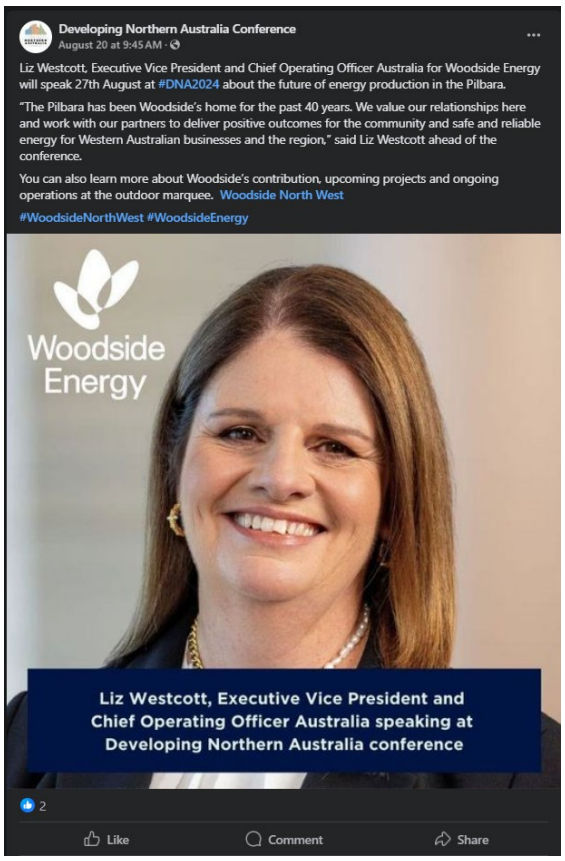
5.11 Developing Northern Australia (DNA conference) (26 to 28 August 2024)

Location	Karratha
Activity	Developing Northern Australia (DNA) Conference
Date	26-28 August 2024
Description of the consultation	Woodside hosted an exhibition stand at the DNA Conference. Members of Woodside's Corporate Affairs team actively engaged with 400+ individuals, policy makers and decision makers attending the conference to discuss, amongst other things, EP activities. Woodside displayed a QR code, linked to the Let's Talk EP newsletter on the Woodside consultation page of the website. An ipad was available encouraging audience to view and subscribe to the consultation page on the Woodside website. Woodside made available consultation information sheets for this EP.
Advertising and invitations	Woodside advertised the sessions to enable individuals to self-identify, become aware of the community consultation, and enable individuals to provide feedback on proposed activities, through the following: Woodside advertised participation at the DNA Conference, the opportunity to consult and to enable individuals to self-identify, and enable individuals to provide feedback on proposed activities, through the following: • Social media post was advertised on the Developing Northern Australia Facebook page on 20 August 2024.

	EP consultation information sheets and copies of Let's Talk with QR codes linking to Consultation Activities - Woodside Energy were displayed and provided.
Estimated number of individuals / organisations consulted	Over 400 delegates attended the conference. Woodside spoke to many conference attendees, recording 20 meaningful conversations.

Summary of Feedback, Objection or Claim
• Approximately 10 conversations occurred around new energy opportunities and plans.
• Other conversations included:
  ○ Local content
  ○ Social investment
  ○ General understanding of an EMBA
  ○ How oil and gas is produced and the organisations future in energy transition
  ○ Price of gas for international project forecasting
  ○ Ai and simulation technology
  ○ Carbon sequestration
• No feedback was received regarding specific Environment Plans.	

Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response	
Woodside's participation at the DNA conference forms part of Woodside's broader consultation approach to enable self-identification, and provide relevant persons with the opportunity to assess any impacts on their functions, interests or activities, and provide feedback on proposed activities, which is consistent with the intended outcome of consultation (see **Section 5.2** of the EP).	



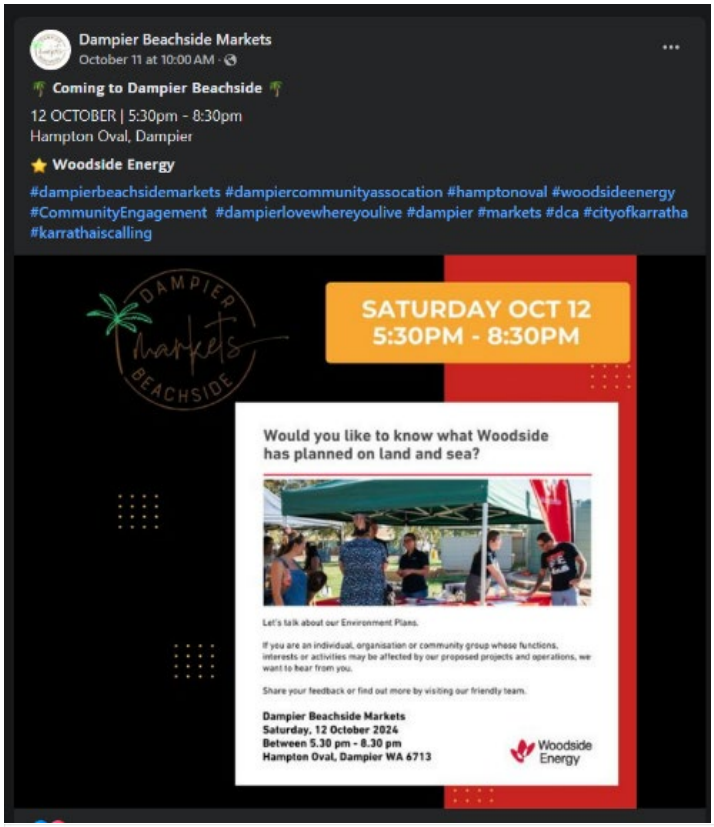
5.12 Dampier Beachside Markets (12 October 2024)

Location	Dampier
Activity	Dampier Beachside Markets - Oktoberfest
Date	12 October 2024
Description of the consultation	Woodside hosted a stand at the Dampier Beachside Markets a community event bringing together local businesses selling local products, a variety of food vendors and community groups. The stand was staffed by members from Woodside's Corporate Affairs team. Woodside displayed a QR code on the stand, linked to the consultation activities page of the Woodside website. An iPad with consultation/feedback subscription prompt was made available. Woodside made available printed consultation information sheets for this EP.
Advertising and invitations	Woodside advertised the event to enable individuals to self-identify, become aware of the community consultation, and enable individuals to provide feedback on proposed activities, through the following: • Advertisement in the Pilbara News on 9 October 2024. • Geotargeted Social media posts were published inviting public to attend on Woodside North West Facebook page. • Social media post from the event host, Dampier Community Association was published on 11 October 2024 inviting the public to attend. • Advertisement was displayed on community noticeboard at Lo's Café, Karratha, and Roebourne Library. • An EP consultation banner with QR code (linked to the Consultation Activities page on the Woodside website) displayed at Woodside's stand along with current EP factsheets.
Estimated number of individuals / organisations consulted	Over 1000 community members attended the event. Woodside spoke to many community members, recording 6 meaningful conversations.
Summary of Feedback, Objection or Claim	
• General interest in progress on the Scarborough project and the future of gas in the energy transition. • General interest in the Carbon Capture and Storage process. • Interest in the Woodside community grant program	

- EP approval process discussed and why we want to talk to the community. No concerns raised.
- General queries around employment and graduate opportunities.
- Interest in divestment of ex-Woodside homes.

Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response

Whilst feedback was received, there were no objections or claims raised about EPs.
Woodside's participation at the market's is part of Woodside's broader consultation approach to enable self-identification, and provide relevant persons with the opportunity to assess any impacts on their functions, interests or activities, and provide feedback on proposed activities, which is consistent with the intended outcome of consultation (see **Section 5.2**).




4 NEWS
Pilbara NEWS
Minefield for ore big shots
ADRIAN RAUSO


Pilbara NEWS
NEWS 5
Author's incredible tale hopes to inspire
MADELIN HAYES
Dr Tracy Westerman travelled to Karratha for the launch of her book. Picture: Dr Tracy Westerman

Woodside Community Grants
Applications open Tuesday, 1 October 2024
Woodside Energy

5.13 Dampier Beachside Markets (2 November 2024)

Location	Dampier
Activity	Dampier Beachside Markets – Guy Fawkes
Date	2 November 2024
Description of the consultation	Woodside hosted a stand at the Dampier Beachside Markets a community event bringing together local businesses selling local products, a variety of food vendors and community groups. The stand was staffed by members from Woodside's Corporate Affairs and First Nations teams. Woodside displayed a QR code on the stand, linked to the consultation activities page of the Woodside website. Woodside made available printed consultation information sheets for this EP.
Advertising and invitations	Woodside advertised event to enable individuals to self-identify, become aware of the community consultation, and enable individuals to provide feedback on proposed activities, through the following: • Advertisement in the Pilbara News on 30 October 2024. • Social media posts were published inviting public to attend on Woodside North West Facebook page. • Social media post from event host, Dampier Community Association was published on 11 October 2024 inviting public to attend. • Advertisement was displayed on community noticeboard at Lo's Café, Karratha, and Roebourne Library. • An EP consultation display with QR code (linked to the Consultation Activities page on the Woodside website) displayed at Woodside's stand along with current EP factsheets.
Estimated number of individuals / organisations consulted	Over 1200 community members (Dampier Community Association) attended the event. Woodside spoke to many community members, recording 10 meaningful conversations.
Summary of Feedback, Objection or Claim	
• General queries around employment opportunities. • General interest in the Scarborough progress and Browse and the future of gas in the energy transition. • EP approval process discussed and why we want to talk to community. No concerns raised. • General interest in the Carbon Capture and Storage process.	

• Discussions around the areas housing market and related industry opportunities.
Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response
Whilst feedback was received, there were no objections or claims raised about EPs. Woodside's participation at the market's is part of Woodside's broader consultation approach to enable self-identification and provide relevant persons with the opportunity to assess any impacts on their functions, interests or activities, and provide feedback on proposed activities, which is consistent with the intended outcome of consultation (see Section 5.2).

Evidence of Advertising and Invitations for Event	
Newspaper Advertisement(s)	**Social Media Campaign**
	
Photo of Information Sheets	
	

5.14 Exmouth Community Information Session (14 November 2024)

Activity	**Community markets – Woodside stand**
Date	Thursday, 14 November 2024
Description of the consultation	Woodside hosted a stand at Ross Street Mall in Exmouth. The stand was staffed by Woodside Environment and Corporate Affairs representatives. Woodside displayed a QR code on the stand, linked to the consultation activities page of the Woodside website. Environment Plan Consultation Information Sheets available to attendees including this EP.
Advertising and invitations	Woodside advertised the sessions to enable individuals to self-identify, become aware of the community consultation, and enable individuals to provide feedback on proposed activities, through the following: • Geotargeted social media campaign advertising in Exmouth and surrounding areas (+80 kms) from November 9 to November 14 • Post on Woodside social media channel • Promotion at the Exmouth Community Liaison Group meeting • An EP consultation banner with QR code (linked to the Consultation Activities page on the Woodside website) was displayed at Woodside's stand along with the EP factsheets and Project information sheets.
Estimated number of individuals / organisations consulted	Woodside had meaningful conversations with approximately 12 groups. These people identified as being Exmouth community members or visitors to Exmouth (residents of the East Coast of Australia or Western Australia).
Summary of Feedback, Objection or Claim	

• Community members were able to engage with Woodside representatives to understand the proposed activity and how it may affect them, ask questions, and provide their feedback.
• There was general interest in Woodside activities. Key issues discussed:
  • Query on whether Woodside is building new marine infrastructure being built in the nearshore environment. A query was received on whether the design of Scarborough infrastructure allows for juvenile fauna to continue to traverse the nearshore environment.
  • Woodside responded that the Scarborough trunkline was installed by horizontal directional drilling to minimise impacts to the beach and nesting turtles. The Scarborough trunkline is not a solid structure that would block movement of nearshore juvenile fauna.
  ○ General queries on Woodside's footprint in Exmouth.
  ○ Queries about employment and local content opportunities.
  ○ Interest in understanding current social investment programs and opportunities.
  ○ Stakeholders identifying themselves as Woodside shareholders interested in project updates, particularly on Scarborough.
  ○ Query on domestic gas commitments for Woodside's activities.	

Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response	
Whilst feedback was received, there were no specific objections or claims to a particular Woodside project or activity. The community information sessions were part of Woodside's broader consultation approach to enable self-identification, and provide relevant persons with the opportunity to assess any impacts on their functions, interests or activities, and provide feedback on proposed activities, which is consistent with the intended outcome of consultation.	

From 09 November 2024, Woodside ran an Operations EP specific geotargeted, sponsored social media campaign across regions within or coastally adjacent to the Operations EP EMBA. The campaign was designed to bring the proposed activity to the attention of persons who may be interested and advised persons or organisations on how they could find out about Woodside's proposed activities by visiting Woodside's website.

Platform	Geotargeted Reach	Post Dates	Impact
Facebook	Regional: Users 18+ located within 40kms of Exmouth	09 November 2024 – 14 November 2024	Reach: 20,826 Frequency: 1.15 Impressions: 23,895 All clicks: 76 Link clicks: 5 CTR%: 0.02%
Instagram	Regional: Users 18+ located within 40kms of Exmouth	09 November 2024 – 14 November 2024	Reach: 19,650 Frequency: 1.10 Impressions:21,636 All clicks: 9 Link clicks: 1 CTR%: 0.00%

Social Media

Reach: 40,388

Post engagements 61

social media Organic Facebook post 14 November

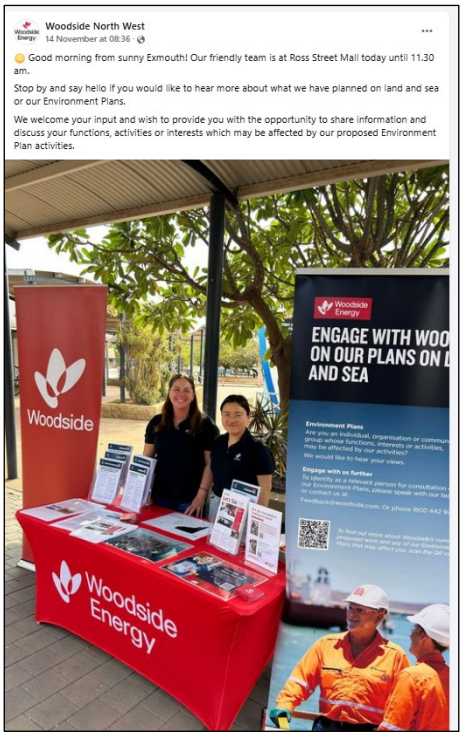


Photo of event

5.15 Dampier Who's Who in the Hood (18 March 2025)

Location	Dampier
Activity	Dampier Community Association – Who's Who in the Hood
Date	18 March 2025
Description of the consultation	Woodside hosted a stand at the Dampier Community Hub available to community members, sporting groups and industry representatives who provide funding opportunities in Dampier. The stand was staffed by members from Woodside's Corporate Affairs teams. Woodside displayed a QR code at the stand, linked to the 'Consultation activities' page of the Woodside website and provided hard copy versions of the March 2025 'Let's Talk' newsletter. Woodside made available printed consultation information sheets including for this EP.
Advertising and invitations	Woodside advertised the event to enable individuals to self-identify, become aware of the community consultation, and to allow individuals to provide feedback on proposed activities, through the following: • Social media posts on the Woodside North West Facebook page inviting the public to attend (see below) • An EP consultation display with QR code (linked to the 'Consultation activities' page on the Woodside website) displayed at Woodside's stand along with current EP consultation information sheets (see below).
Estimated number of individuals /	Over 50 community members (Dampier Community Association) attended the event. Woodside spoke to many community members, recording 2 meaningful conversations.

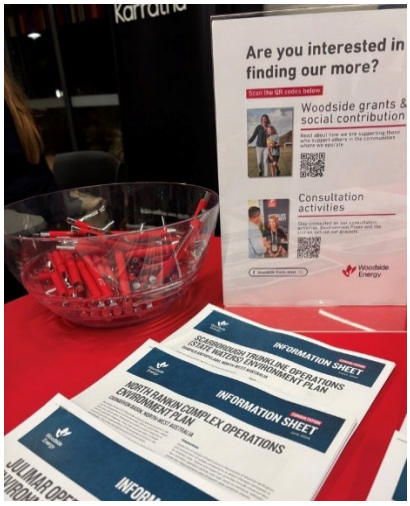
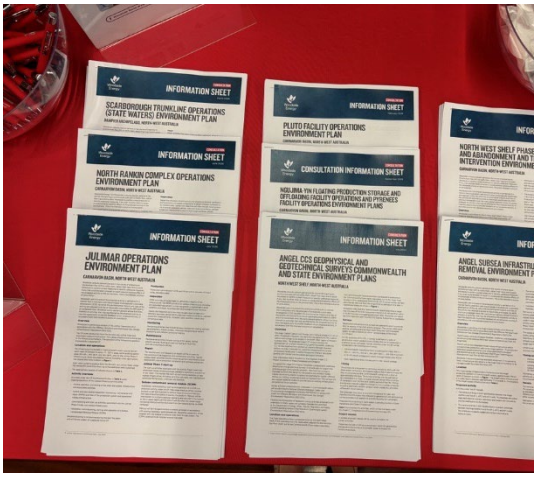
organisations consulted	

Summary of Feedback, Objection or Claim
• General queries around community grants and what is available from Woodside.

Woodside's Assessment of Merits of Feedback, Objection or Claim and its Response
There were no objections or claims raised about EPs. Woodside's participation at 'Who's Who in the Hood' is part of Woodside's broader consultation approach to enable self-identification and provide relevant persons with the opportunity to assess any impacts on their functions, interests or activities, and provide feedback on proposed activities, which is consistent with the intended outcome of consultation (see Section 5.2).

Evidence of promotion and event

Social Media campaign Woodside North West Facebook 18 March 2025	Photo of event
	

Photo of event	Photo of Information Sheets
	

APPENDIX G: ONGOING ENGAGEMENT WITH TRADITIONAL OWNERS

Proposed Program of Ongoing Engagement with Traditional Custodians

This Program of Ongoing Engagement with Traditional Custodians ("Program") has been developed to demonstrate Woodside's commitment to ongoing engagement and support of Traditional Custodians' capacity to care for and manage Country, including Sea Country, and has been directly informed by Traditional Custodians' feedback regarding their capacity to engage and consult on Environment Plans.

It is a living document designed to evolve with ongoing consultation and feedback from Traditional Custodians and, at a minimum, will be subject to annual review. In addition to this Program, Woodside will continue to participate in, and support collective industry engagement with Traditional Owners on the development of a future, sustainable, industry wide Program. Through the Program, Woodside actively supports Traditional Custodians' capacity for, and involvement in, ongoing engagement and feedback on environment plans.

The Program has been developed so that Traditional Custodians can, on an ongoing basis, provide Woodside with feedback relating to the possible consequences of an activity to be carried out under an environment plan on their functions, interests and activities as they relate to cultural values. This feedback will be evaluated in conjunction with Traditional Custodians and, where necessary, avoidance or mitigation strategies in will be developed in collaboration with Traditional Custodians. How the Program is implemented with specific Traditional Custodians will depend on their stated needs and priorities.

The Program is underpinned by Woodside's First Nations Communities Policy (woodside.com), the objective of which is to ensure Woodside partners and engages with First Nations communities to create positive economic, social and cultural outcomes that leave a lasting legacy. Woodside does this through building respectful relationships and partnerships with First Nations communities where we are active, in the areas where they are most interested in. We acknowledge the unique connection that First Nations communities have to land, waters and the environment.

The Program will include, as agreed with relevant communities, reasonable commitment to:

1. **Support for ongoing dialogue and engagement**

Woodside will support the capacity of Traditional Custodians to participate in ongoing dialogue and engagement about the environment plans and to enable the ongoing and future identification of cultural values potentially impacted by Woodside's activities. Woodside further commits to agreeing consultation protocols with individual Traditional Custodians to ensure the material provided is appropriate in level of detail such that the potential for cultural impact from Woodside activities can be determined and as required measures can be adopted to avoid or minimise impact.

In addition, Woodside will receive feedback on cultural values from an individual person or organisation that identifies as a Traditional Custodian, at any stage during the development and implementation of activities. This feedback will be evaluated, in conjunction with the Traditional Custodian individual or group and if required, control measures will put in place to avoid impacts to cultural values, or where avoidance is not possible, to minimise and mitigate the impacts to an acceptable level.

Where cultural values are identified post activity completion, any controls relevant to value management will be implemented during the next relevant activity.

2. **Support for the identification and recording of cultural features**

Woodside will support Traditional Custodians to record and articulate their Sea Country values and will invest in cultural assessments codesigned with Traditional Custodians, where required, to inform potential risks to cultural values from our petroleum activities.

This may include supporting cultural mapping by Traditional Custodians to identify and map significant cultural features including archaeological sites and other cultural values. The scoping of the mapping process will be codesigned with Traditional Custodians.

Woodside understands that cultural knowledge remains the intellectual property of Traditional Custodians and will agree with Traditional Custodians at the outset how that information from surveys will be used to feedback into and inform the environment plan's design and implementation.

In addition, Woodside applies the Cultural Heritage Management Procedure 2019, updated in 2023, to the Program which:

- provides a process for the identification, protection, and management of Cultural Heritage taking into account relevant standards, in particular, the United Nations Declaration on the Rights of Indigenous Peoples, the Charter for the Protection and Management of the Archaeological Heritage, the Convention for the Safeguarding of the Intangible Cultural Heritage, and the Convention on the Protection of the Underwater Cultural Heritage;
- applies to underwater cultural heritage and, consistent with current practice, provides for the commissioning of (where appropriate) both archaeological and ethnographic assessments of cultural values over the submerged landscape; and
- the process includes the following:
    - early engagement with relevant Traditional Custodians
    - identification of potential heritage, this could include desktop and field surveys undertaken with the Traditional Custodians.
- the development of cultural management strategies; and, where it is determined cultural heritage may be impacted, the development of Cultural Heritage Management Plans codesigned with Traditional Custodians and implemented by Woodside's First Nations team which:
    - focus on avoidance or minimisation of impacts; and
    - provide regular reviews and for inclusion of new information and further development of the Cultural Heritage Management Plan.

Woodside is committed to continue to receive feedback on cultural values for the life of an environment plan, the inclusion of new information and the development of avoidance or mitigation strategies in collaboration with Traditional Custodians. This information will be recorded via the Woodside Management of Knowledge Process and any potential impacts to the accepted Environment Plan evaluated via the Woodside Management of Change Process.

3. **Building capacity for the ongoing protection of country**

Woodside will support measures to increase the capability and capacity of the Traditional Custodian groups. This is guided by Woodside's Indigenous Affairs Strategy 2019 ("Strategy"), which is designed to enable the building and maintaining of relationships with Traditional Custodians to leave a lasting legacy, including strengthening of Traditional Custodians' capacity to care for and manage Country, including Sea Country. The Strategy was developed with inputs from Traditional Custodians and contains four pillars that direct Woodside's social investment, policies relating to economic development, procurement and employment, and Woodside's agreement making and implementation of agreements. The pillars are:

1. Culture and Heritage Management: support social outcomes through protection, recognition and respect for culture and heritage;
2. Economic Participation: provide training, jobs, and business opportunities;

3. Capability and capacity: ensure strong corporate governance, leadership development and education initiatives to support self-determination; and
4. Safer and Healthier Communities: partner with Aboriginal people and service providers to maximise safer and healthier community outcomes.

Woodside is committed to an ongoing relationship between Woodside and the Traditional Custodian groups. Through consultation with Traditional Custodians Woodside will continue to:

- establish support for Indigenous ranger programs via social investment;
- establish support for Indigenous oil spill response capability via investigating training models;
- establish support for identification and recording of cultural values and the management of that information by Traditional Custodians;
- establish support for programs identified by the Traditional Custodians as important to them and as agreed by Woodside.

4. Support for capacity and capability in relation to governance

Pillar 3 of the Indigenous Affairs Strategy 2019 focuses on ensuring strong corporate governance, leadership development and education initiatives to support self-determination. To enable this, Woodside will support measures to increase the capability and capacity of the Traditional Custodian groups, including in relation to governance and management systems.

The nature of this support will be informed by the individual needs of Traditional Custodian groups, but may include:

- funding or other support for community meetings, particularly where consultation with representative bodies lies outside of that body's core business and cultural authority or mandate needs to be secured,
- resourcing internal expertise so that information is managed consistently and internally, including ensuring appropriate record keeping of consultation to provide stakeholders with a lasting record of discussions, and
- development or upgrade of IT systems to manage information.

5. Program Reporting and Review of Effectiveness

Woodside will undertake an annual review of the Program to assess its effectiveness and adapt the Program accordingly. The annual review will also include an assessment of appropriateness of the methods used to undertake ongoing consultation with Traditional Custodians.
Progress of the Program will be reported annually in line with annual sustainability reporting via the Woodside website.

6. Current Status

Following distribution of this proposed Program, Woodside is now participating in a number of specific ongoing consultation activities with Traditional Custodian Relevant Persons. Specific ongoing activities are tabulated below:

Traditional Custodian Relevant Person	Ongoing Consultation Description	Forward Plan	Estimated Timeframes
Buurabalayji Thalanyji Aboriginal Corporation (BTAC)	BTAC proposed a Collaboration Agreement in May 2023. Woodside agreed in principle and exchanged correspondence to understand details of the proposal. The Collaboration Agreement would enable support for BTAC to undertake an ethnographic assessment to articulate values, and ensure appropriate cost recovery.	Woodside and BTAC have executed a Costs Acceptance Letter. Woodside provided a draft Consultation Agreement to BTAC in February 2024. Discussions about the agreement are continuing.	Woodside is in regular discussions with BTAC regarding the draft proposed Consultation Agreement. Woodside continues to be guided by BTAC in relation to BTAC's capacity and priorities to finalise the agreement.
Yamatji Marlpa Aboriginal Corporation (YMAC)	In June 2023, YMAC provided Woodside a proposed draft Framework Agreement, and a proposal to fund in-house expertise to support consultation and implement the Collaboration Framework. In July 2023, Woodside agreed in principle to the proposed Collaboration Framework and the funding proposal and requested a meeting to work together on details. Woodside provided the Proposed Program of Ongoing Consultation to complement the proposed Collaboration Framework.	Woodside provided a draft Consultation Agreement to YMAC for NTGAC, who are represented by YMAC, in February 2024. Discussions about the agreement are continuing.	Woodside is in regular discussions with YMAC regarding the draft proposed Consultation Agreement. Woodside continues to be guided by YMAC in relation to YMAC's capacity and priorities to finalise the agreement.
Wirrawandi Aboriginal Corporation (WAC)	In August 2023, WAC proposed a Framework Agreement with Woodside to provide a streamlined, formalised approach to consultation between WAC and Woodside. Woodside has confirmed receipt of the proposed framework from WAC.	Woodside provided a draft Consultation Agreement to WAC in March 2024. Discussions about the agreement are continuing.	Woodside is in regular discussions with WAC regarding the draft proposed Consultation Agreement. Woodside continues to be guided by WAC in relation to WAC's capacity and priorities to finalise the agreement.
Ngarluma Aboriginal Corporation (NAC)	In September 2023, NAC proposed a Joint Working Group to practically manage consultation processes. It was proposed that the group would meet monthly for 2023 and quarterly thereafter, meetings would include NAC CEO and NAC Directors and potentially independent SME/s, the proposal was that Woodside draft a Framework Agreement, and included a request for funding for this approach. Woodside provided in-principle support for the proposal.	Woodside provided a draft Consultation Agreement to NAC in March 2024. Discussions about the agreement are continuing.	Woodside is in regular discussions with NAC regarding the draft proposed Consultation Agreement. Woodside continues to be guided by NAC in relation to NAC's capacity and priorities to finalise the agreement.
Nganhurra Thanardi Garrbu Aboriginal Corporation (NTGAC)	In a meeting during August 2023, NTGAC proposed a Framework Agreement. This included terms for ongoing engagement such as frequency of consultation, participation, and content. NTGAC has also requested Woodside provide funding for an in-house environmental scientist to review material. Woodside agreed in principle to this approach and has requested a first draft of the Framework Agreement for consideration. Woodside have agreed to pay for YMAC's in-house scientist to attend NTGAC meetings to advise NTGAC.	Woodside has been responding to queries from NTGAC regarding various Environment Plans, who have passed information provided by Woodside onto their Environmental Scientist. Woodside provided a draft Consultation Agreement to NTGAC via YMAC in February 2024. Discussions about the agreement are continuing.	Woodside is in regular discussions with NTGAC regarding the draft proposed Consultation Agreement. Woodside continues to be guided by NTGAC in relation to NTGAC's capacity and priorities to finalise the agreement.

Yinggarda Aboriginal Corporation (YAC)	In August 2023, YAC requested Woodside provide a draft Framework Agreement for their consideration. Woodside has provided a draft Framework Agreement to YAC for review.	Woodside provided a draft Consultation Agreement to YAC in March 2024. Discussions about the agreement are continuing.	Woodside is in regular discussions with YAC regarding the draft proposed Consultation Agreement. Woodside continues to be guided by YAC in relation to YAC's capacity and priorities to finalise the agreement.
Robe River Kuruma Aboriginal Corporation (RRKAC)	RRKAC have noted that they are insufficiently resourced to engage further and respond to Woodside regarding EPs. Woodside assesses that a Framework Agreement could address this.	Woodside has on several occasions written to RRKAC offering to fund consultation meetings. Woodside will offer RRKAC a Framework Agreement which will propose funding, scope of work and timeframes to assist with consultation and ongoing consultation. If RRKAC are open to the proposal, it is intended to put forward a draft Framework Agreement to RRKAC.	Woodside continues to be guided by RRKAC in relation to RRKAC's capacity and priorities relating to an agreement.
Ngarluma Yindjibarndi Foundation Limited (NYFL)	NYFL and Woodside have an existing Agreement in place which enables quarterly communication about Woodside activities. NYFL has advised they are working with other First Nations organisations and representative Bodies developing a Framework Agreement.	Woodside provided a draft Consultation Agreement to NYFL in March 2024. NYFL responded with a quote for an initial review of the draft terms of agreement. Woodside supports funding requests that are reasonable and will seek to reach agreement on a funding proposal put forward by NYFL.	Woodside is in regular discussions with NYFL regarding the draft proposed Consultation Agreement and continues be guided by NYFL in relation to its progress.
Kariyarra Aboriginal Corporation (KAC)	In September 2023 KAC proposed an agreement which would include meeting arrangements, ongoing consultations, specialist advice and contact protocols.	Woodside supports funding requests that are reasonable and will seek to reach agreement on a funding proposal put forward by KAC. Woodside agrees that a Framework Agreement is a sound tool to set out ongoing consultation with KAC, funding arrangements and social investment opportunities that KAC would want explored. Woodside provided a draft Consultation Agreement to KAC in February 2024. Discussions about the agreement are continuing.	Woodside is in regular discussions with KAC regarding the draft proposed Consultation Agreement and continues be guided by KAC in relation to its progress.

APPENDIX H: OIL SPILL PREPAREDNESS AND RESPONSE MITIGATION ASSESSMENT

Oil Spill Preparedness and Response Mitigation Assessment for Pluto Facility Operations

Corporate HSE

Hydrocarbon Spill Preparedness

April 2025
Revision 0c

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EXECUTIVE SUMMARY

Woodside Burrup Pty Ltd (Woodside) has developed its oil spill preparedness and response position for the Pluto Facility Operations, hereafter known as the Petroleum Activities Program (PAP).

This document demonstrates that the risks and impacts from an unplanned hydrocarbon release, and the associated response operations, are controlled to as low as reasonably practicable (ALARP) and an acceptable level. It achieves this by evaluating response options to address the potential environmental impacts resulting from an unplanned loss of hydrocarbon containment associated with the PAP detailed in the Environment Plan (EP). This document then details Woodside's decisions and techniques for responding to a hydrocarbon release event and the process for determining its level of hydrocarbon spill preparedness.

A summary of the key facts and references to additional detail within this document are presented below.

Table 0-1: Summary of the key details for assessment

Key details of assessment	Summary	Reference to additional detail
Worst Case Credible Scenarios (WCCS)	Major Environmental Event-01 (MEE-01): long-term (77-day) subsurface release of Pluto Condensate caused by a loss of well containment from PLA02 well at 19° 54' 48.266" S, 115° 7' 54.151" E. 59,459 m^3 over 77 days of Pluto condensate. 2.53% residual component of 1504.3 m^3	Section 2.2.
	MEE-02b: loss of containment of the export pipeline at a location near-shore, releasing 607 metric tons (662 standard m^3) of Pluto condensate, with gas, over 8 hours at 20° 21' 0.81" S, 116° 42' 12.41" E. 0.5 % residual component of 3.31 m^3	
	Credible Scenario-05 (CS-05): Loss of vessel containment releasing 1000 m^3 of Marine Gas Oil (MGO) over 1 hour at the PLA platform 19° 59' 46.5" S 115° 22' 5.6" E. 5% residue of 50 m^3	
Hydrocarbon properties	**Pluto Condensate** Pluto Condensate (API 70.9) contains a high proportion (~68% by mass) of hydrocarbon compounds that will not evaporate at atmospheric temperatures. The unweathered mixture has a dynamic viscosity of 0.7032 cP. The pour point of the whole oil (< 15 °C) ensures that it will remain in a liquid state over the annual temperature range observed on the Northwest Shelf. The mixture is composed of hydrocarbons that have a wide range of boiling points and volatilities at atmospheric temperatures, and which will begin to evaporate at different rates on exposure to the atmosphere. Evaporation rates will increase with temperature, but in general about 67.97% of the oil mass should evaporate within the first 12 hours (BP < 180°C); a further 18.48% should evaporate within the first 12-24 hours (180°C < BP < 265 °C); and a further 10.05% should evaporate over several days (265 °C < BP < 380 °C). **Eris-1 Condensate** Eris-1 Condensate (API 41.3) contains a high proportion (~[66% by mass) of hydrocarbon compounds that will not evaporate at atmospheric temperatures. The unweathered mixture has a dynamic viscosity of 0.4.922 cP. The pour point of the whole oil (< 15 °C) ensures that it will remain in a liquid state over the annual temperature range observed on the Northwest Shelf. The mixture is composed of hydrocarbons that have a wide range of boiling points and volatilities at atmospheric temperatures, and which will begin to evaporate at different rates on exposure to the atmosphere. Evaporation rates will increase with temperature, but in general about 14.97% of the oil mass should evaporate within the first 12 hours (BP < 180°C); a further	Section 6.7 of the EP Appendix A of the Oil Pollution First Strike Plan

48.43% should evaporate within the first 12-24 hours (180°C < BP < 265 °C); and a further 26.6% should evaporate over several days (265 °C < BP < 380 °C).

Marine Gas Oil

Marine Diesel Oil (MGO) is typically classed as an International Tanker Owners Pollution Federation (ITOPF) Group I/II oil. Group I oils are non-persistent and tend to dissipate completely through evaporation within a few hours and do not normally form emulsions.

From modelling results it is predicted that around 6% of the release will be subject to a fairly rapid evaporation when on or around the surface of the water and around 95% in total is available to evaporate over time. It is predicted only 50m^3 of product would remain after several days from the bunkering scenario and there is no predicted shoreline contact or accumulation.

Modelling results

Stochastic modelling

A quantitative, stochastic assessment has been undertaken for credible spill scenarios to help assess the environmental risk of a hydrocarbon spill.

A total of 100 replicate simulations were completed for the modelled condensate scenarios and 200 for the MGO scenario to test for trends and variations in the trajectory and weathering of the spilled oil, with an even number of replicates completed using samples of metocean data that commenced within each calendar quarter.

Deterministic modelling

Deterministic modelling was then undertaken for scenario MEE-02b as the worst-case credible scenario (WCCS) to contact shoreline receptors to establish the following for response planning purposes:

- Minimum time to commencement of oil accumulation at any shoreline receptor (at a threshold of 100 g/m^2)
- Maximum cumulative oil volume accumulated at any individual shoreline receptor (at concentrations in excess of 100 g/m^2)
- Maximum cumulative oil volume accumulated across all shoreline receptors (at concentrations in excess of 100 g/m^2)

Stochastic modelling has been included below for MEE-01 and CS-05 to inform spill contact.

	MEE-01: loss of well containment from PLA02 well - 59,459 m^3 loss of Pluto condensate over 77 days	**MEE-02b: Hydrocarbon release the export pipeline – 607 tonnes 662 standard m^3) of Pluto condensate over 8 hours**	**CS-05: Loss of vessel containment releasing 1000 m^3 MGO over 1 hour**
Minimum time to floating hydrocarbon contact with the offshore edge(s) of any shoreline receptor polygon (at a concentration of 10 g/m^2)	Day 1 (1 hour) at Montebello Marine Park	No contact at this threshold	Day 1 (1 hour) at Montebello Marine Park
Minimum time to shoreline contact (above 100 g/m^2)	No contact at any of the assessed thresholds	Day 1 (21 hours) at Dampier Archipelago (9 m^3) (Run 48, Q2)	No contact at any of the assessed thresholds
Largest volume ashore at any single	No contact at any of the	9 m^3 at Dampier Archipelago (day	No contact at any of the

Section 2.3

	Response Protection Area (RPA) (above 100 g/m^2)	assessed thresholds	1, 21 hours) (Run 48, Q2)	assessed thresholds	
	Largest total shoreline accumulation (above 100 g/m^2) all shorelines	No contact at any of the assessed thresholds	9 m^3 at Dampier Archipelago (day 1, 21 hours) (Run 48, Q2)	No contact at any of the assessed thresholds	
	Minimum time to entrained/dissolved hydrocarbon contact with the offshore edges of any receptor polygon (at a threshold of 100 ppb)	Day 2 (34 hours) at Montebello Marine Park	Day 1 (22 hours) at Dampier Archipelago (Run 37, Q1)	Day 1 (1 hour) at Montebello Marine Park	
Net Environmental Benefit Analysis	Operational monitoring, source control, shoreline protection and deflection, shoreline clean-up, oiled wildlife response, are all identified as potentially having a net environmental benefit (dependent on the actual spill scenario) and carried forward for further assessment.				Section 4
ALARP evaluation of selected response techniques	The evaluation of the selected response techniques shows the proposed controls reduced the risk to an ALARP and an acceptable level for the risk presented in Section 2, without the implementation of considered additional, alternative or improved control measures.				Section 7

1 INTRODUCTION

1.1 Overview

Woodside Burrup Pty Ltd (Woodside) has developed its oil spill preparedness and response position for the Pluto Facility Operations, hereafter known as the Petroleum Activities Program (PAP). This document outlines Woodside's decisions and techniques for responding to a hydrocarbon loss of containment event and the process for determining its level of hydrocarbon spill preparedness.

1.2 Purpose

This document, together with the documents listed below, meet the requirements of the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth) (Environment Regulations) relating to hydrocarbon spill response arrangements.

- The Pluto Facility Operations Environment Plan (EP)
- Oil Pollution Emergency Arrangements (OPEA) (Australia)
- The Pluto Facility Operations Oil Pollution Emergency Plan (OPEP) including
  - First Strike Plan (FSP)
  - relevant operations plans
  - relevant Tactical Response Plans (TRPs)
  - relevant supporting plans
  - data directory.

1.3 Scope

This document demonstrates that the risks and impacts from an unplanned hydrocarbon release, and the associated response operations, are controlled to as low as reasonably practicable (ALARP) and an acceptable level. It achieves this by evaluating response options to address the potential environmental risks and impacts resulting from an unplanned loss of hydrocarbon containment associated with the PAP detailed in the EP. This document then details Woodside's decisions and techniques for responding to a hydrocarbon release event and the process for determining its level of hydrocarbon spill preparedness. It should be read in conjunction with the documents listed in Table 1-1. The location of the PAP is shown in Figure 3-1 of the EP.

1.4 Oil spill response document overview

The documents outlined in Table 1-1 and Figure 1-1 are collectively used to manage the preparedness and response for a hydrocarbon release.

The Oil Pollution First Strike Plan (FSP) contains a pre-operational Net Environmental Benefit Analysis (NEBA) summary, detailing the selected response techniques for this PAP. Relevant Operational Plans to be initiated for associated response techniques are identified in the FSP and relevant forms to initiate a response are appended to the FSP.

The process to develop an Incident Action Plan (IAP) begins once the Oil Pollution FSP is underway. The IAP includes inputs from the operational monitoring and the operational NEBA (Section 4). Planning, coordination and resource management are initiated by the Corporate Incident Management Team (CIMT). In some instances, technical specialists may be utilised to provide expert advice. The planning may also involve liaison officers from supporting government agencies.

During each operational period, field reports are continually reviewed to evaluate the effectiveness of response operations. In addition, the operational NEBA is continually reviewed and updated to confirm the response techniques implemented continue to result in a net environmental benefit (Section 4).

The response will continue as described in Section 5 until the response termination criteria have been met.

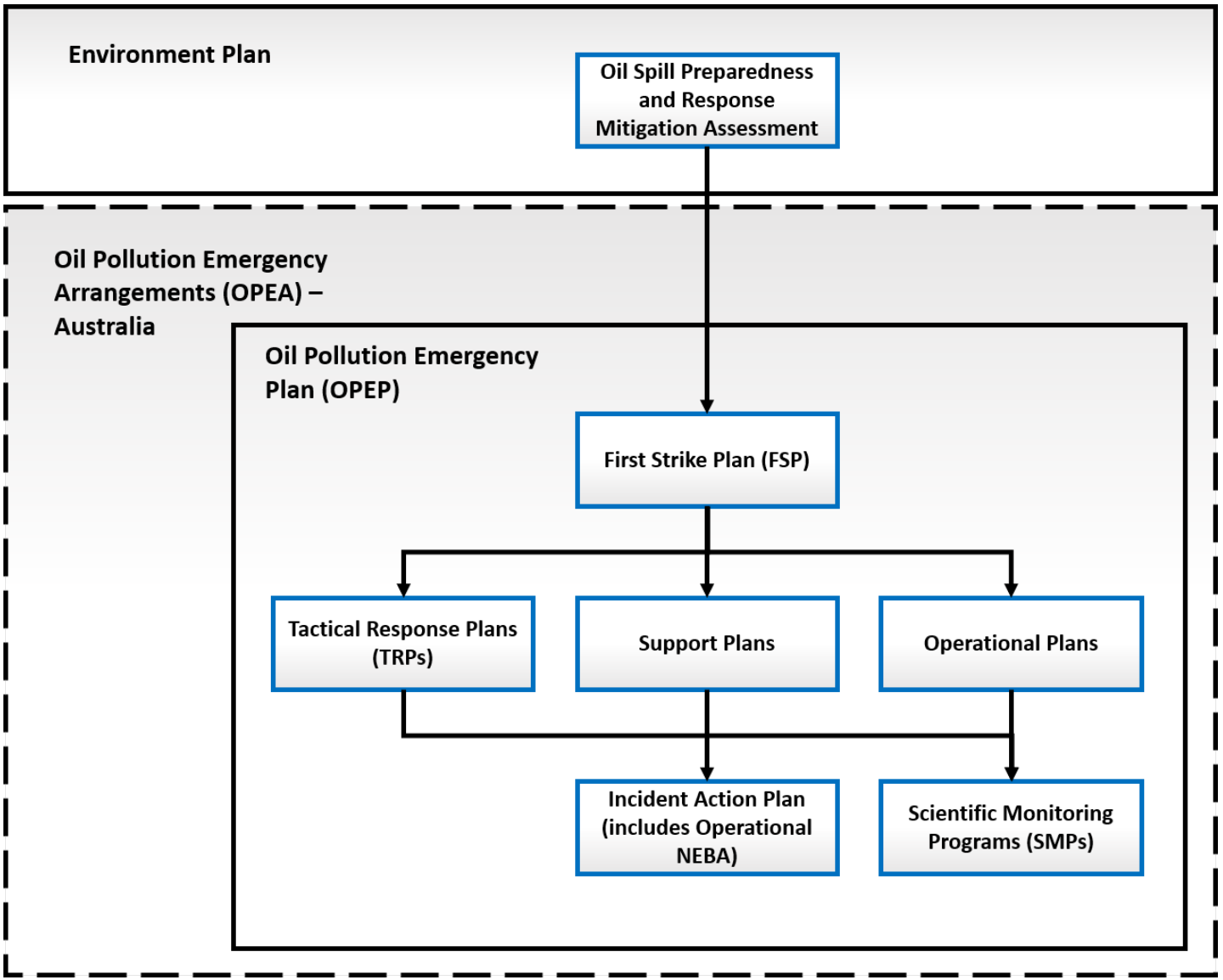

Figure 1-1: Woodside hydrocarbon spill document structure

Table 1-1: Hydrocarbon Spill preparedness and response – document references

Document	Document overview	Stakeholders	Relevant information	Document subsections (if applicable)
Pluto Facility Operations Environment Plan (EP)	Demonstrates that potential adverse impacts on the environment associated with the Pluto Facility Operations (during both routine and non-routine operations) are mitigated and managed to As Low As Reasonably Practicable (ALARP) and will be of an acceptable level.	NOPSEMA Woodside internal	EP Section 4 (Identification and evaluation of environmental risks and impacts, including credible spill scenarios). EP Section 6 (Performance outcomes, standards and measurement criteria). EP Section 7 (Implementation strategy – including emergency preparedness and response, and Reporting and compliance).	
Oil Pollution Emergency Arrangements (OPEA) Australia	Describes the arrangements and processes adopted by Woodside when responding to a hydrocarbon spill from a petroleum activity.	Regulatory agencies Woodside internal	All	
Oil Spill Preparedness and Response Mitigation Assessment for the Pluto Facility Operations (this document)	Evaluates response options to address the potential environmental impacts resulting from an unplanned loss of hydrocarbon containment associated with the PAP described in the EP.	Regulatory agencies Corporate Incident Management Team (CIMT): Control function in an ongoing spill response for activity-specific response information.	All Performance outcomes, standards and measurement criteria related to hydrocarbon spill preparedness and response are included in this document.	
Pluto Facility Operations Oil Pollution First Strike Plan	Facility specific document providing details and tasks required to mobilise a first strike response. Primarily applied to the first 24 hours of a response until a full Incident Action Plan (IAP) specific to the event is developed. Oil Pollution First Strike Plans are intended to be the first document used to provide immediate guidance to the responding	Site-based IMT for initial response, activation and notification. CIMT for initial response, activation and notification. CIMT: Control function in an ongoing spill response for activity-specific response information.	Initial notifications and reporting required within the first 24 hours of a spill event. Relevant spill response options that could be initiated for mobilisation in the event of a spill. Recommended pre-planned tactics. Details and forms for use in immediate response. Activation process for oil spill trajectory	

Document	Document overview	Stakeholders	Relevant information	Document subsections (if applicable)
	Incident Management Team (IMT).		modelling, aerial surveillance and oil spill tracking buoy details.	
Operational Plans	Lists the actions required to activate, mobilise and deploy personnel and resources to commence response operations. Includes details on access to equipment and personnel (available immediately) and steps to mobilise additional resources depending on the nature and scale of a release. Relevant operational plans will be initially selected based on the Oil Pollution First Strike Plan; additional operational plans will be activated depending on the nature and scale of the release.	CIMT: Operations and Logistics Sections for first strike activities. CIMT: Planning Section to help inform the IAP on resources available.	Locations from where resources may be mobilised. How resources will be mobilised. Details of where resources may be mobilised to and what facilities are needed once the resources arrive. Details on how to implement resources to undertake a response.	Operational monitoring Source Control Emergency Response Planning Guideline Vessel Shipboard Oil Pollution Emergency Plan (SOPEP) Protection and deflection Shoreline clean-up Oiled wildlife response Scientific monitoring program
Tactical Response Plans	Provides options for response techniques in selected RPAs. Provides site, access and deployment information to support a response at the location.	CIMT: Planning Section to help develop IAPs, and Logistics Section to assist with determining resources required.	Indicative response techniques. Access requirements and/or permissions. Relevant information for undertaking a response at that site. Where applicable, may include equipment deployment locations and site layouts.	For full list of relevant Tactical Plans for the Pluto Facility Operations oil spill response, refer to ANNEX E: Tactical Response Plans.
Support Plans	Support Plans detail Woodside's approach to resourcing and the provision of services during a hydrocarbon spill response.	CIMT: Operations, Logistics and Planning Sections.	Technique for mobilising and managing additional resources outside of Woodside's immediate preparedness arrangements.	Logistics Support Plan Aviation Support Plan Marine Support Plan Waste Management Plan – Australia Health and Safety Support Plan

Document	Document overview	Stakeholders	Relevant information	Document subsections (if applicable)
				Hydrocarbon Spill Responder Health Monitoring Guidelines People and Global Capability (Surge Labour Requirements) Support Plan Stakeholder Engagement Support Plan Guidance for Hydrocarbon Spill Claims Management

2 RESPONSE PLANNING PROCESS

This document details Woodside's process for identifying potential response options for the hydrocarbon release scenarios, identified in the EP. Figure 2-1 details the interaction between Woodside's response, planning/ preparedness and selection process.

This structure has been used because it shows how the planning and preparedness activities inform a response and provides indicative guidance on what activities would be undertaken, in sequential order, if a real event were to occur. The process also evaluates alternative, additional and/or improved control measures specific to the PAP.

The Pluto Facility Operations Oil Pollution First Strike Plan then summarises the outcome of the response planning process and provides initial response guidance and a summary of ongoing response activities, if an incident were to occur.

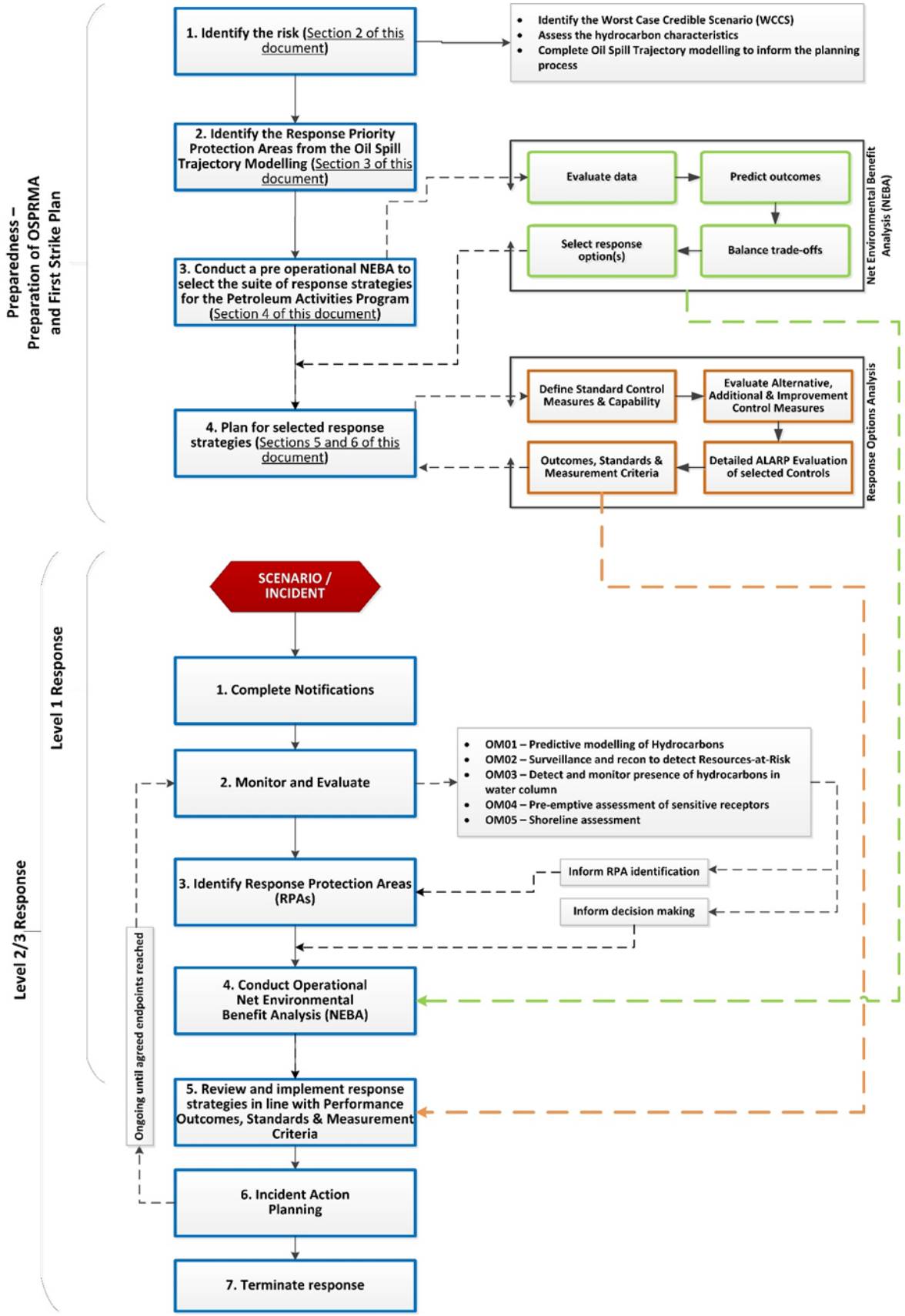

Figure 2-1: Response planning and selection process

2.1 Response planning process outline

This document is expanded below to provide additional context on the key steps in determining capability, evaluating ALARP and hydrocarbon spill response requirements.

Section 1. INTRODUCTION

Section 2. RESPONSE PLANNING PROCESS

- identification of worst-case credible scenario(s) (WCCS)
- spill modelling for WCCS.

Section 3. IDENTIFY RESPONSE PROTECTION AREAS (RPAs)

- areas predicted to be contacted at concentration >100 g/m^2.

Section 4. NET ENVIRONMENTAL BENEFIT ANALYSIS (NEBA)

- pre-operational NEBA (during planning/ALARP evaluation): this must be reviewed during the initial response to an incident to confirm its accuracy
- selected response techniques prioritised and carried forward for ALARP assessment.

Section 5. HYDROCARBON SPILL ALARP PROCESS

- determines the response need based on predicted consequence parameters
- details the environmental performance of the selected response options based on need
- sets the environmental performance outcomes, environmental performance standards and measurement criteria.

Section 6. ALARP EVALUATION

- evaluates alternative, additional, and improved options for each response technique to demonstrate the risk has been reduced to ALARP
- provides a detailed ALARP assessment of selected control measure options against:
  - predicted cost associated with implementing the option
  - predicted change to environmental benefit
  - predicted effectiveness / feasibility of the control measure.

Section 7. ENVIRONMENTAL RISK ASSESSMENT OF SELECTED RESPONSE TECHNIQUES

- evaluation of impacts and risks from implementing selected response options.

Section 8. ALARP CONCLUSION

Section 9. ACCEPTABILITY CONCLUSION

2.1.1 Response Planning Assumptions

Figure 2-2 illustrates the initial steps of a response to an oil spill event and, where available, the indicative timing. For the latter stages, the timing will be specific to the selective response option.

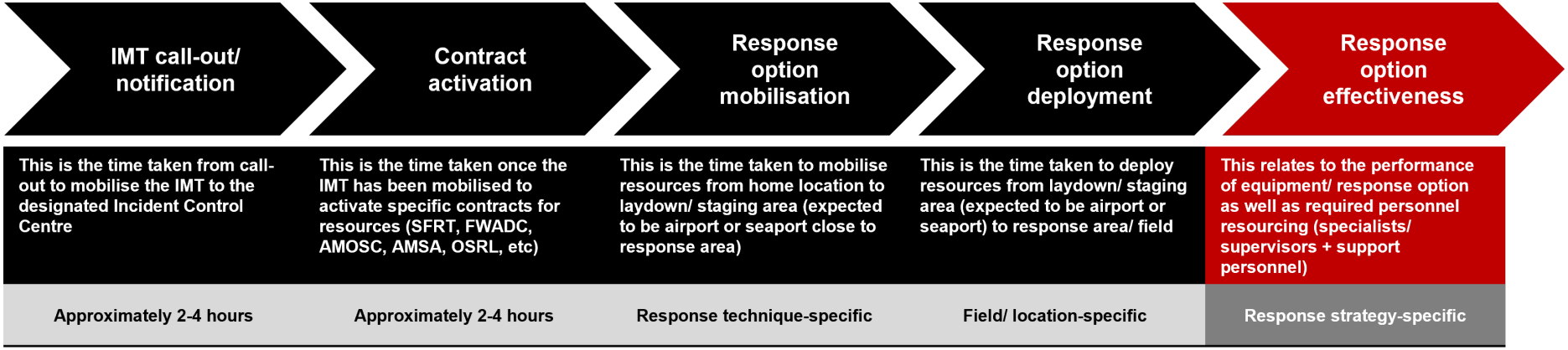

Figure 2-2: Response planning assumption – timing, resourcing and effectiveness

2.2 Environment plan risk assessment (credible spill scenarios)

Potential hydrocarbon release scenarios from the PAP have been identified during the risk assessment process (Section 4 of the EP). Further descriptions of risk, impacts and mitigation measures (which are not related to hydrocarbon preparedness and response) are provided in Section 6 of the EP. Six unplanned events or credible spill scenarios for the PAP have been selected as representative across types, sources and incident/response levels, up to and including the WCCS.

Table 2-1 presents the credible scenarios for the PAP. The WCCS(s) for the activity are then used for response planning purposes, as all other scenarios are of a lesser scale and extent. By demonstrating capability to manage the response to the WCCS(s), Woodside assumes other scenarios that are smaller in nature and scale can also be managed by the same capability. Response performance measures have been defined based on a response to the WCCS(s).

The LOWC scenario at PLA02 platform (MEE-01) has been modelled and is considered to determine the WCCS for source control response planning purposes. Although the release volumes are smaller for the trunkline subsea release (MEE-02b), this results in larger shoreline loading and has therefore been selected for response planning and scaling of the shoreline response.

Table 2-1: PAP credible spill scenarios

Credible Spill Scenarios	Scenario selected for planning purposes	Scenario description	Maximum credible volume released (liquid m^3)[1]	Incident level	Hydrocarbon type	Residual proportion	Residual volume (m^3)
CS-01	No	A long-term (64-day) release of Eris-1 condensate caused by a loss of well containment during drilling at the Xena-03 well. The release occurring at the sea surface for 5 days, evolving to release from seabed level for the remaining 59 days	Spilled volume: 46,631 m^3 (1880 m^3 at the surface, 44,751 m^3 subsea) Release depth: 0 m for 5 days, 178 m for 59 days	3	Eris-1 Condensate	Surface: 10.01% Seabed: 3.39%	Surface: 4,666.78 m^3 Seabed: 1,580.79 m^3
MEE-01 (WCCS)	Yes	A long-term (77-day) subsurface release of Pluto Condensate caused by a loss of well containment from PLA02 well	Spilled volume: 59,459 m^3 Release depth: 829 m Spill duration: 77 Days	3	Pluto Condensate	2.53%	1504.31 m^3
MEE-02a	No	Loss of containment of the export trunkline at 29 km from Pluto A	Spilled volume: 479 metric tons (632 standard m^3) Release depth: 78 m Spill duration: 8 hours	1/2	Pluto Condensate	0.5%	3.16 m^3
MEE-02b (WCCS)	Yes	Loss of containment of the export trunkline at a location near-shore	Spilled volume: 607 metric tons (662 standard m^3) Release depth: 41 m Spill duration: 8 hours	1/2	Pluto Condensate	0.5%	3.31 m^3
CS-05	No	Loss of vessel containment at the PLA platform	Spilled volume: 1000 m^3 Release depth: surface Spill duration: 1 hour	1/2	MGO	5.0%	50 m^3

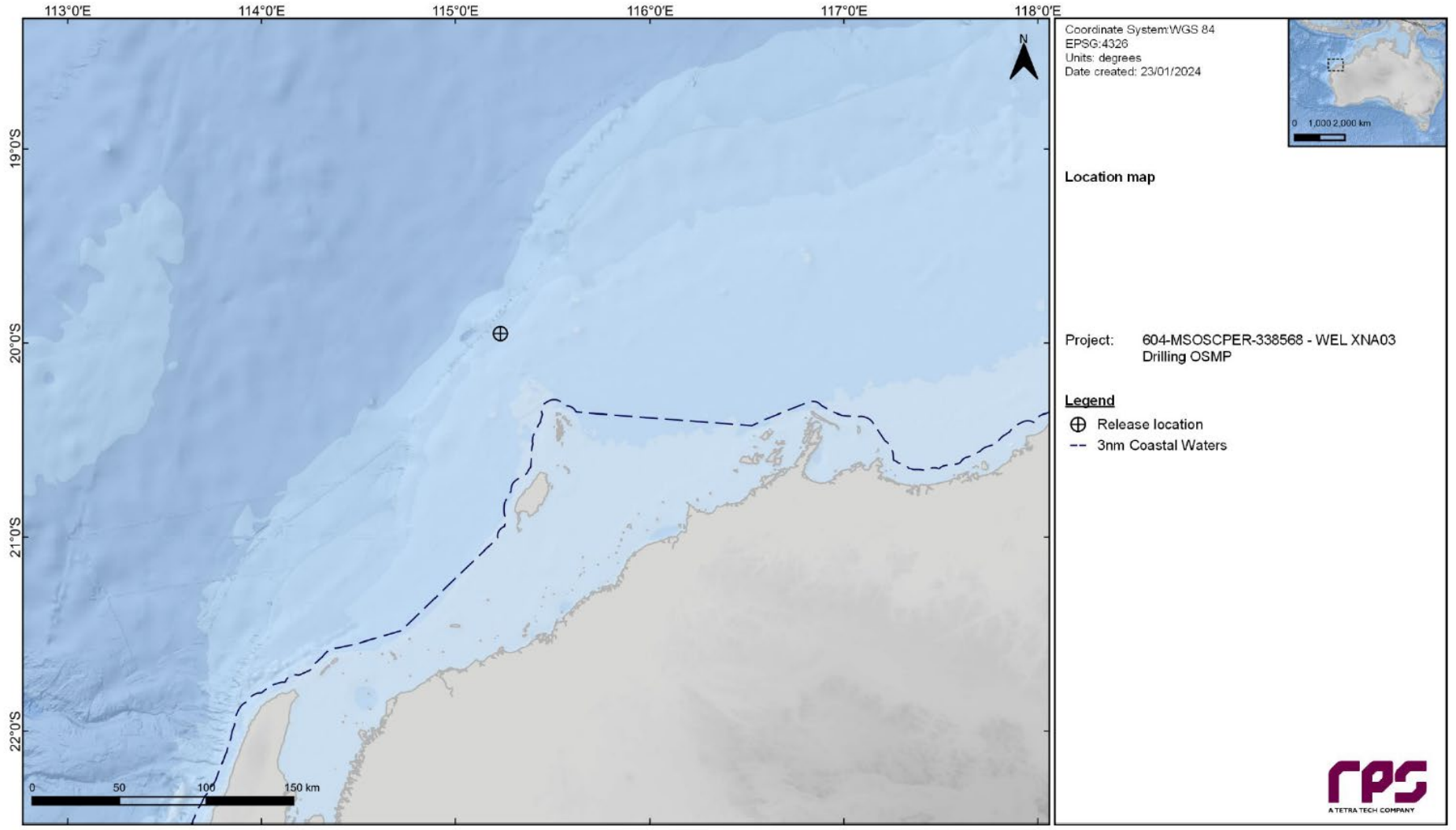

Figure 2-3: Location of CS-01 – A release of Eris-1 condensate (46,631 m^3) caused by a loss of well containment during drilling at the Xena-03 well

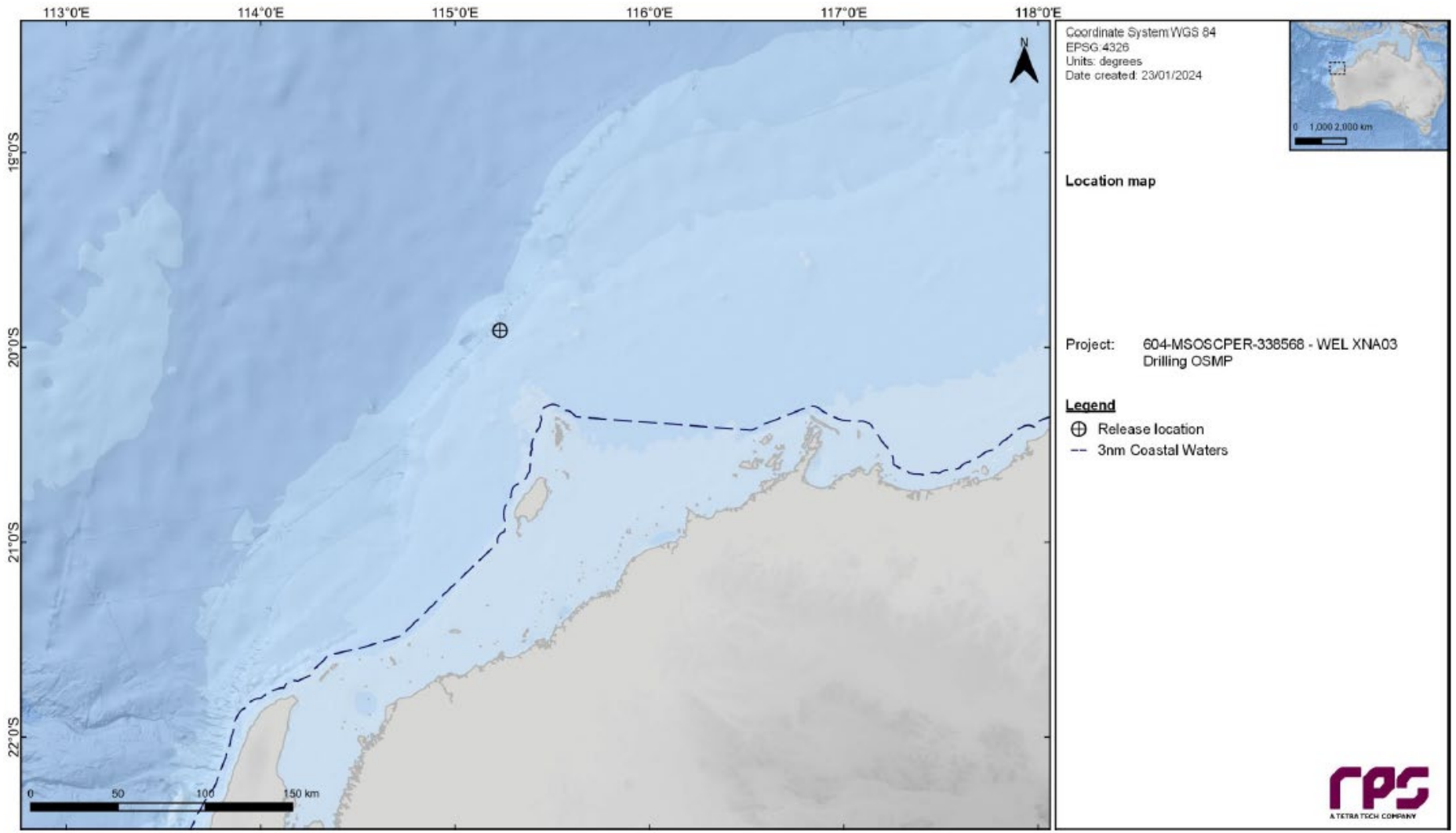

Figure 2-4: Location of MEE-01 – A subsurface release of Pluto Condensate (59,459 m^3) caused by a loss of well containment from PLA02 well

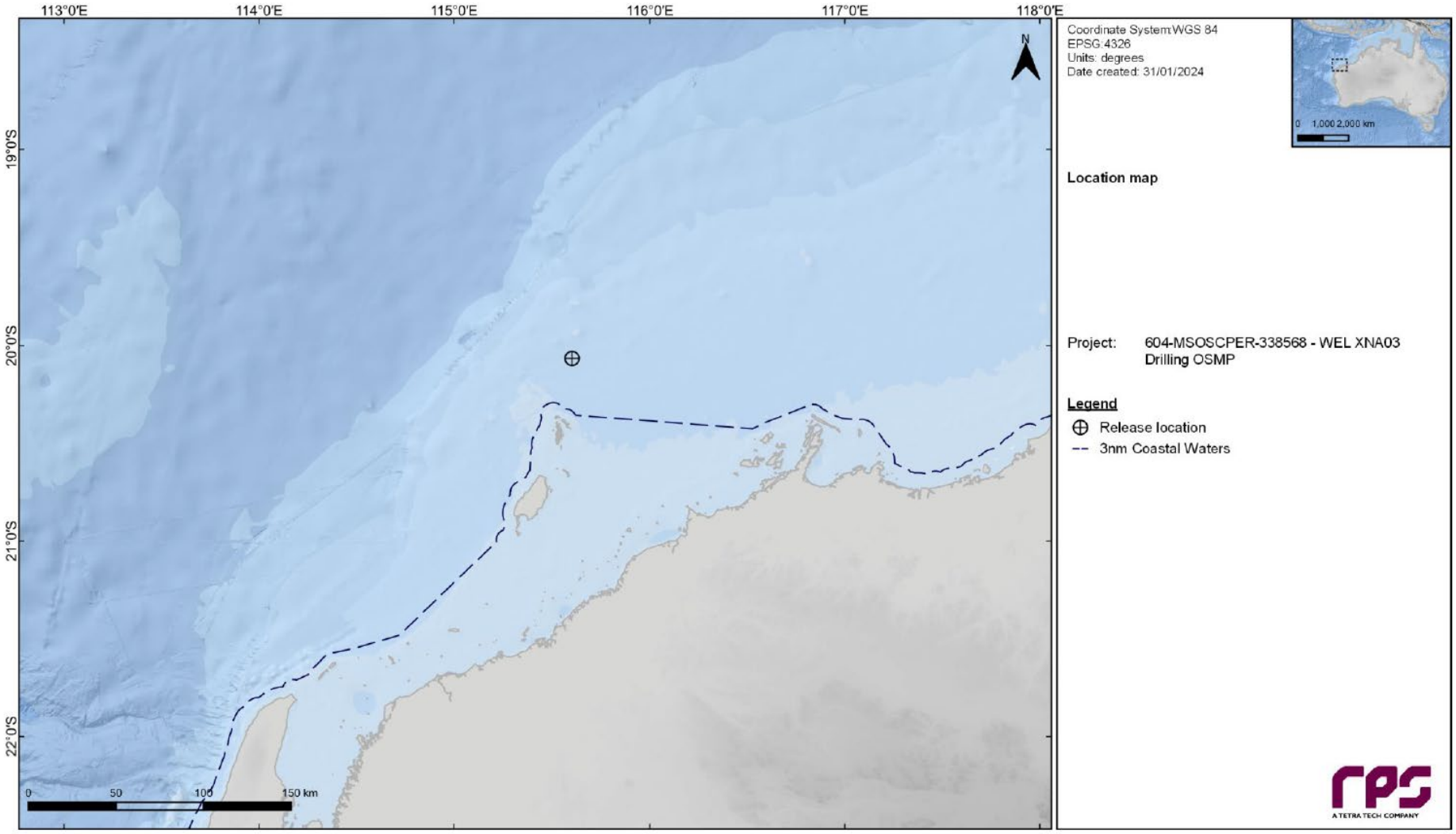

Figure 2-5: Location of MEE-02a – Loss of containment of the export trunkline at 29 km from Pluto A, releasing 479 metric tons of Pluto condensate, with gas, over 8 hours

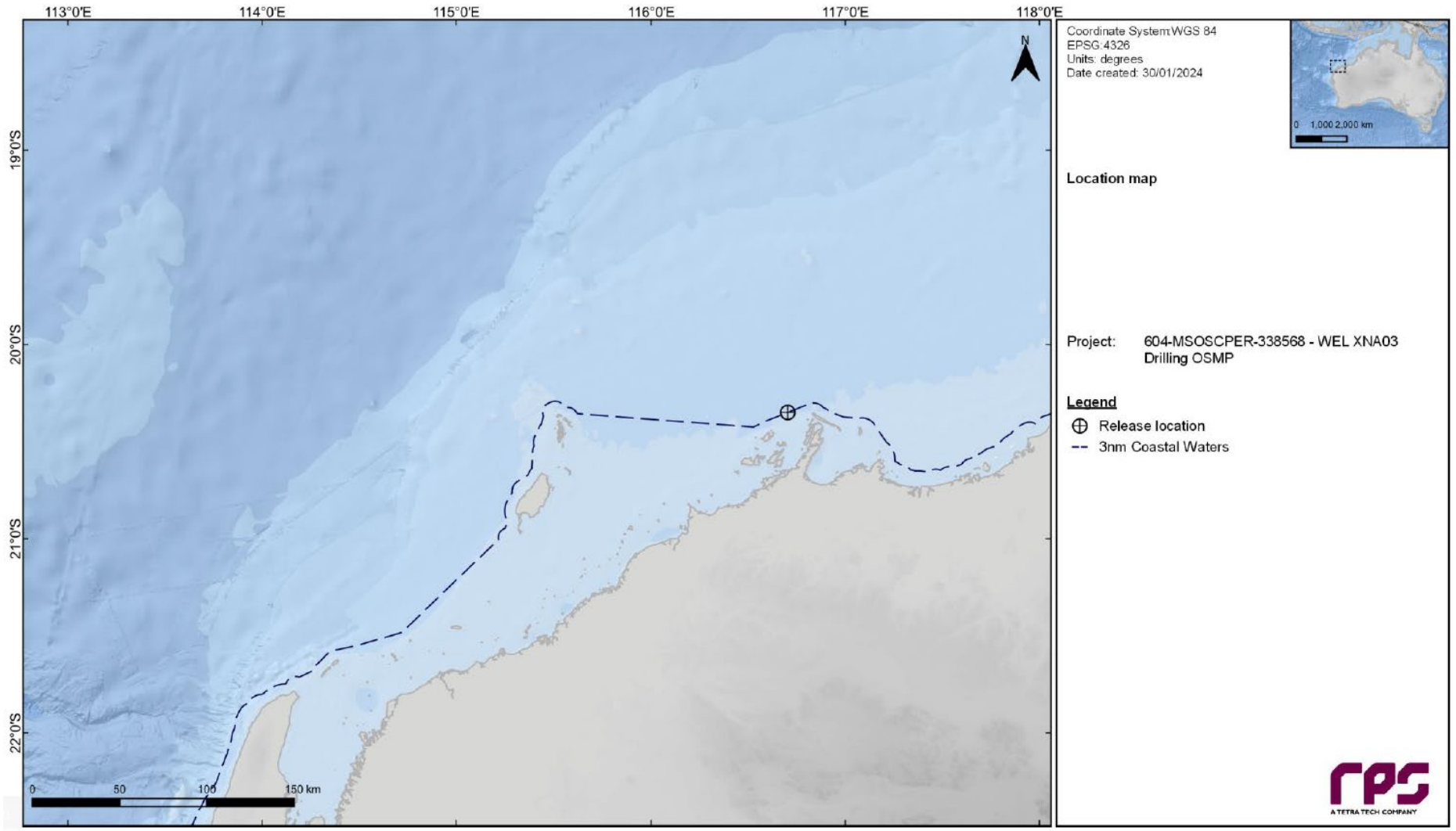

Figure 2-6: Location of MEE-02b- Loss of containment of the export trunkline at the State Water boundary (3nm), releasing 607 metric tons of Pluto condensate, with gas, over 8 hours.

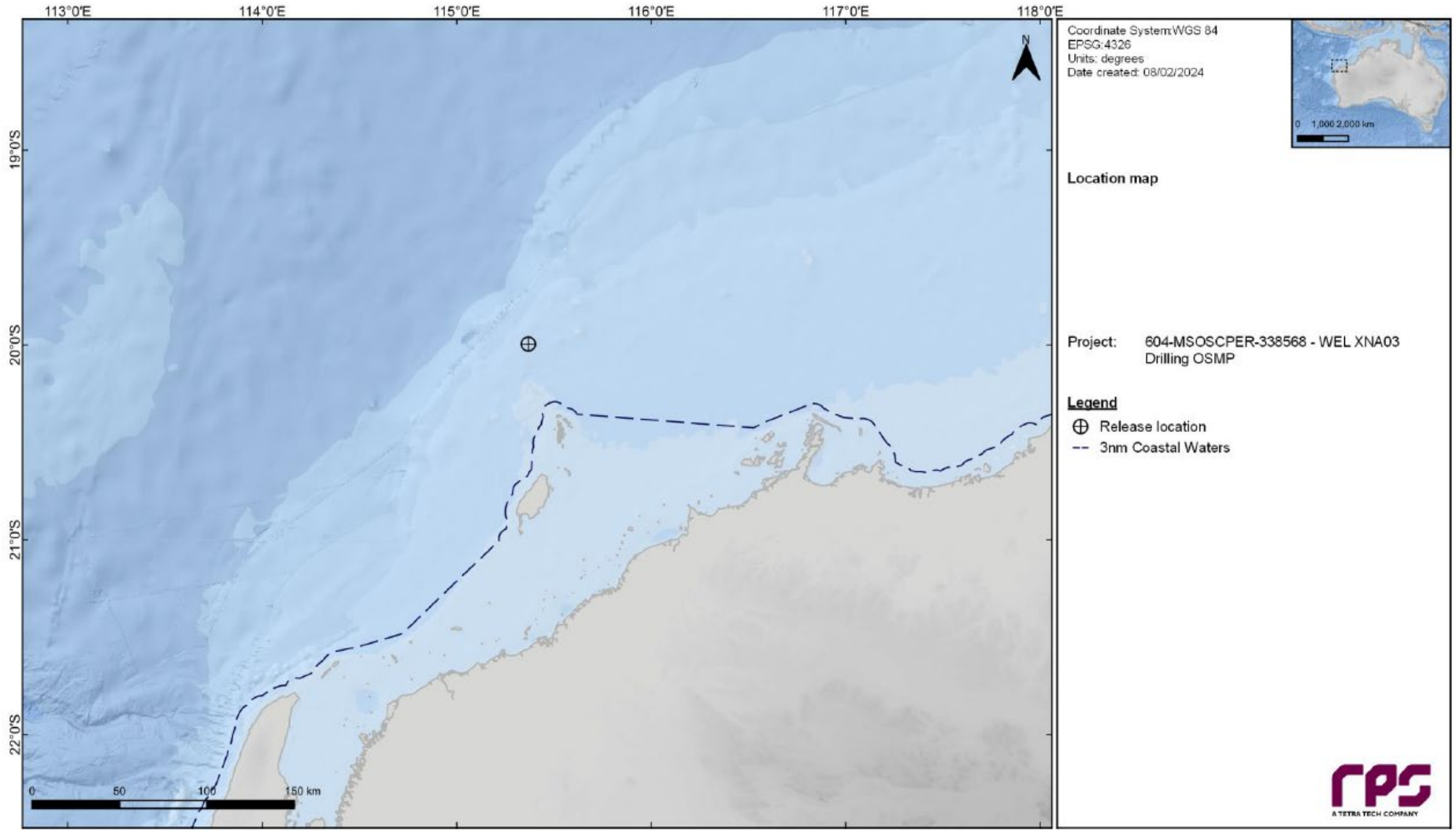

Figure 2-7: Location of CS-05 – Loss of vessel containment at the PLA platform, releasing 1000 m^3 of Marine Gas Oil (MGO) over 1 hour

2.2.1 Hydrocarbon characteristics

Hydrocarbon characteristics, including modelled weathering data and ecotoxicity, are included in Section 6.7.3 of the EP.

Pluto Condensate – Operations activities (MEE-01, MEE-02a and MEE-02b)

Pluto Condensate (API 70.9°) contains a relatively high proportion (~68% by mass) of hydrocarbon compounds that will not evaporate at atmospheric temperatures. These compounds are expected to persist in the marine environment.

The unweathered mixture has a dynamic viscosity of 0.7032 cP. The pour point of the whole oil (<15 °C) ensures that it will remain in a liquid state over the annual temperature range observed on the North West Shelf. The mixture is composed of hydrocarbons that have a wide range of boiling points and volatilities at atmospheric temperatures, and which will begin to evaporate at different rates on exposure to the atmosphere. Evaporation rates will increase with temperature, but in general about ~68% of the oil mass should evaporate within the first 12hours (BP < 180 °C); a further ~19% should evaporate within the first 12-24hours (180°C < BP < 265 °C); and a further ~10% should evaporate over several days (265 °C < BP < 380°C).

Soluble aromatic hydrocarbons contribute approximately 9.83% by mass of the whole oil, with a large proportion (6.93%) in the C4-C10 range of hydrocarbons. These compounds will evaporate slowly, leaving the potential for dissolution of a proportion of them into the water.

Eris-1 Condensate – Tie-back activities (CS-01)

Eris-1 Condensate (surface API 41.3°, seabed API 58.2°) contains a relatively high proportion (~66% by mass) of hydrocarbon compounds that will not evaporate at atmospheric temperatures. These compounds are expected to persist in the marine environment.

The unweathered mixture has a dynamic viscosity of 0.4.922 cP at the surface and 0.68 cP at the seabed. The pour point of the whole oil (<15 °C) ensures that it will remain in a liquid state over the annual temperature range observed on the North West Shelf. The mixture is composed of hydrocarbons that have a wide range of boiling points and volatilities at atmospheric temperatures, and which will begin to evaporate at different rates on exposure to the atmosphere.

Evaporation rates at the surface will increase with temperature, but in general about ~15% of the oil mass should evaporate within the first 12hours (BP < 180 °C); a further ~49% should evaporate within the first 12-24hours (180°C < BP < 265 °C); and a further ~27% should evaporate over several days (265 °C < BP < 380°C). Evaporation rates at the seabed will increase with temperature, but in general about 65.99% of the oil mass should evaporate within the first 12hours (BP < 180 °C); a further 21.6% should evaporate within the first 12-24hours (180°C < BP < 265 °C); and a further 9.02% should evaporate over several days (265 °C < BP < 380°C).

Soluble aromatic hydrocarbons contribute approximately 9.85% (surface) and 9.84% (seabed) by mass of the whole oil, with a large proportion (6.72%) in the C4-C10 range of hydrocarbons. These compounds will evaporate slowly, leaving the potential for dissolution of a proportion of them into the water.

Marine Gas Oil

Marine Gas Oil (MGO) is typically classed as an International Tanker Owners Pollution Federation (ITOPF) Group I/II oil. Group I oils are non-persistent and tend to dissipate completely through evaporation within a few hours and do not normally form emulsions.

From modelling results it is predicted that around 6% of the release will be subject to a fairly rapid evaporation when on or around the surface of the water and around 95% in total is available to evaporate over time. It is predicted only 50 m^3 of product would remain after several days from the bunkering scenario and there is no predicted shoreline contact or accumulation.

2.3 Hydrocarbon spill modelling

Oil spill trajectory modelling (OSTM) tools are used for environmental impact assessment and during response planning to understand spatial scale and timeframes for response operations. Woodside recognises there is a degree of uncertainty related to the use of modelling data and has subsequently utilised conservative approaches to volumes, weathering, spatial areas, timing and response effectiveness to scale capability to need.

The Oil Spill Model and Response System (OILMAP) and Integrated Oil Spill Impact Model System (SIMAP) models are both used for stochastic and deterministic trajectory modelling. They have been developed over three decades of planning, exercises, actual responses, several peer reviews, and validation studies. OILMAP was originally derived from the United States Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Type A model (French et al. 1996), for assessing marine transport, biological impact and economic damage that was also used under the United States Oil Pollution Act 1990 Natural Resource Damage Assessment (NRDA) regulations. Notable spills where the model has been used and validated against actual field observations include, Exxon Valdez (French McCay 2004), North Cape Oil Spill (French McCay 2003), along with an assessment of 20 other spills (French McCay and Rowe, 2004). In addition, test spills designed to verify fate, weathering and movement algorithms have been conducted regularly and in a range of climate conditions (French and Rines 1997; French et al. 1997; Payne et al. 2007; French McCay et al. 2007).

Further to this, the algorithms have been updated using the latest findings from the Macondo/Deepwater Horizon well blowout in the Gulf of Mexico and validated according to the Deepwater Horizon (DWH) oil spill in support of the NRDA (Spaulding et al. 2015; French McCay et al. 2015, 2016). Finally, the OILMAP and SIMAP models have been used extensively in Australia to prosecute pollution offences, predict discharge locations and likely spill volumes based on weathering and surveillance observations, and has been used as expert witness evidence in Australian court proceedings, aiding the prosecution to determine spill quantum estimates.

2.3.1 Stochastic modelling

Quantitative, stochastic assessments have been undertaken for the credible spill scenarios (refer to Table 2-1) to help assess the environmental consequences of a hydrocarbon spill.

A total of 100 replicate simulations were completed for each of the scenarios to test for trends and variations in the trajectory and weathering of the spilled oil, with an even number of replicates completed using samples of metocean data that commenced within each calendar quarter (25 simulations per quarter). Further details relating to the assessments for the scenarios can be found in Section 6 of the EP.

2.3.1.1 Environmental impact thresholds – Environment that May Be Affected (EMBA) and hydrocarbon exposure

The outputs of the stochastic spill modelling are used to assess the potential environmental impact from the credible scenarios. The stochastic modelling results are used to delineate areas of the marine and shoreline environment that could be exposed to hydrocarbon levels exceeding environmental impact threshold concentrations. The summary of all the locations where hydrocarbon thresholds could be exceeded by any of the simulations modelled is defined as the EMBA and is discussed further in Section 6 of the EP. As the weathering of different fates of hydrocarbons (surface, entrained and dissolved) differs due to the influence of the metocean mechanism of transportation, a different EMBA is presented for each fate within the EP.

A conservative approach – adopting accepted accumulation thresholds for impacts on the marine environment – is used to define the EMBA. These hydrocarbon thresholds are presented in Table 2-2 below and described in Section 6 of the EP.

Table 2-2: Summary of thresholds applied to the stochastic hydrocarbon spill modelling to determine the EMBA and environmental impacts

Hydrocarbon	Surface hydrocarbon (g/m^2)	Dissolved hydrocarbon (ppb)	Entrained hydrocarbon (ppb)	Accumulated hydrocarbon (g/m^2)
Condensate	10	50	100	100
Diesel	10	50	100	100

2.3.2 Deterministic modelling

Woodside uses deterministic modelling results to evaluate risks and impacts and response capability requirements. These results are provided in both shapefile and data table format with each row of the data table representing a 1 km^2 cell. This cell size has been used as it represents the approximate area a single containment and recovery operation or surface dispersant operation (single sortie or vessel spraying) can effectively treat in one ten (10) hour day. Smaller cell sizes have been considered but would not change the response need as the potential distance between cells would not allow multiple cells to be treated per day by

response operations. Additionally, a 1 km^2 cell is expected to allow averaging of threshold concentrations and mass across the spatial extent to represent a conservative approach (patches of oil and windrows) to response planning that simulates operational monitoring feedback in a real event.

Deterministic modelling was carried out on CS-01 and CS-02 as the WCCSs and used for response planning purposes. A sample of the deterministic results is provided below as an indication of the data format and content.

- Column A and B provide the latitude and longitude of the cell
- Column C is the elapsed time since the release occurred
- Column D represents the average concentration across the cell in g/m2
- Column E represents the viscosity of the hydrocarbon in centistokes (cSt) at sea surface temperature
- Column F and G represents the mass of hydrocarbon across the entire cell in kg and tons respectively.

Table 2-3: Example deterministic modelling data

Latitude	Longitude	Time_hour	Conc_gm^2	Visc_cSt	Mass_kg	Mass_tons
A	B	C	D	E	F	G
-19.711226	115.814366	6	6.413877	81.007389	6429.693282	6.413877
-19.702194	115.814366	6	1.740181	81.300190	1744.571745	1.740181
-19.720258	115.823922	6	1.869578	76.440503	1874.078751	1.869578
-19.711226	115.823922	6	51.471109	80.668490	51597.969472	51.471109
-19.702194	115.823922	6	4.734574	80.068396	4746.515274	4.734574
-19.720258	115.833477	6	4.879617	58.780817	4891.356945	4.879617
-19.711226	115.833477	6	36.161301	70.992921	36250.382543	36.161301

The deterministic modelling data provides an indication of the response need by displaying the potential surface area and volume treated or recovered by response operations. Existing capability is reviewed to approximate the surface area and volumes that can be treated or removed and a range of alternate, improved and additional options to reduce risks and impacts to ALARP are considered.

Woodside recognises no single response technique will treat all available subsea or surface oil and a combination of response techniques will be required for the identified scenario. Even with the significant resources available to Woodside through existing capability and third-party resources, the primary offshore response techniques of surface dispersant application and containment and recovery will only treat or recover a minor proportion (<30%) of the available surface hydrocarbons based on previous response experience.

Woodside is committed to a realistic, scalable response capability commensurate to the level of risk and able to be practically implemented and feasibly sustained.

2.3.3 Response planning thresholds for surface and shoreline hydrocarbon exposure

Thresholds to determine the EMBA are used to predict and assess environmental impacts and inform the Scientific Monitoring Program (SMP), however they do not appropriately represent the thresholds at which an effective response can be implemented. Additional response thresholds are used for response planning and to determine areas where response techniques would be most effective. The deterministic modelling is then used to assess the nature and scale of a response.

In the event of an actual response, existing deterministic modelling would be reviewed for suitability and additional modelling would be conducted using real-time data and field information to inform IMT decisions.

The deterministic spill modelling outputs are presented at response planning thresholds for surface hydrocarbons for the WCCS. Surface spill concentrations are expressed as grams per square metre (g/m^2). The thresholds used are derived from oil spill response planning literature and industry guidance and are summarised below.

2.3.3.1 Surface hydrocarbon concentrations

Table 2-4: Surface hydrocarbon thresholds for response planning

Surface hydrocarbon threshold (g/m^2)	Description	Bonn Agreement Oil Appearance Code	Mass per area (m^3/km^2)
>10	Predicted minimum threshold for commencing operational monitoring[1]	Code 3 – Dull metallic colours	5 to 50
50	Predicted minimum floating oil threshold for containment and recovery and surface dispersant application [2]	Code 4 – Discontinuous true oil colour	50 to 200
100	Predicted optimum floating oil threshold for containment and recovery and surface dispersant application	Code 5 – Continuous true oil colour	>200
Shoreline hydrocarbon threshold (g/m^2)	**Description**	**National Plan Guidance on Oil Contaminated Foreshores**	**Mass per area (m^3/km^2)**
100	Predicted minimum shoreline accumulation threshold for shoreline assessment operations	Stain	>100
250	Predicted minimum threshold for commencing shoreline clean-up operations	Level 3 – Thin Coating	200 to 1000

The surface thickness of oil at which dispersants are typically effective is approximately 100 g/m^2. However, substantial variations occur in the thickness of the oil within the slick, and most fresh crude oils spread within a few hours, so that overall the average thickness is 0.1 mm (or approximately 100 g/m^2) (ITOPF, 2011). Additionally, the recommended rate of application for surface dispersant is typically one-part dispersant to 20 or 25 parts of spilled oil. These figures assume a 0.1 mm slick thickness, averaged over the thickest part of the spill, to calculate a litres/hectare application rate from vessels and aircraft. In practice this can be difficult to achieve as it is not possible to accurately assess the thickness of the floating oil.

Some degree of localised over-dosage and under-dosage is inevitable in dispersant response. An average oil layer thickness of 0.1 mm is often assumed, although the actual thickness can vary over a wide range (from less than 0.0001 mm to more than 1 mm) over short distances (International Petroleum Industry Environment Conservation Association [IPIECA] 2015).

Guidance from the Australian Maritime Safety Authority (AMSA, 2020) indicates spreading of spills of Group II or III products will rapidly decrease slick thickness over the first 24 hours of a spill resulting in the potential requirement of up to a ten-fold increase in capability on day 2 to achieve the same level of performance.

Further guidance from the European Maritime Safety Authority (EMSA) states spraying the 'metallic' looking area of an oil slick (Bonn Agreement Oil Appearance Code (BAOAC) 3, approximately 5 – 50 µm) with dispersant from spraying gear designed to treat an oil layer 0.1 mm (100 µm) thick, will inevitably cause dispersant over-treatment by a factor of 2 to 20 times (EMSA 2012).

Therefore, dispersant application should be concentrated on the thickest areas of an oil slick and Woodside intends on applying surface dispersants to only BAOAC 4 and 5. Spraying areas of oil designated as BAOAC Code 4 (Discontinuous true oil colour) with dispersant will, on average, deliver approximately the recommended treatment rate of dispersant.

Spraying areas of oil designated as BAOAC Code 5 with dispersant (Continuous true oil colour and more than 0.2 mm thick) will, on average, deliver approximately half the recommended treatment rate of dispersant.

[1] Operational monitoring will be undertaken from the outset of a spill whether or not this threshold has been reached. Monitoring is needed throughout the response to assess the nature of the spill, track its location and inform the need for any additional monitoring and/or response techniques. It also informs when the spill has entered State Waters and control of the incident passes to statutory authorities e.g. Western Australia Department of Transport (WA DoT) or AMSA.

[2] At 50 g/m^2, containment and recovery and surface dispersant application operations are not expected to be particularly effective. This threshold represents a conservative approach to planning response capability and containing the spread of surface oil.

Repeated application of these areas of thicker oil, or increased dosage ratios, will be required to achieve the recommended treatment rate of dispersant (EMSA 2012).

Guidance from the National Oceanic and Atmospheric Administration (NOAA) in the United States is found in the document: *Characteristics of Response Strategies: A Guide for Spill Response Planning in Marine Environments 2013 (NOAA 2013).* This guide outlines advice for response planning across all common techniques, including surface dispersant spraying and containment and recovery. It states oil thickness can vary by orders of magnitude within distinct areas of a slick, thus the actual slick thickness and oil distribution of target areas are crucial for determining response method feasibility. Further to this, ITOPF also states in terms of oil spill response, sheen can be disregarded as it represents a negligible quantity of oil, cannot be recovered or otherwise dealt with to a significant degree by existing response techniques, and is likely to dissipate readily and naturally (ITOPF, 2014a and 2014b).

Figure 2-8 from AMSA's Identification of Oil on Water – Aerial Observation and Identification Guide (AMSA, 2014) shows expected percent coverage of surface hydrocarbons as a proportion of total surface area. Windrows, heavy oil patches and tar balls, for example, must be considered, as they influence oil encounter rates, chemical dosages and ignition potential. Each method has different thickness thresholds for effective response.

From this information and other relevant sources (Allen and Dale, 1996, EMSA, 2012, Spence, 2018) the surface threshold of 50 g/m^2 was chosen as an average/equilibrium thickness (50 g/m^2 is an average of 50% coverage of 0.1 mm Bonn Agreement Code 4 – discontinuous true oil colour, or 25% coverage of 0.2 mm Bonn Agreement Code 5 – continuous true oil colour which would represent small patches of thick oil or windrows).

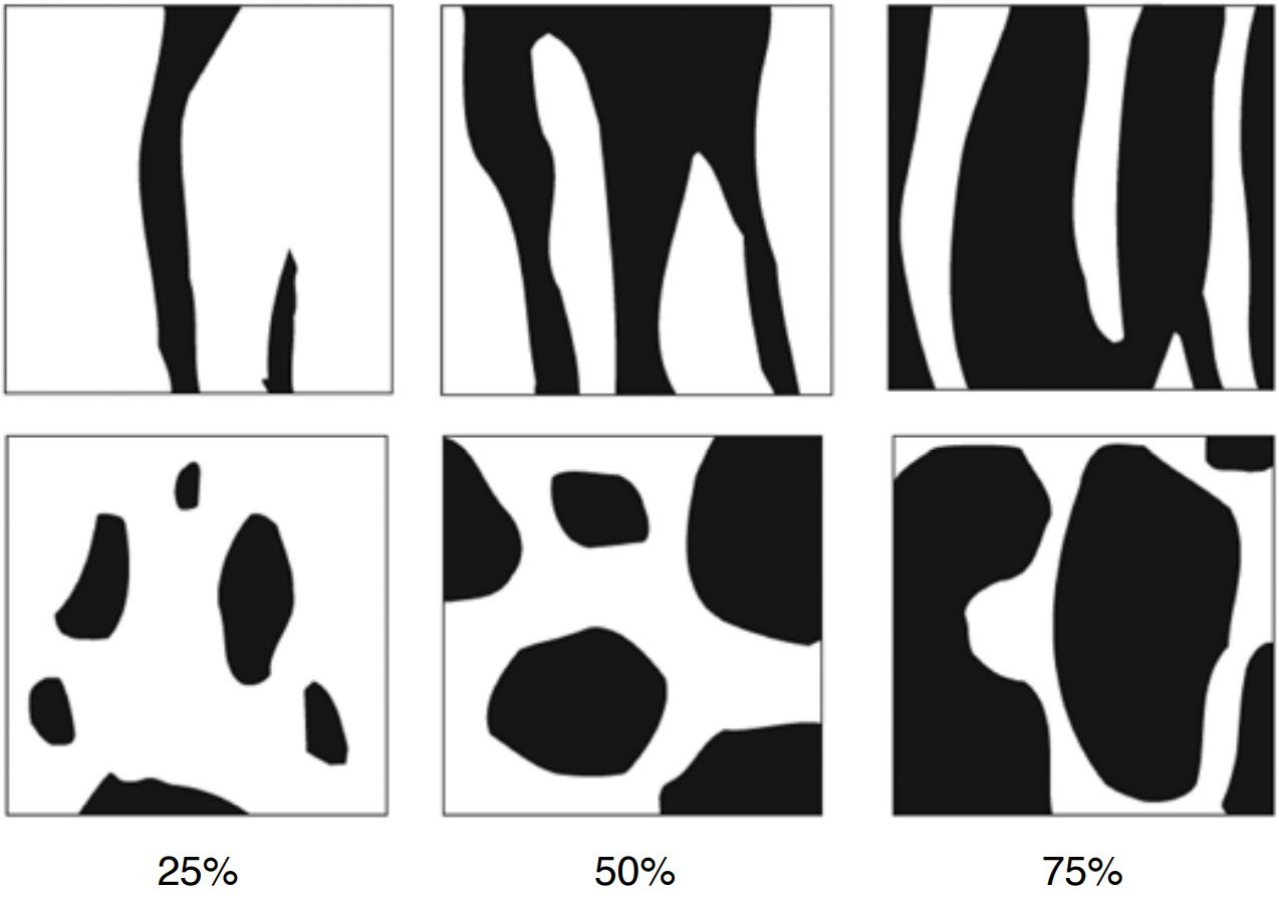

Figure 2-8: Proportion of total area coverage (AMSA, 2014)

Figure 2-9 illustrates the general relationships between on-water response techniques and slick thickness. Windrows, heavy oil patches and tar balls, for example, must be considered, as they influence oil encounter rates, chemical dosages and ignition potential. Each method has different thickness thresholds for effective response.

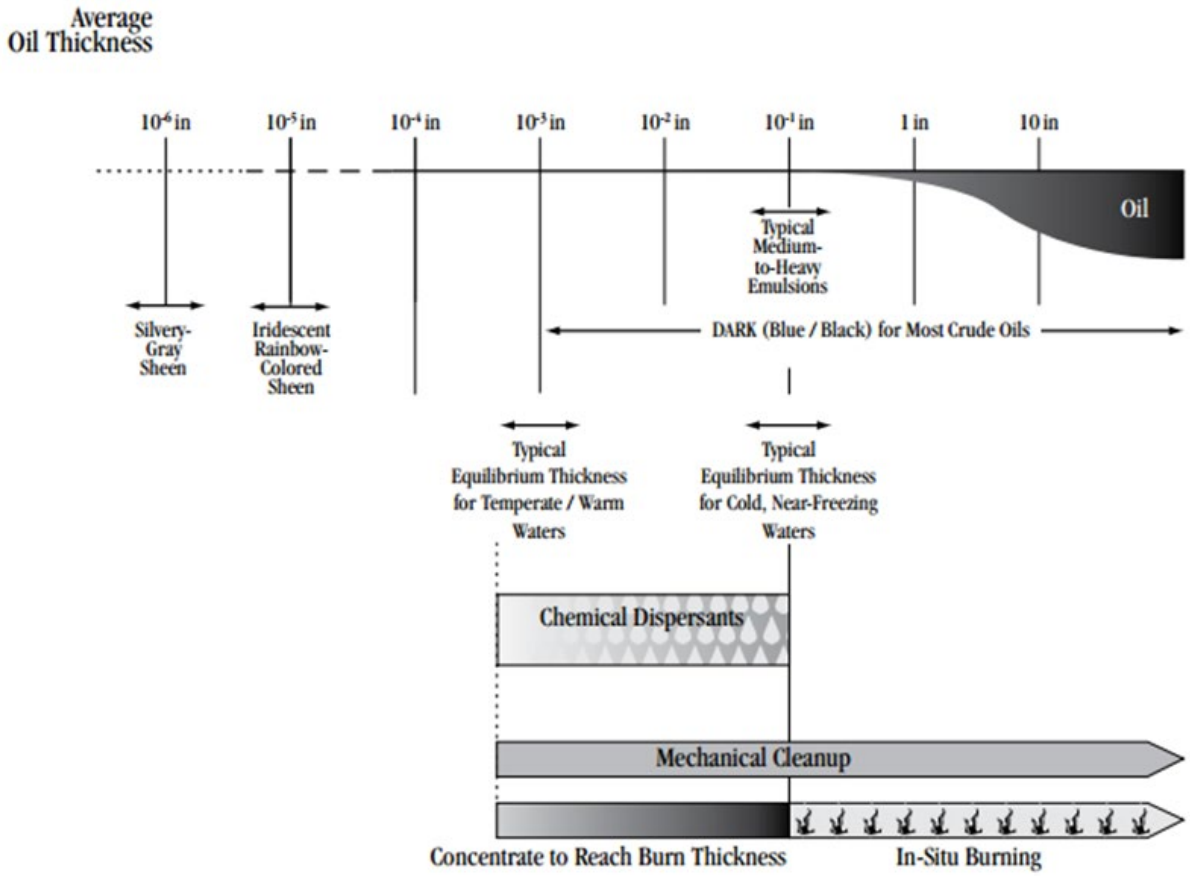

Figure 2-9: Oil thickness versus potential response options (from Allen and Dale 1996)

Wind and waves influence the feasibility of response operations, dropping the effectiveness significantly because of entrainment and/or splash-over as short-period waves develop beyond two to three feet (0.6 to 0.9 m) in height. Waves and wind can also be limiting factors for the safe operation of vessels and aircraft.

Effective dispersion requires a threshold amount of surface mixing energy (typically a few knots of wind and a light chop) to be effective. At higher wind and sea conditions, dispersant evaporation and wind-drift will limit chemical dispersion application effectiveness and there is a point (~25-kt winds, 10-ft waves) at which natural dispersion forces become greater, particularly for light oils. Because of droplet size versus slick thickness constraints and application dose-rate limitations, dispersants work best on slick thicknesses of a few thousandths (approximately 50 g/m^2) to hundredths of an inch (approximately 250 g/m^2). Improved dispersants, higher dose rates, and multiple-pass techniques may extend the thickness limitation to 0.1 inch (2.5 mm) or more.

As offshore response operations (surface dispersant and containment and recovery) are intended to be undertaken at the thickest part of the slick, 50 g/m^2 and 100 g/m^2 (aligning with the lower limit of BAOAC 4 and midpoint of BAOAC 5) have been utilised by Woodside in deterministic modelling to identify the most likely locations for surface dispersant application and containment and recovery operations.

2.3.3.2 Surface hydrocarbon viscosity

Table 2-5: Surface hydrocarbon viscosity thresholds

Surface viscosity (cSt)	Description	European Maritime Safety Authority	Viscosity at sea temperature (cSt)
5000*	Predicted optimum viscosity for surface dispersant operations	Generally possible to disperse	500-5000
10,000*	Predicted maximum viscosity for effective surface dispersant operations	Sometimes possible to disperse	5000-10,000

*Measured at sea surface temperature

Further to the required thickness for surface dispersant application and containment and recovery to be deployed effectively as outlined above, changes to viscosity will also limit the treatment of offshore response techniques. As outlined in the EMSA Manual on the Applicability of Oil Spill Dispersants (EMSA, 2012), guidance around changes to viscosity and likely effectiveness of surface dispersant application is provided.

This includes the following statements: “It has been known for many years that it is more difficult to disperse a high viscosity oil than a low or medium viscosity oil. Laboratory testing had shown that the effectiveness of dispersants is related to oil viscosity, being highest for modern ‘Concentrate, UK Type 2/3’ dispersants at an oil viscosity of about 1000 or 2000 mPa (1000 – 2000 cSt) and then declining to a low level with an oil viscosity of 10,000 mPa (10,000 cSt). It was considered that some generally applicable viscosity limit, such as 2000 or 5000 mPa (2000 – 5000 cSt), could be applied to all oils.”

However, modern oil spill dispersants are generally effective up to an oil viscosity of 5000 mPa (5000 cSt) or more, and their performance gradually decreases with increasing viscosity; oils with a viscosity of more than 10,000 cSt are in most cases, no longer dispersible. Guidance from CEDRE (EMSA, 2012) also indicates products with a range of 500 – 5000 cSt at sea temperature are generally possible to disperse, while 5000 – 10,000 cSt at sea temperature above pour point are sometimes possible to disperse, with products beyond 10,000 cSt at sea temperature below pour point are generally impossible to disperse.

To support decision making and response planning, a threshold of 10,000 cSt at sea temperature was chosen as a conservative estimate of maximum viscosity for surface dispersant spraying operations.

Spills of Pluto Condensate and MGO will not reach the 10,000 cSt threshold for the duration of the spill and dispersant is thus not deemed to provide a net environmental benefit for a spill arising from this PAP. The thresholds described above are compared with the modelling results for the WCCS (Table 2-6).

2.3.4 Spill modelling results

Details of the scenario and modelling inputs and results are included along with deterministic and stochastic modelling results in Table 2-6.

The selected deterministic runs used to represent the WCCS are:

- Minimum time to floating hydrocarbon contact with the offshore edge(s) of any shoreline receptor polygon (at a threshold of 10 g/m^2).
- Minimum time to commencement of hydrocarbon accumulation at any shoreline receptor (at a threshold of 100 g/m^2).
- Maximum cumulative hydrocarbon volume accumulated at any individual shoreline receptor (at a threshold of 100 g/m^2).
- Maximum cumulative hydrocarbon volume accumulated across all shoreline receptors (at a threshold of 100 g/m^2).
- Minimum time to entrained/dissolved hydrocarbon contact with the offshore edges of any receptor polygon (at a threshold of 100 ppb).

Table 2-6: Worst case credible scenario modelling results

Scenario description	Results				
	CS-01 (stochastic)	**MEE-01 (stochastic)**	**MEE-02a (stochastic)**	**MEE-02b (deterministic)**	**CS-05 (stochastic)**
WCCS – total volume released Refer to Section 2.2.1 for detailed hydrocarbon characteristics	Hydrocarbon release of Eris-1 condensate caused by a loss of well containment during drilling at the Xena-03 well Total released - 46,631 m^3 over 64 days Surface – 1,880 m^3 over 5 days Subsurface – 44,751 m^3 over 59 days	Hydrocarbon release of Pluto condensate caused by a loss of well containment from PLA02 well during operations. Subsurface – 59,459 m^3 over 77 days (WCCS)	Hydrocarbon release caused by a loss of containment of the subsea export pipeline at 29 km from Pluto A, releasing 479 metric tons of Pluto condensate, with gas, over 8 hours. Subsurface – 479 metric tons (632 standard m^3) over 8 hours	Hydrocarbon release caused by a loss of containment of the export pipeline at the State Water boundary (3nm), releasing 607 metric tons of Pluto condensate, with gas, over 8 hours. Subsurface – 607 metric tons (662 standard m^3) over 8 hours (WCCS)	Hydrocarbon release of MGO cause by a loss of vessel containment following a vessel collision at the PLA platform 1000 m^3 over one hour (WCCS)
WCCS – residual volume remaining post-weathering	Surface – 10.01% residue Subsurface – 3.39% residue	2.53% residue	0.5% residue	0.5% residue	5% residue
Location	19° 57’ 5.5” S 115° 13’ 4.38” E	19° 54’ 48.266” S 115° 7’ 54.151” E	20° 3’ 55.1” S 115° 36’ 1.1” E	20° 21’ 0.81” S 116° 42’ 12.41” E	19° 59’ 46.5” S 115° 22’ 5.6” E
Modelling results					
Surface area of hydrocarbons (>50 g/m^2)	*Not available from stochastic modelling*	*Not available from stochastic modelling*	*Not available from stochastic modelling*	No contact at this threshold	*Not available from stochastic modelling*
Surface area of hydrocarbons (>50 g/m^2 and <15,000 cSt)	*Not available from stochastic modelling*	*Not available from stochastic modelling*	*Not available from stochastic modelling*	No contact at this threshold	*Not available from stochastic modelling*
Minimum time to floating hydrocarbon contact with the offshore edge(s) of any shoreline receptor polygon (at a concentration of 10 g/m^2)	Day 2 (43 hours) at Montebello Marine Park	No contact at this threshold	Day 1 (1 hour) at Montebello Marine Park	No contact at any of the assessed thresholds	Day 1 (1 hour) at Montebello Marine Park
Minimum time to commencement of hydrocarbon accumulation at any shoreline receptor (at a concentration of 100 g/m^2)	No contact at any of the assessed thresholds	No contact at any of the assessed thresholds	No contact at any of the assessed thresholds	Day 1 (21 hours) at Dampier Archipelago (9 m^3) (Run 48, Q2)	No contact at any of the assessed thresholds
Maximum cumulative hydrocarbon volume accumulated at any individual shoreline receptor (at a concentration of 100 g/m^2).	No contact at any of the assessed thresholds	No contact at any of the assessed thresholds	No contact at any of the assessed thresholds	9 m^3 at Dampier Archipelago (day 1, 21 hours) (Run 48, Q2)	No contact at any of the assessed thresholds
Maximum cumulative hydrocarbon volume accumulated across all shoreline receptors contacted by accumulated hydrocarbons (at a concentration of 100 g/m^2)	No contact at any of the assessed thresholds	No contact at any of the assessed thresholds	No contact at any of the assessed thresholds	9 m^3 at Dampier Archipelago (day 1, 21 hours) (Run 48, Q2)	No contact at any of the assessed thresholds
Minimum time to entrained/dissolved hydrocarbon contact with the offshore edges of any receptor polygon (at a threshold of 100 ppb)	Day 1 (13 hours) at Montebello Marine Park	Day 2 (34 hours) at Montebello Marine Park	Day 1 (1 hour) at Montebello Marine Park	Day 1 (22 hours) at Dampier Archipelago (Run 37, Q1)	Day 1 (1 hour) at Montebello Marine Park
The full list of response protection areas (RPAs) predicted from modelling is available in Table 3-1					

From the above modelling results, Run 37, Q1 and Run 48, Q2 deterministic results for MEE-02b have been used as the basis for response planning and are included in Section 4.2

From analysis of the stochastic and deterministic results, modelling predicts the following:

- The subsea release results in insufficient concentrations for effective surface dispersant and containment and recovery operations due to rapid spreading and weathering of the surface oil. Furthermore, the spill is predicted to move beyond the pre-defined Zone of Application for surface dispersants including movement into WA State waters by approximately Day 1.
- The release results in sufficient concentrations for effective shoreline response at a few receptors.
- Weathering predictions for the release indicate a low residual portion of hydrocarbons (0.5%).
- Response operations cannot be implemented if the safety of response personnel cannot be guaranteed. Safety circumstances that limit the execution of this control measure include volatile concentrations of hydrocarbons in the atmosphere, high winds (>20 knots), waves and/or sea states (>1.5m waves) and high ambient temperatures.

3 IDENTIFY RESPONSE PROTECTION AREAS

In a response, operational monitoring programs (OMPs) – including trajectory modelling and vessel/aerial observations – would be used to predict RPAs that may be impacted. For the purposes of planning and appropriately scaling a response, modelling has been used to identify RPAs as outlined below in Figure 3-1.

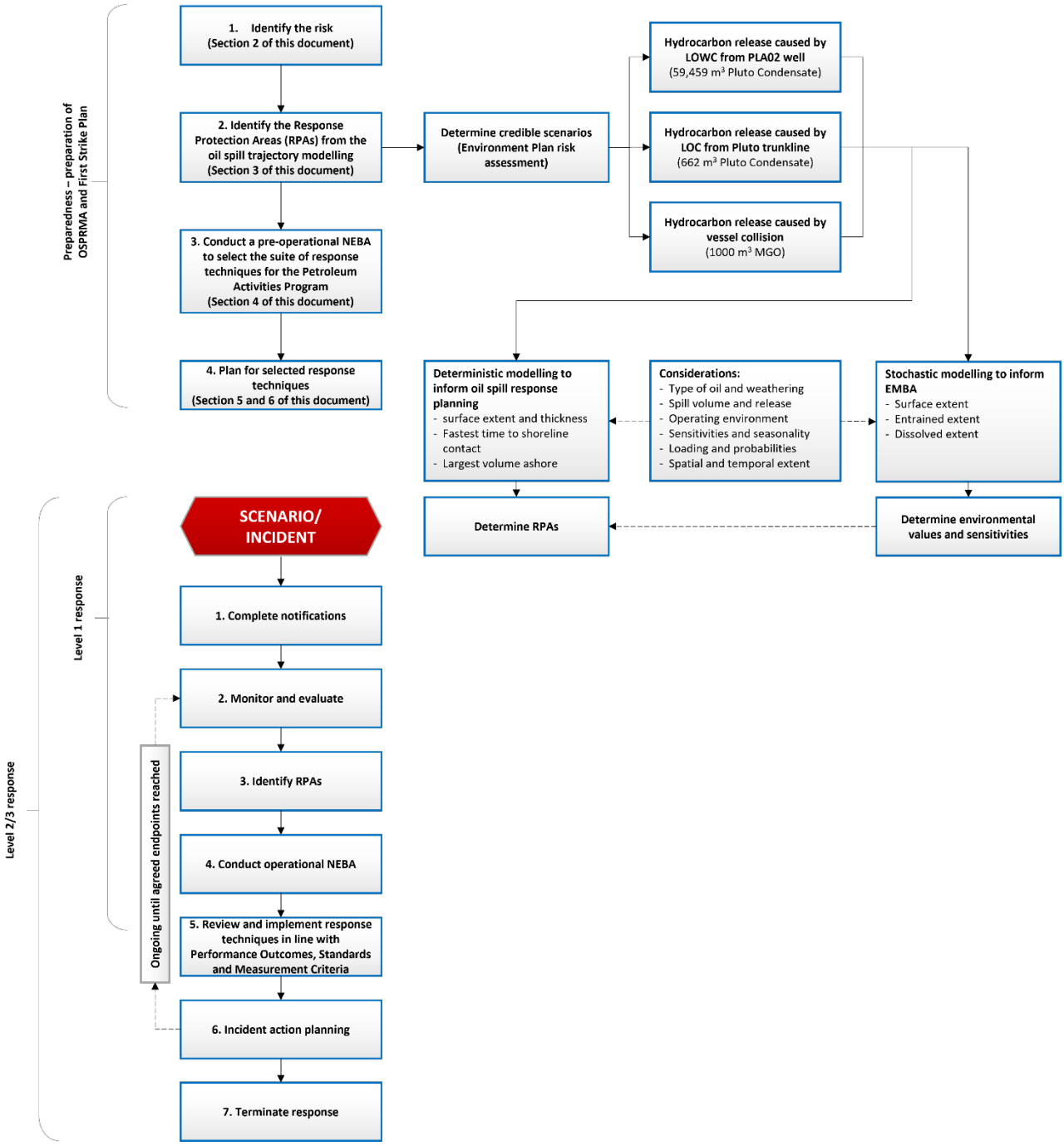

Figure 3-1: Identify Response Protection Areas (RPAs) flowchart

3.1 Identified sensitive receptor locations

Section 4 of the EP includes the list of sensitive receptor locations that have been identified by stochastic modelling as meeting the requirements outlined below:

- receptors with the potential to incur surface, entrained or shoreline accumulation contact above environmental impact thresholds
- receptors within the EMBA which meet any of the following:
  - priority protection criteria/categories
  - International Union of Conservation of Nature (IUCN) marine protected area categories
  - high conservation value habitat and species
  - important socio-economic/heritage value.

3.2 Identify Response Protection Areas

RPAs have been selected on the basis of their environmental ecological, social, economic, cultural and heritage values and sensitivities and the ability to conduct a response based on the minimum response thresholds (**Section 2.3.3**). The figures outlined in Table 3-1 are the combined results of the individual worst-case runs and do not indicate a single worst case credible scenario (where the timings and volumes are all expected from one release).

From the identified sensitive receptors described in Section 6 of the EP, only those which a shoreline response could feasibly be conducted (accumulation > 100 g/m^2 for shoreline assessment and/or contact with surface slicks >10 g/m^2 for operational monitoring) have been selected for response planning purposes. While not discounting other sensitivities, these RPAs have been used as the basis for demonstrating the capability to respond to the nature and scale of a spill from the WCCS and prioritising response techniques.

Table 3-1 outlines locations which were identified from the modelling runs for the WCCS but does not constitute the full list of RPAs potentially contacted from stochastic modelling (as per EMBA definition) (see Section 4 of the EP). Other RPA outliers were identified from the modelling and have been included in the assessment of capability in Sections 5 and 6.

Additional sensitive receptors are presented the existing environment description (Section 4 of the EP) and impact assessment section (Section 6.7 of the EP) for each respective spill scenario. The pre-operational NEBA (Section 4) includes the results from the stochastic modelling to allow consideration of all feasible response techniques in the planning phase, therefore additional receptors are also included in the pre-operational NEBA.

The RPAs identified in Table 3-1 are used to plan for the nature and scale of a shoreline response.

Table 3-1: Response Protection Areas (RPAs) from deterministic modelling

Response protection area	Conservation status	IUCN protection category	Minimum time to shoreline contact (above 100 g/m^2) in days [3]	Maximum shoreline accumulation (above 100 g/m^2) in m^3 [4]
Cape Bruguieres	National Heritage Property	N/A	32 hours (4 m^3)	4 m^3 (32 hours)
Dampier Archipelago	Nature reserve and National Heritage Place	IUCN Ia – Strict Nature Reserve IUCN II – National Park IUCN IV – Habitat/Species Management Area IUCN VI – Multiple Use Zone	21 hours (9 m^3)	9 m^3 (21 hours)
Cohen Island	Nature reserve	IUCN Ia – Strict Nature Reserve	30 hours (<1 m^3)	5 m^3 (31 hours)
Keast Island	Nature reserve	IUCN Ia – Strict Nature Reserve	32 hours (3 m^3)	3 m^3 (32 hours)
Legendre Island	Nature reserve	IUCN Ia – Strict Nature Reserve	22 hours (6 m^3)	6 m^3 (22 hours)

[3] This volume and time represent the first time to contact on defined shoreline polygon and the maximum volume ashore for that 24 hour period.
[4] This volume and time represent the maximum volume ashore on defined shoreline polygon for any 24 hour time period

4 NET ENVIRONMENTAL BENEFIT ANALYSIS (NEBA)

A Net Environmental Benefit Analysis (NEBA) is a structured process to consider which response techniques are likely to provide the greatest net environmental benefit.

The NEBA process typically involves four key steps outlined in Figure 4-1: evaluate data, predict outcomes, balance trade-offs, and select response options. These steps are followed in the planning/preparedness process and would also be followed in a response.

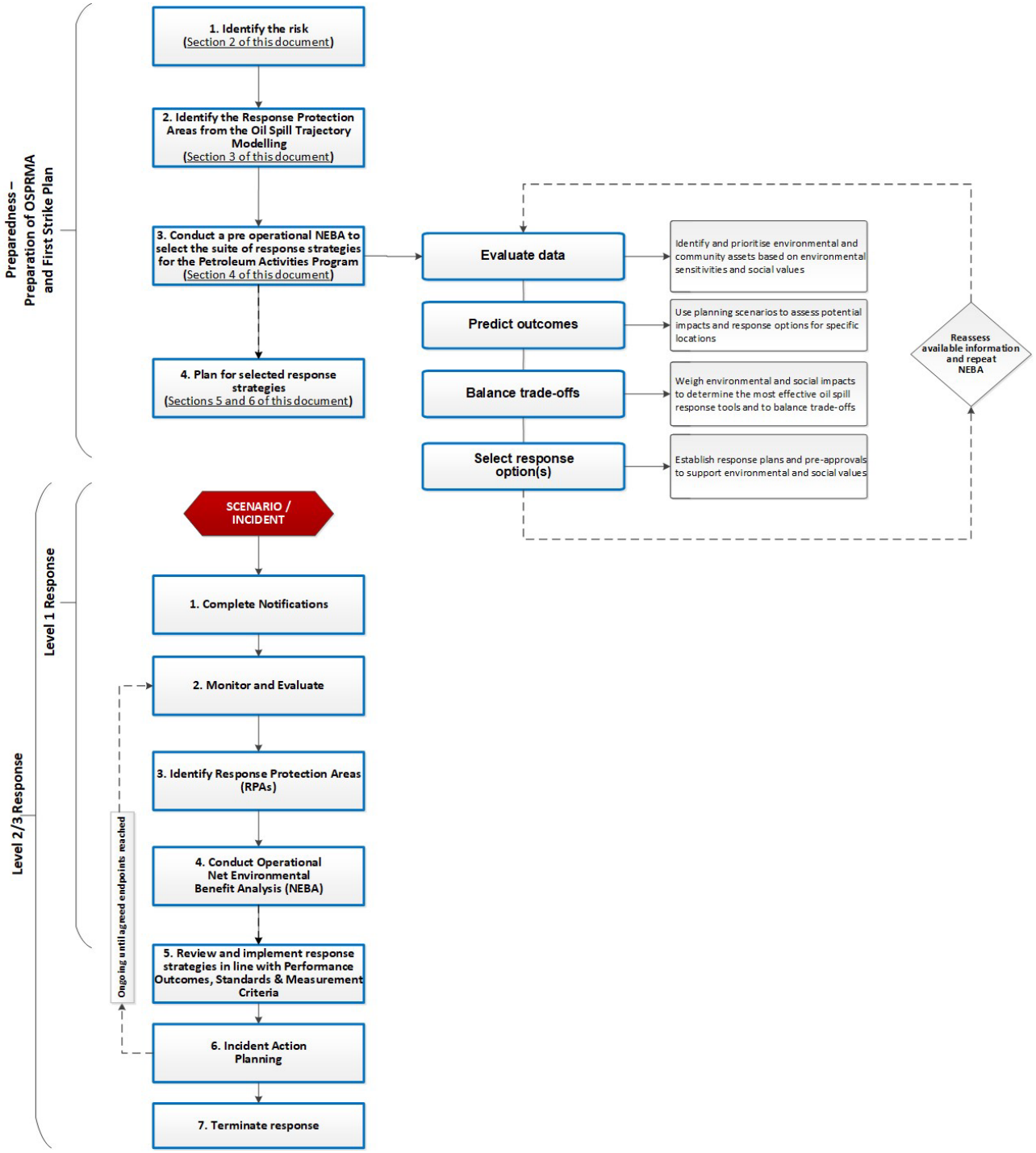

Figure 4-1: Net Environmental Benefit Analysis (NEBA) flowchart

4.1 Pre-operational / Strategic NEBA

The pre-operational NEBA identifies positive and negative impacts to sensitive receptors from implementing the response techniques. Feasibility is considered by assessing the receptors potentially impacted above response thresholds and the surface concentrations (**Table 2-4** and **Table 3-1**) from the modelling.

Completing a pre-operational NEBA is a key response planning control that reduces the environmental risks and impacts of implementing the selected response techniques. Comprehensive details of the pre-operational NEBA for this PAP are contained in ANNEX A: Net Environmental Benefit Analysis detailed outcomes.

4.2 Stage 1: Evaluate data

Woodside identifies and prioritises environmental and community assets based on environmental sensitivities and social values, informed using trajectory modelling. Interpretation of stochastic oil spill modelling determines the EMBA for the release, which defines the spatial area that may be potentially impacted by the PAP.

4.2.1 Define the scenario(s)

Woodside uses scenarios identified from the risk assessment in the EP to assess potential impacts and response options for specific locations. The WCCS is then selected for deterministic modelling and is used for this pre-operational NEBA. Outlier locations with potential environmental impacts, selected from the stochastic modelling may also be included for assessment. Response thresholds and deterministic modelling are then used to assess the feasibility/effectiveness and scale of the response. Modelling results are available in **Table 2-4** and **Table 3-1**.

4.3 Stage 2: Predict Outcomes

Woodside uses planning scenarios to assess potential impacts and response options for specific locations. Locations with potential environmental impacts, selected from the stochastic modelling are included for assessment. Response thresholds and deterministic modelling are then used to assess the feasibility/ effectiveness of a response.

4.4 Stage 3: Balance trade-offs

Woodside considers environmental impacts and response feasibility/ effectiveness to determine the most effective oil spill response tools and balance trade-offs, using an automated NEBA tool. The tool considers potential benefits and impacts associated with a response at sensitive receptors and then considers the feasibility/ effectiveness of the response to select the response techniques carried forward to the ALARP assessment. The NEBA can be found in ANNEX A: Net Environmental Benefit Analysis detailed outcomes.

4.5 Stage 4: Select Best Response Options

To select the response technique, all the other stages in the NEBA process are considered and used to establish response plans and any pre-approvals to support protection of identified environmental and social values.

The response techniques implemented may vary according to a particular spill. The hydrocarbon type released, and the sensitivities of the receptors (both ecological and socio-economic), may influence the response. The pre-operational NEBA broadly evaluates each response technique and supports decisions on whether they are feasible and of net environmental benefit. Response techniques that are not feasible or beneficial are rejected at this stage and not progressed to planning.

Further risks and impacts from implementing these selected response options are outlined in Section 7.

4.5.1 Determining potential response options

The available response techniques based on current technology can be summarised under the following headings:

- Operational monitoring
- Source control
  - Remotely operated vehicle (ROV) intervention
  - debris clearance and/or removal
  - capping stack

  - containment dome
  - relief well drilling
- Source control via vessel SOPEP
- Subsea dispersant injection
- Surface dispersant application:
  - aerial dispersant application
  - vessel dispersant application
- Mechanical dispersion
- In-situ burning
- Containment and recovery
- Shoreline protection and deflection:
  - protection
  - deflection
- Shoreline clean-up:
  - Phase 1 – mechanical clean-up
  - Phase 2 – manual clean-up
  - Phase 3 – final polishing
- In-situ burning
- Oiled wildlife response (including hazing).

Support functions may include:

- Waste management
- Post spill/ scientific monitoring

Table 4-1, Table 4-2,

Table 4-3 include scenario-specific assessments of feasible response options and justification for the exclusion of inappropriate options. These options are evaluated against the scenario parameters including oil type, volume, characteristics, prevailing weather conditions, logistical support, and resource availability to determine deployment feasibility.

A shortlist of the feasible response options is then carried forward for the ALARP assessment. This assessment will typically result in a range of available options, that are deployed at different areas (at-source, offshore, nearshore and onshore) and different times during the response. The NEBA process assists in prioritising which options to use where and when, and timings throughout the response.

Table 4-1: Response technique evaluation – loss of well containment

Response Technique	Effectiveness	Feasibility	Decision	Rationale for the decision
Hydrocarbon: Pluto condensate (MEE-01) and Eris-1 Condensate during tie-back (CS-01)				
Techniques feasible during operations phase (MEE-01)				
Operational Monitoring	Will be effective in tracking the location of the spill, informing when it has entered State waters, predicting potential impacts and triggering further monitoring and response techniques as required. Monitoring techniques include: • OM01 Predictive modelling of hydrocarbons – used throughout spill. 'Ground-truthed' using the outputs of all other monitoring techniques. • OM02 Surveillance and reconnaissance to detect hydrocarbons and resources at risk – from outset of spill. • OM03 Monitoring of hydrocarbon presence, properties, behaviour and weathering in water – from outset of spill. • OM04 Pre-emptive assessment of sensitive receptors at risk – triggered once OM01, OM02 and OM03 inform likely RPAs at risk. • OM05 Shoreline assessment – once OM02, OM03 and OM04 inform which RPAs have been impacted.	Monitoring of a condensate spill is a feasible response technique and an essential element of all spill response incidents. Outputs will be used to guide decision making on the use of other monitoring/response techniques and providing required information to regulatory agencies including AMSA and Western Australia Department of Transport (WA DoT).	**Yes**	Monitoring the spill will be necessary to: • validate trajectory and weathering models • determine the behaviour of the oil in water • determine the location and state of the slick • provide forecasts of spill trajectory • determine appropriate response techniques • determine effectiveness of response techniques • confirm impact pathways to receptors • provide regulatory agencies with required information.
Source control via blowout preventer (BOP) intervention using ROV and hotstab	Not applicable – production wells do not have blowout preventers in place and thus intervention and/or hotstab are not feasible response techniques.	Not applicable – production wells do not have blowout preventers in place and thus intervention and/or hotstab are not feasible response techniques.	**N/A**	Not applicable – production wells do not have blowout preventers in place and thus intervention and/or hotstab are not feasible response techniques.
Source control via debris clearance and capping stack	Controlling a loss of well containment at source via capping stack would be an effective way to limit the quantity of hydrocarbon entering the marine environment.	Capping the Pluto well is considered feasible based on worst-case discharge rates. Though all capping stack deployment technologies are unproven, in the event of a loss of well containment, the use of a proven subsea deployment method such as a heavy lift vessel, which is more commonly used in industry, is a more reliable and, in turn, ALARP approach. If environmental conditions permit (wind speed, wave height, current and plume radius), deployment of a capping stack would be attempted with a heavy lift vessel. Woodside maintains several frame agreements with various vessel service providers and maintains the ability to call off services with a capping stack and debris clearance agreement. The location of suitable vessels for capping stack deployment are monitored monthly. Consideration to mobilise the capping stack from the supplier on a suitable vessel but then hand over to another vessel to conduct the capping activity will also be made to meet response time frames. Landing force analysis through computational fluid dynamic (CFD) modelling confirms the ability to land the capping stack on the Xmas tree.	**Yes**	Conventional/vertical capping stack deployment with a heavy lift vessel will be attempted at the discretion of the vessel master on the day, giving due regard to the safety of the vessel and crew. Circumstances that limit the safe execution of this control measure include lower explosive limit (LEL) concentrations, volatile concentrations of hydrocarbons in the atmosphere, weather window, waves and/or sea states and high ambient temperatures.
Source control via relief well drilling	A loss of well containment is predicted to be over 77 days for MEE-01. Relief well drilling will be a feasible option to stop the release.	For a loss of well containment, relief well drilling will be a feasible means of controlling a loss of well containment event.	**Yes**	Relief well drilling is a feasible technique employed to control a loss of well containment event. Relief well drilling is a widely accepted and utilised technique.
Subsea dispersant injection	Application of subsea dispersant may reduce the scale and extent of hydrocarbons reaching the surface and thus may reduce spill volumes contacting predicted RPAs. SSDI can increase dispersed/entrained hydrocarbons which can potentially have higher toxicity to biota in shallow water than naturally dispersed hydrocarbons. Entrained oil could potentially impact on sensitive shallow-water receptors e.g. corals and fish, which may be otherwise unaffected. Entrained oil plume likely to be increased resulting in greater spatial extent of entrained oil.	The goal of SSDI is to decrease the volume of oil that rises to the water surface and to reduce exposure to floating and entrained/dissolved oil. Based on the stochastic modelling analysis, no shoreline accumulation is predicted to occur following a LOWC of condensate during drilling or operation activities. The use of SSDI would not be required in order to deploy a capping stack and unnecessary use of SSDI would increase the complexity of SIMOPS operations around the wellhead. Given the preceding information and that there is conflicting evidence on the efficacy of SSDI, despite the considerable amount of research and experimental work completed since the Deepwater Horizon spill (Quigg et al. 2021), the use of SSDI is considered unwarranted and would not provide net environmental or safety benefits.	**No**	Due to the modelling predicting no shoreline exposure at RPAs, together with the minimal surface exposure and this technique not being required to facilitate other source control techniques, the use of SSDI is not deemed appropriate. The application of subsea dispersant would unnecessarily introduce additional chemical substances to the marine environment and further increase exposure of subsea ecosystems to entrained hydrocarbons.

Response Technique	Effectiveness	Feasibility	Decision	Rationale for the decision
Surface dispersant application	Application of surface dispersant would likely reduce the volumes of hydrocarbons contacting sensitive surface receptors. Dispersant can also enhance biodegradation and may reduce volatile organic compounds (VOCs) in some circumstances therefore reducing potential health and safety risk to responders. Dispersant can increase dispersed/entrained hydrocarbons which can potentially have higher toxicity to biota in shallow water than naturally dispersed hydrocarbons. Subsurface oil plume likely to increase in size resulting in greater spatial extent of entrained oil. Entrained oil could potentially impact on sensitive shallow-water receptors e.g. corals, which otherwise may have been unaffected.	Surface dispersants are not generally considered a feasible response technique when applied to thin surface films such as condensate, as the dispersant droplets tend to pass through the surface films without binding to the hydrocarbon. EMSA (2010) recommends thin layers of spilled hydrocarbons should not be treated with surface dispersant, including surface slicks with Bonn Agreement Oil Appearance Codes (BAOAC) 1-3. Modelling LOWC spill for the Pluto Facility Operations drilling project predicts that floating oil will be prone to rapid spreading and evaporation and will not reach the required threshold (>50 g/m^2) for surface dispersant to be effective within any RPA. The volatile nature of condensates modelled (Eris-1 and Pluto) is also likely to lead to unsafe conditions in the vicinity of the hydrocarbon spill, thus this response technique is deemed unsuitable for this activity.	**No**	Condensate will rapidly evaporate and disperse, resulting in spill thicknesses too thin to effectively treat with surface dispersant. The use of surface dispersant could unnecessarily introduce additional chemical substances to the marine environment.
Mechanical dispersion	Mechanical dispersion involves the use of a vessel's prop wash and/or fire hose to target surface hydrocarbons to achieve dispersion into the water column. However, this technique is of limited benefit in an open ocean environment where wind and wave action are likely to deliver similar advantages.	Although the technique is feasible, highly volatile hydrocarbons are likely to weather, spread and evaporate quickly. The volatile nature of the oil likely to lead to unsafe conditions in the vicinity of fresh hydrocarbon. Additionally, any vessel used for mechanical dispersion activities would be contaminated by the hydrocarbon and could potentially cause secondary contamination of unimpacted areas when exiting the spill area. The decontamination of a vessel used for mechanical dispersion activities would result in additional quantities of oily waste requiring appropriate handling and treatment.	**No**	Given the limited benefit of mechanical dispersion over natural wind and wave action, secondary contamination and waste issues, and the associated safety risk of implementing the response for this activity, this strategy is deemed unsuitable.
In-situ burning	In-situ burning is only effective where minimum slick thickness can be achieved and where calm metocean conditions can be ensured. Use of this technique would also cause an increase the release of atmospheric pollutants.	There is a limited window of opportunity in which this technique can be applied (prior to evaporation of the volatiles) which would be difficult to achieve. Furthermore, this technique may be prevented from being undertaken due to personnel safety issues arising from predicted high local concentrations of atmospheric volatiles.	**No**	The safety concerns and the predicted low effectiveness associated with implementing an in-situ burning response outweigh the potential environmental benefit.
Containment and recovery	Containment and recovery has an effective recovery rate of 5-10% when a hydrocarbon encounter rate of 25-50% is achieved at BAOAC 4 and 5. It has the potential to reduce the magnitude, probability, extent, contact and accumulation of hydrocarbon on shorelines receptors when suitable encounter rates can be achieved. It also has the potential to reduce the magnitude and extent of contact with submerged receptors by removing oil before further natural entraining/dissolving of hydrocarbons occurs.	Modelling of a LOWC spill of either Eris-1 or Pluto condensate for the Pluto Facility Operations drilling project predicts that floating oil will be prone to rapid spreading and evaporation and will not reach the required threshold (>50 g/m^2) for containment and recovery to be feasible within any RPA. The volatile nature of condensates is also likely to lead to unsafe conditions near release location.	**No**	Containment and recovery would be an ineffective response technique as it requires a hydrocarbon thickness of BAOAC 4-5 with a 50-100% coverage of 100-200 g/m^2. Modelling does not predict any surface hydrocarbons above 50 g/m^2, thus this response strategy is considered ineffective.
Shoreline protection and deflection	Shoreline protection and deflection can be effective at preventing contamination of sensitive resources and can be used to corral oil into slicks thick enough to skim effectively.	Stochastic modelling predicted that no shoreline receptors would be contacted by hydrocarbons at any threshold in the event of a LOWC from the Pluto Facility during drilling or operation activities. Therefore, shoreline response strategies, such as shoreline protection and deflection, are not applicable as hydrocarbons are unlikely to accumulate on the shoreline.	**No**	The modelling undertaken predicts no contact to any shoreline receptor at any threshold following a LOWC scenario.
Shoreline clean-up	Shoreline clean-up is an effective means of hydrocarbon removal from contaminated shorelines where coverage is at an optimum level of 250 g/m^2.	Stochastic modelling predicted that no shoreline receptors would be contacted by hydrocarbons at any threshold in the event of a LOWC from the Pluto Facility during drilling or operation activities. Therefore, shoreline response strategies are not applicable as hydrocarbons are unlikely to accumulate on the shoreline.	**No**	The modelling undertaken predicts no contact to any shoreline receptor at any threshold following a LOWC scenario.
Oiled wildlife	Oiled wildlife response is an effective response technique for reducing the overall impact of a spill on wildlife. This is mostly achieved through hazing to prevent additional wildlife from being contaminated and through rehabilitation of those already subject to contamination.	In the event that wildlife are at risk of contamination, oiled wildlife response will be undertaken in accordance with the Oiled Wildlife Response Operational Plan as and where required. In addition, any rehabilitation could only be undertaken by trained specialists. Due to the likely volatile atmospheric conditions surrounding a Pluto Condensate spill, response options may be limited to hazing to ensure the safety of response personnel.	**Yes**	This technique may prevent impact to and/or treat oiled wildlife providing net environmental benefit.

Response Technique	Effectiveness	Feasibility	Decision	Rationale for the decision
Additional techniques feasible during tie-back activities (CS-01)				
Source control via blowout preventer (BOP) intervention using ROV and hotstab	Controlling a loss of well containment at source via BOP intervention would be the most effective way to limit the quantity of hydrocarbon entering the marine environment.	In the event of the worst-case scenario with a loss of well containment during drilling and tie-back activities, remotely operated vehicle (ROV) operations to locally operate the BOP would be attempted.	**Yes**	The use of source control intervention via ROV may be feasible during drilling and tie-back activities (depending on local concentration of atmospheric volatiles) and would reduce quantity of hydrocarbons entering the marine environment.
Source control via debris clearance and capping stack	Controlling a loss of well containment at source via capping stack would be an effective way to limit the quantity of hydrocarbon entering the marine environment.	Woodside will have a project specific source control emergency response plan (SCERP) for the Xena-03 tie-back activities which will include an assessment of capping stack landing feasibility. Woodside maintains several frame agreements with various vessel service providers and maintains the ability to call off services with a capping stack and debris clearance agreement. The location of suitable vessels for capping stack deployment are monitored monthly. The supply arrangements and reliability to achieve the required mobilisation time will be revalidated prior to spud. Consideration to mobilise the capping stack from the supplier on a suitable vessel but then hand over to another vessel to conduct the capping activity will also be made to meet response time frames.	**Yes**	Conventional/ vertical capping stack deployment may be feasible during the tie-back activity phase. This would be considered, at the discretion of the vessel master on the day, giving due regard to the safety of the vessel and crew and factors that may influence a safe deployment such as plume radius and acceptable environmental conditions e.g. wind speed, wave height, current and plume radius.
Source control via relief well drilling	A loss of well containment is predicted to be over 64 days for CS-01. Relief well drilling will be a feasible option to stop the release.	For a loss of well containment, relief well drilling will be a feasible means of controlling a loss of well containment event.	**Yes**	Relief well drilling is a feasible technique employed to control a loss of well containment event. Relief well drilling is a widely accepted and utilised technique.

Table 4-2: Response technique evaluation – loss of containment from subsea export pipeline

Response Technique	Effectiveness	Feasibility	Decision	Rationale for the decision
Hydrocarbon: Pluto condensate (MEE-02b)				
Operational Monitoring	Will be effective in tracking the location of the spill, informing when it has entered State Waters, predicting potential impacts and triggering further monitoring and response techniques as required. Monitoring techniques include: • OM01 Predictive modelling of hydrocarbons – used throughout spill. 'Ground-truthed' using the outputs of all other monitoring techniques. • OM02 Surveillance and reconnaissance to detect hydrocarbons and resources at risk – from outset of spill. • OM03 Monitoring of hydrocarbon presence, properties, behaviour and weathering in water – from outset of spill. • OM04 Pre-emptive assessment of sensitive receptors at risk – triggered once OM01, OM02 and OM03 inform likely RPAs at risk. • OM05 Shoreline assessment – once OM02, OM03 and OM04 inform which RPAs have been impacted.	Monitoring of a Pluto condensate spill is a feasible response technique and an essential element of all spill response incidents. Outputs will be used to guide decision making on the use of other monitoring/response techniques and providing required information to regulatory agencies including AMSA and Western Australia Department of Transport (WA DoT).	**Yes**	Monitoring the spill will be necessary to: • validate trajectory and weathering models • determine the behaviour of the oil in water • determine the location and state of the slick • provide forecasts of spill trajectory • determine appropriate response techniques • determine effectiveness of response techniques • confirm impact pathways to receptors • provide regulatory agencies with required information.
Source control via emergency shutdown (ESD) valves	Controlling a loss of containment at source via the ESD valves is an effective way to reduce the amount of hydrocarbon released into the marine environment in the event of a hydrocarbon release.	In the event of the worst-case scenario with a loss of containment from the export pipeline, the use of ESD valves would be attempted.	**Yes**	Source control from the facility will be the main technique employed to control a loss of containment event of the export pipeline.
Source control via ROV	Controlling a loss of containment at source via ROV would an effective way to actuate the subsea valves in the event of a hydrocarbon release.	In the event of the worst-case scenario with a loss of containment from the export pipeline, the use of ROV operations to actuate the subsea vales would be attempted in the event of failure of valve operation.	**Yes**	Source control via ROV will be a secondary technique employed in the event that ESD valves are not effective.
Surface dispersant application	Application of surface dispersant would likely reduce the volumes of hydrocarbons contacting sensitive surface receptors. Dispersant can also enhance biodegradation and may reduce VOCs in some circumstances therefore reducing potential health and safety risk to responders.	Surface dispersants are not generally considered a feasible response technique when applied to thin surface films such as condensate, as the dispersant droplets tend to pass through the surface films without binding to the hydrocarbon. EMSA (2010) recommends thin layers of spilled hydrocarbons should not be treated with surface dispersant, including surface slicks with Bonn Agreement Oil Appearance Codes (BAOAC) 1-3.	**No**	Pluto Condensate will rapidly evaporate and disperse, resulting in spill thicknesses too thin to effectively treat with surface dispersant. The use of surface dispersant could unnecessarily introduce additional chemical substances to the marine environment.

Response Technique	Effectiveness	Feasibility	Decision	Rationale for the decision
	Dispersant can increase dispersed/entrained hydrocarbons which can potentially have higher toxicity to biota in shallow water than naturally dispersed hydrocarbons. Subsurface oil plume likely to increase in size resulting in greater spatial extent of entrained oil. Entrained oil could potentially impact on sensitive shallow-water receptors e.g. corals, which otherwise may have been unaffected.	Modelling of a Pluto Condensate spill for the Pluto Facility Operations drilling project predicts that floating oil will be prone to rapid spreading and evaporation and will not reach the required threshold (>50 g/m^2) for surface dispersant to be effective within any RPA. The volatile nature of Pluto Condensate is also likely to lead to unsafe conditions in the vicinity of the hydrocarbon spill, thus this response technique is deemed unsuitable for this activity.		
Mechanical dispersion	Mechanical dispersion involves the use of a vessel's prop wash and/or fire hose to target surface hydrocarbons to achieve dispersion into the water column. However, this technique is of limited benefit in an open ocean environment where wind and wave action are likely to deliver similar advantages.	Although the technique is feasible, highly volatile hydrocarbons are likely to weather, spread and evaporate quickly. The volatile nature of the oil likely to lead to unsafe conditions in the vicinity of fresh hydrocarbon. Additionally, any vessel used for mechanical dispersion activities would be contaminated by the hydrocarbon and could potentially cause secondary contamination of unimpacted areas when exiting the spill area. The decontamination of a vessel used for mechanical dispersion activities would result in additional quantities of oily waste requiring appropriate handling and treatment.	**No**	Given the limited benefit of mechanical dispersion over natural wind and wave action, secondary contamination and waste issues, and the associated safety risk of implementing the response for this activity, this strategy is deemed unsuitable.
In-situ burning	In-situ burning is only effective where minimum slick thickness can be achieved and where calm metocean conditions can be ensured. Use of this technique would also cause an increase the release of atmospheric pollutants.	There is a limited window of opportunity in which this technique can be applied (prior to evaporation of the volatiles) which would be difficult to achieve. Furthermore, this technique may be prevented from being undertaken due to personnel safety issues arising from predicted high local concentrations of atmospheric volatiles.	**No**	The safety concerns and the predicted low effectiveness associated with implementing an in-situ burning response outweigh the potential environmental benefit.
Containment and recovery	Containment and recovery has an effective recovery rate of 5-10% when a hydrocarbon encounter rate of 25-50% is achieved at BAOAC 4 and 5. It has the potential to reduce the magnitude, probability, extent, contact and accumulation of hydrocarbon on shorelines receptors when suitable encounter rates can be achieved. It also has the potential to reduce the magnitude and extent of contact with submerged receptors by removing oil before further natural entraining/dissolving of hydrocarbons occurs.	Modelling of a Pluto Condensate spill for the Pluto Facility Operations drilling project predicts that floating oil will be prone to rapid spreading and evaporation and will not reach the required threshold (>50 g/m^2) for containment and recovery to be feasible within any RPA. The volatile nature of Pluto Condensate is also likely to lead to unsafe conditions near release location.	**No**	Containment and recovery would be an ineffective response technique as it requires a hydrocarbon thickness of BAOAC 4-5 with a 50-100% coverage of 100-200 g/m^2. Modelling does not predict any surface hydrocarbons above 50 g/m^2, thus this response strategy is considered ineffective.
Shoreline protection and deflection	Shoreline protection and deflection can be effective at preventing contamination of sensitive resources and can be used to corral oil into slicks thick enough to skim effectively.	If real-time Operational Monitoring activities (OM01, OM02 and OM03) indicate surface hydrocarbons are moving toward shorelines, pre-emptive assessments of sensitive receptors at risk (OM04) and existing TRPs will be utilised to guide shoreline protection and deflection operations, in agreement with WA DoT (for Level 2/3 spills). For MEE-02b, deterministic modelling predicts first shoreline accumulation from floating surface hydrocarbon will occur within 24 hours (15 m^3 at Dampier Archipelago and Legendre Island) Protection strategies can be used for targeted protection of sensitive resources. Access to sensitive areas may cause more negative impact than benefit.	**Yes**	RPAs predicted to be contacted are based on modelling outputs and thus may differ under the prevailing conditions of a real event. If RPAs are deemed to be at risk, based on real-time modelling during a spill event, shoreline protection and deflection techniques will be employed to minimise hydrocarbon accumulation providing net environmental benefit.
Shoreline clean-up	Shoreline clean-up is an effective means of hydrocarbon removal from contaminated shorelines where coverage is at an optimum level of 250 g/m^2.	If real-time Operational Monitoring activities (OM01, OM02 and OM03) indicate hydrocarbons will contact shorelines, pre-emptive assessments of sensitive receptors at risk (OM04), shoreline assessments (OM05) and existing TRPs will be utilised to guide shoreline protection and deflection operations, in agreement with WA DoT (for Level 2/3 spills). For MEE-02b, deterministic modelling predicts first shoreline accumulation from floating surface hydrocarbon will occur within 24 hours (15 m^3 at Dampier Archipelago and Legendre Island) Can reduce or prevent impact on sensitive receptors in most cases. Must ensure, through shoreline assessment, that sensitive sites will benefit from clean-up activities as the response itself may cause more negative impact than benefit through disturbance of habitats and species.	**Yes**	Response Protection Areas predicted to be contacted are based on modelling outputs and thus may differ under the prevailing conditions of a real event. If RPAs are at risk, based on real-time modelling during a spill event, shoreline clean-up techniques will be deployed to expedite clean-up of the impacted sites. Removal of hydrocarbons will help shorten the recovery window unless shoreline type is of a sensitive nature. This technique can help prevent remobilisation of hydrocarbon and impact on shorelines.

Response Technique	Effectiveness	Feasibility	Decision	Rationale for the decision
Oiled wildlife response	Oiled wildlife response is an effective response technique for reducing the overall impact of a spill on wildlife. This is mostly achieved through hazing to prevent additional wildlife from being contaminated and through rehabilitation of those already subject to contamination.	In the event that wildlife are at risk of contamination, oiled wildlife response will be undertaken in accordance with the Oiled Wildlife Response Operational Plan as and where required. In addition, any rehabilitation could only be undertaken by trained specialists. Due to the likely volatile atmospheric conditions surrounding a Pluto Condensate spill, response options may be limited to hazing to ensure the safety of response personnel.	**Yes**	This technique may prevent impact to and/or treat oiled wildlife providing net environmental benefit.

Table 4-3: Response technique evaluation – vessel collision

Response Technique	Effectiveness	Feasibility	Decision	Rationale for the decision
Hydrocarbon: Marine Gas Oil (MGO) (CS-05)				
Operational Monitoring	Will be effective in tracking the location of the spill, predicting potential impacts and triggering further monitoring and response techniques as required. Monitoring techniques include: • OM01 Predictive modelling of hydrocarbons – used throughout spill. 'Ground-truthed' using the outputs of all other monitoring techniques. • OM02 Surveillance and reconnaissance to detect hydrocarbons and resources at risk – from outset of spill. • OM03 Monitoring of hydrocarbon presence, properties, behaviour and weathering in water – from outset of spill. • OM04 Pre-emptive assessment of sensitive receptors at risk – triggered once OM01, OM02 and OM03 inform likely RPAs at risk. OM05 Shoreline assessment – once OM02, OM03 and OM04 inform if any RPAs have been impacted.	Monitoring of a marine diesel spill is a feasible response technique and outputs will be used to guide decision making on the use of other monitoring/response techniques and providing information to regulatory agencies including AMSA and WA DoT. Practicable techniques that could be used for this scenario include predictive modelling (OM01), surveillance and reconnaissance OM02) and monitoring of hydrocarbon presence in water (OM03). Modelling does not predict impact of any shoreline receptors at threshold, however, pre-emptive assessment of sensitive receptors at risk (OM04) and monitoring of contaminated resources (OM05) would be utilised if any sensitive shoreline receptors are deemed to be at risk of impact.	**Yes**	Monitoring the spill will be necessary to: • validate trajectory and weathering models • determine the behaviour of the oil in water • determine the location and state of the slick • provide forecasts of spill trajectory • determine appropriate response techniques • determine effectiveness of response techniques • confirm impact pathways to receptors • provide regulatory agencies with required information.
Source control via vessel SOPEP	Controlling the spill of diesel at source would be the most effective way to limit the quantity of hydrocarbon entering the marine environment.	A spill of diesel from a vessel collision will be instantaneous and source control will be limited to what the vessel or facility can safely achieve whilst responding to the incident.	**Yes**	Ability to stop the spill at source will be dependent upon the specific spill circumstances and whether or not it is safe for response personnel to access/isolate the source of the spill.
Surface dispersant application	Application of surface dispersant would likely reduce the volumes of hydrocarbons contacting sensitive surface receptors. Dispersant can also enhance biodegradation and may reduce VOCs in some circumstances therefore reducing potential health and safety risk to responders. Dispersant can increase dispersed/entrained hydrocarbons which can potentially have higher toxicity to biota in shallow water than naturally dispersed hydrocarbons. Subsurface oil plume likely to increase in size resulting in greater spatial extent of entrained oil. Entrained oil could potentially impact on sensitive shallow-water receptors e.g. corals, which otherwise may have been unaffected.	This technique is not suitable for MGO spills as this hydrocarbon is prone to rapid spreading and evaporation and are not considered effective when applied on thin surface films such as marine diesel as the dispersant droplets tend to pass through the surface films without binding to the hydrocarbon resulting in the unnecessary addition of chemicals to the marine environment. Further, modelling for CS-05 does not predict that floating oil will reach the minimum feasible threshold for surface dispersant application (>50 g/m^2) The volatile nature of MGO is also likely to lead to unsafe conditions in the vicinity of fresh hydrocarbon thus this response technique is deemed inappropriate.	**No**	The application of dispersant to marine diesel is not appropriate as the diesel will rapidly evaporate and would thus unnecessarily introduce additional chemical substances to the marine environment. The additional entrainment would also increase exposure of subsea species and habitats to hydrocarbons.
Mechanical dispersion	Mechanical dispersion involves the use of a vessel's prop wash and/or fire hose to target surface hydrocarbons to achieve dispersion into the water column. However, this technique is of limited benefit in an open ocean environment where wind and wave action are likely to deliver similar advantages.	Although the technique is feasible, highly volatile hydrocarbons are likely to weather, spread and evaporate quickly. The volatile nature of the oil likely to lead to unsafe conditions in the vicinity of fresh hydrocarbon. Additionally, any vessel used for mechanical dispersion activities would be contaminated by the hydrocarbon and could potentially cause secondary contamination of unimpacted areas when exiting the spill area.	**No**	Given the limited benefit of mechanical dispersion over natural wind and wave action, secondary contamination and waste issues, and the associated safety risk of implementing the response for this activity, this strategy is deemed unsuitable.

Response Technique	Effectiveness	Feasibility	Decision	Rationale for the decision
		The decontamination of a vessel used for mechanical dispersion activities would result in additional quantities of oily waste requiring appropriate handling and treatment.		
In-situ burning	In-situ burning is only effective where minimum slick thickness can be achieved.	Use of in-situ burning as a response technique for marine diesel is unfeasible as the minimum slick thickness cannot be attained due to rapid spreading. In addition, there is a limited window of opportunity in which this technique can be applied (prior to evaporation of the volatiles) which is unlikely to be achieved. Furthermore, entering a volatile environment to undertake this technique would be unsafe for response personnel and its used would unnecessarily cause an increase the release of atmospheric pollutants.	**No**	Diesel characteristics are not appropriate for the use of in-situ burning and would unnecessarily cause an increase the release of atmospheric pollutants.
Containment and recovery	Containment and recovery has an effective recovery rate of 5-10% when a hydrocarbon encounter rate of 25-50% is achieved at BAOAC 4 and 5 with a 50-100% coverage of 100 g/m^2 to 200 g/m^2.	Modelling of an MGO spill predicts that floating oil will be prone to rapid spreading and evaporation and will not reach the required threshold (>50 g/m^2) for containment and recovery to be feasible within any RPA. The volatile nature of MGO is also likely to lead to unsafe conditions in the vicinity of the hydrocarbon thus this response technique is deemed inappropriate.	**No**	Containment and recovery would be an inappropriate response technique for a spill of MGO. Corralling a volatile hydrocarbon such as MGO is deemed unsafe for response personnel thus this response strategy is not considered feasible. In addition to the safety issues, most of the spilled diesel would have been subject to rapid evaporation prior to the commencement of containment and recovery operations.
Shoreline protection and deflection	Shoreline protection and deflection can be effective at preventing contamination of at-risk areas.	Stochastic modelling predicts that no shoreline receptors will be contacted by hydrocarbons at any threshold. An MGO spill would be prone to rapid spreading and evaporation. Furthermore, the volatile nature of MGO is also likely to lead to unsafe conditions in the vicinity of the hydrocarbon. Operational monitoring will, however, be deployed from the outset of a spill to track the spill location and fate in real-time.	**No**	In addition to safety issues and the rapid spreading and evaporation of the diesel, the modelling undertaken predicts that no shoreline receptors would be contacted by floating oil concentrations at any of the assessed thresholds.
Shoreline clean-up	Shoreline clean-up is an effective means of hydrocarbon removal from contaminated shorelines where coverage is at an optimum level of 250 g/m2.	Stochastic modelling predicts that no shoreline receptors will be contacted by hydrocarbons at any threshold. An MGO spill would be prone to rapid spreading and evaporation. Furthermore, the volatile nature of MGO is also likely to lead to unsafe conditions in the vicinity of the hydrocarbon. Operational monitoring will, however, be deployed from the outset of a spill to track the spill location and fate in real-time.	**No**	In addition to safety issues, the modelling undertaken predicts that no shoreline receptors would be contacted by floating oil concentrations at a recoverable threshold and a spill of marine diesel is unlikely to accumulate at concentrations appropriate for shoreline clean-up techniques.
Oiled wildlife response	Oiled wildlife response is an effective response technique for reducing the overall impact of a spill on wildlife. This is mostly achieved through hazing to prevent additional wildlife from being contaminated and through rehabilitation of those already subject to contamination.	Due to the likely volatile atmospheric conditions surrounding a diesel spill, response options may be limited to hazing to ensure the safety of response personnel. The modelling undertaken predicts that no sensitive areas will be impacted thus it is unlikely that this technique would be required. Monitor and evaluate will, however, be deployed from the outset of a spill to track the spill location and fate in real-time. Thus, in the event that wildlife are at risk of contamination, oiled wildlife response will be undertaken in accordance with the Oiled Wildlife Response Operational Plan as and where required. In addition, any rehabilitation could only be undertaken by trained specialists.	**Yes**	The modelling undertaken predicts that no sensitive areas will be impacted thus it is unlikely that this technique would be required. However, in the event that wildlife are at risk of contamination, oiled wildlife response will be undertaken as and where required.

5 HYDROCARBON SPILL ALARP PROCESS

Woodside's hydrocarbon spill ALARP process is aligned with guidance provided by NOPSEMA in *ALARP Guidance Note N-04300-GN0166* (2022) and *Oil Spill Risk Management Guidance Note N-04750-GN1488* (2021) and is set out in the 'Woodside Oil Spill Preparedness and Response Mitigation Assessment (OSPRMA) Guidelines'.

From the identified response planning need and pre-operational NEBA/SIMA, Woodside conducts a structured, semi-quantitative hydrocarbon spill process which has the following steps:

1. It considers the Response Planning Need identified in terms of surface area (km^2) and available surface hydrocarbon volumes (m^3) against existing Woodside capability.
2. It considers alternative, additional, and improved options for each response technique/control measure by providing an initial and, if required, detailed evaluation of:
    - predicted cost associated with adopting the control measure
    - predicted change/environmental benefit
    - predicted effectiveness/feasibility of the control measure.
3. It evaluates the risks and impacts of implementing the proposed response techniques, and any further control measures with associated environmental performance to manage these additional risks and impacts.

Woodside considers the risks and impacts from a hydrocarbon spill to have been reduced to ALARP when:

1. A structured process for identifying and considering alternative, additional, and improved options has been completed for each selected response technique.
2. The analysis of alternate, additional, and improved control measures meets one of the following criteria:
    - all identified, reasonably practicable control measures have been adopted; or
    - no identified reasonably practicable additional, alternative and/or improved control measures would provide further overall increased proportionate environmental benefit; or
    - no reasonably practical additional, alternative, and/or improved control measures have been identified.
3. Where an alternative, additional and/or improved control measure is adopted, a measurable level of environmental performance has been assigned.
4. Higher order impacts/ risks have received more comprehensive alternative, additional, and improved control measure evaluations and do not just compare the cost of the adopted control measures to the costs of an extreme or unreasonable control measure.
5. cumulative effects have been analysed when considered in combination across the whole activity.

The response technique selection is based on the risk assessment conducted in the EP. The risk assessment identifies the type of oil, volume of release, duration of release, predicted fate, weathering and the EMBA (along with other requirements such as time to impact and predicted volumes ashore). Modelling is then used to inform the NEBA and the prioritisation of suitable response options. The scale of the response techniques selected in the pre-operational NEBA is informed through the assessment of results from deterministic modelling.

For the ALARP assessment, the following terms and definitions have been used:

- Response techniques are considered the control measures that reduce consequences from hydrocarbon spill events. The terms 'response technique' and 'control measure' are used interchangeably.
- Cost is defined as the time, effort and/or complexity of financial, safety, design/storage/installation, capital/lease, and/or operations/maintenance required to adopt a control measure.

- Environmental impact is the comparison against standard environmental values and sensitivities impacts using positive or negative criteria from the NEBA Impact Ranking Classification Guidance in Annex A.

5.1 Operational Monitoring

Operational Monitoring includes the gathering and evaluation of data to inform the oil spill response planning and operations. It includes fate and trajectory modelling, spill tracking, weather updates and field observations. This response option is deployed in some capacity for every event.

The table below provides the operations monitoring plans that support the successful execution of this response technique.

Table 5-1: Description of supporting operational monitoring plans

ID	Title
OM01	Predictive modelling of hydrocarbons to assess resources at risk
OM02	Surveillance and reconnaissance to detect hydrocarbons and resources at risk
OM03	Monitoring of hydrocarbon presence, properties, behaviour and weathering in water
OM04	Pre-emptive assessment of sensitive receptors at risk
OM05	Shoreline assessment

Woodside maintains an *Operational Monitoring Operational Plan*. If shoreline contact is predicted, RPAs will be identified and assessed before contact. If shorelines are contacted, a shoreline assessment survey will be completed to guide effective shoreline clean-up operations. This plan includes the process for the IMT to mobilise resources depending on the nature and scale of the spill.

The proximity of Dampier, Onslow and Exmouth to the spill event locations means that multiple logistical options are available to monitor the spill in relatively short timeframes. The primary mobilisation base for initial monitoring activities would be Dampier. However, in the unlikely event of an extended spill with potential to impact receptors further afield, monitoring activities may also be mobilised from Exmouth, Onslow, Karratha, and Port Hedland.

5.1.1 Response need based on predicted consequence parameters

The following statements identify the key parameters upon which a response need can be based:

- Floating surface oil in sufficient concentrations for effective operational monitoring (>10 g/m^2) is expected to be present after 1 hour (CS-05) or 43 hours (CS-01) at Montebello Marine Park. .
- The shortest timeframe that shoreline contact at response threshold (>100 g/m^2) is predicted within 24 hours at Dampier Archipelago and Legendre Island (MEE-02b only).
- The time to contact for oil at concentrations of entrained hydrocarbons greater than 100 ppb is 1 hour within Montebello Marine Park (CS-05).
- Arrangements for support organisations who provide specialist services or resources should be tested regularly.
- Plans, procedures and support documents need to be in place for operational and support functions. These should be reviewed and updated regularly.
- The duration of the spill may extend up to 59 and 77 days for CS-01 and MEE-01 respectively, and up to 8 hours for MEE-02b and CS-05 with response operations extending to 5 days (MEE-02b) based on the predicted time to complete shoreline clean-up operations.

5.1.2 Environmental performance based on need

Table 5-2: Environmental Performance – Operational Monitoring

Environmental Performance Outcome		To gather information from multiple sources to establish an accurate common operating picture as soon as possible and predict the fate and behaviour of the spill to validate planning assumptions and adjust response plans as appropriate to the scenario.		
Control measure		**Performance Standard**		**Measurement Criteria (Section 5.10)**
1	Oil spill trajectory modelling	1.1	Initial modelling available within 6 hours using the Rapid Assessment Tool	1, 3B, 3C, 4
		1.2	Detailed modelling available within 4 hours of RPS receiving information from Woodside	
		1.3	Detailed modelling service available for the duration of the incident upon contract activation	
2	Tracking buoy	2.1	Tracking buoy located on facility/ lead vessel and ready for deployment 24/7	1, 3A, 3C, 4
		2.2	Deploy tracking buoy from facility/ lead vessel within 2 hours as per the First Strike Plan.	1, 3A, 3B, 4
		2.3	Contract in place with service provider to allow data from tracking buoy to be received 24/7 and processed.	1, 3B, 3C, 4
		2.4	Data received to be uploaded into Woodside COP daily to improve the accuracy of other Operational Monitoring techniques.	1, 3B, 4
		2.5	For unmanned facility/ vessel deploy tracking buoy within 48 hours	1, 3A, 3C, 4
3	Satellite imagery	3.1	Contract in place with 3rd party provider to enable access and analysis of satellite imagery. Imagery source/type requested on activation of service.	1, 3C, 4
		3.2	3rd party provider will confirm availability of an initial acquisition within 2 hours	1, 3B, 3C, 4
		3.3	First image received with 24 hours of Woodside confirming to 3rd party provider its acceptance of the proposed acquisition plan.	1
		3.4	3rd party provider to submit report to Woodside per image. Report is to include a polygon of any possible or identified slick(s) with metadata.	1
		3.5	Data received to be uploaded into Woodside COP daily to improve accuracy of other Operational Monitoring techniques.	1, 3B, 4
		3.6	Satellite Imagery services available and employed during response	1, 3C, 4
4	Aerial surveillance	4.1	1 trained aerial observers available to be deployed by day 1 from resource pool.	1, 2, 3B, 3C, 4
		4.2	1 aircraft available for two sorties per day, available for the duration of the response from day 1.	1, 3C, 4
		4.3	Observer to compile report during flight as per First Strike Plan. Observers report available to the IMT within 2 hours of landing after each sortie.	1, 2, 3B, 4
		4.4	Unmanned Aerial Vehicles/Systems (UAV/UASs) to support SCAT, containment and recovery and surface dispersal and pre-emptive assessments as contingency if required.	1, 2
5	Hydrocarbon detections in water	5.1	Activate 3rd party service provider as per first strike plan. Deploy resources within 3 days: • 3 specialists in water quality monitoring • 2 monitoring systems and ancillaries	1, 2, 3C, 3D, 4

Environmental Performance Outcome		To gather information from multiple sources to establish an accurate common operating picture as soon as possible and predict the fate and behaviour of the spill to validate planning assumptions and adjust response plans as appropriate to the scenario.		
Control measure		**Performance Standard**		**Measurement Criteria (Section 5.10)**
			• 1 vessel for deploying the monitoring systems with a dedicated winch, A-frame or Hiab and ancillaries to deploy the equipment.	
		5.2	Water monitoring services available and employed during response	1, 3C, 4
		5.3	Preliminary results of water sample as per contractor's implementation plan within 7 days of receipt of samples at the accredited lab	
		5.4	Daily fluorometry reports as per service provider's implementation plan will be provided to IMT to validate modelling and monitor presence/ absence of entrained hydrocarbons.	
6	Pre-emptive assessment of sensitive receptors	6.1	Mobilisation within 24 hours in consultation with WA DoT (for Level 2/3 incidents), of 2 specialists from resource pool in establishing the status of sensitive receptors.	1, 2, 3B, 3C, 4
		6.2	Daily reports provided to CIMT on the status of the receptors to prioritise Response Protection Areas (RPAs) and maximise effective utilisation of resources.	1, 3B, 4
7	Shoreline assessment	7.1	Mobilisation within 24 hours, in consultation with WA DoT (for Level 2/3 incidents), of 2 x specialist(s) in SCAT from resource pool for each of the Response Protection Areas (RPAs) with predicted impacts at greater than 100 g/m^2.	1, 2, 3B, 3C, 4
		7.2	SCAT reports provided to CIMT daily detailing the assessed areas to maximise effective utilisation of resources	1, 3B, 4
		7.3	Shoreline access routes with the least environmental impact identified will be selected by a specialist in SCAT operations	1

The control measures and capability of Woodside and its third-party service providers are shown to support Operational Monitoring activities up to and including the identified WCCS. This is demonstrated by the following:

- Woodside has a documented, structured and tested capability for Operational Monitoring operations including internal trajectory modelling capabilities, tracking buoys located offshore and contracted aerial observation platforms with access to trained observers.
- Woodside and its third-party service providers seek to maintain sufficient capability for the duration of the response.
- Woodside has assessed the existing capability available and considered potential alternative, additional and improved control measures. Where control measures have been selected and implemented, they are included in Section 6.1.

5.2 Source control and well intervention

The worst-case scenario for a Pluto production well is considered to be to be loss of well containment due to a 'tree off' scenario (MEE-01). The worst case scenario during Xena-03 well drilling operations would be a loss of containment resulting in an uncontrolled flow from the well (CS-01). Both scenarios are detailed in the EP. In the event of a loss of well containment for either MEE-01 or CS-01, the primary response would be source control and well intervention.

The Woodside Source Control Emergency Response Planning Guideline has been developed as part of the Woodside assurance plans and in alignment with the guidelines in the *NOPSEMA Source Control Planning and Procedures Information Paper* (N-04750-IP1979 A787102). It includes the process for the CIMT to mobilise resources for Subsea First Response Toolkit (SFRT) support, and capping support. This plan has pre-identified vessel specifications and contracts required for SFRT debris clearance work.

Woodside is a signatory to the Australian Energy Producers' (AEP) MoU between Australian offshore operators to provide mutual aid to facilitate and expedite mobilising a MODU and drilling a relief well, if a loss of well containment incident was to occur. The MoU commits the signatories to share rigs, equipment, personnel, and services to assist another operator in need. Moored and dynamically positioned (DP) MODUs are suitable for the Pluto and Xena wells.

Source control operations cannot be implemented if the safety of response personnel cannot be guaranteed. Circumstances that limit the safe execution of this control measure include lower explosive limit (LEL) concentrations, volatile concentrations of hydrocarbons in the atmosphere, weather window, waves and/or sea states (>1.5m waves) and high ambient temperatures. Gas monitoring will be undertaken in line with standard protocol.

5.2.1 Response need based on predicted consequence parameters

The following statements identify the key parameters upon which a response need can be based:

- Prior to any source control activities, Woodside will implement protocols seeking to ensure that the site is safe including subsea ROV surveys and surface air monitoring.
- Hydrocarbons will flow from the well until one of the following interventions can be made:
  - closure of the Tubing Retrievable Safety Valve (TRSV)
  - intervention with a capping stack.
  - a relief well is drilled and first attempt at well kill within 77 days (MEE-01) or 64 days (CS-01)
- Arrangements for support organisations who provide specialist services or resources should be tested regularly.
- Plans, procedures and support documents need to be in place for operational and support functions. These should be reviewed and updated regularly.
- The duration of the spill may extend up to 77 days (MEE-01) or 64 days (CS-01) with response operations extending until a capping stack has been installed or successful relief well is completed. Modelling does not predict shoreline contact for either MEE-01 or CS-01.

In addition, a number of assumptions are required to estimate the response need for source control. These assumptions have been described in the table below.

Table 5-3: Response Planning Assumptions – Source Control

Response planning assumptions	
Safety considerations	Source control operations cannot be implemented if the safety of response personnel cannot be guaranteed. This requires an initial and ongoing risk assessment of health and safety hazards and risks at the site, in accordance with the Woodside Management System (WMS). Personnel safety issues may include: • hydrocarbon gas and/or liquid exposure • high winds, waves and/or sea states • high ambient temperatures.
Feasibility considerations	Woodside's primary source control option would be ROV intervention if the BOP remains in place and is operable (CS-01). Relief well drilling for the Pluto Facility Operations and Xena wells , coupled with capping stack deployment (if conditions permit and the safety of the intervention personnel can be guaranteed), would also be attempted. The following approaches outline Woodside's hierarchy for relief well operations; • primary – review internal drilling programs and MODU availability to source appropriate rig(s) operating within Australia with an approved Safety Case • alternate – source and contract MODU through AEP MoU that is operating within Australia with an approved Safety Case • contingency – source and contract a MODU outside Australia with an approved Australian Safety Case.

5.2.2 Environmental performance based on need

Table 5-4: Environmental Performance – Source Control

Environmental Performance Outcome		To stop the flow of hydrocarbons into the marine environment		
Control measure		**Performance Standard**		**Measurement Criteria (Section 5.10)**
8	Subsea First Response Toolkit (SFRT)	8.1	Oceaneering support staff available all year round, via contract, to assist with the mobilisation, deployment, and operation of the SFRT equipment.	1, 3B, 3C
		8.2	Intervention vessel with minimum requirement of a working class ROV and operator.	1, 3C
		8.3	Mobilised to site for deployment within 11 days.	1, 3B, 3C
		8.4	Open communication line to be maintained between IMT and infield operations to ensure awareness of progress against plan(s).	1, 3A, 3B
9	Well intervention	9.1	Frame agreements with ROV providers in place to be mobilised upon notification. ROV equipment deployed within 7 days.	1, 3B, 3C
		9.2	Source control vessel will have the following minimum specifications: • active heave compensated crane, rated to at least 150 T in shallower water and 250 T in deeper water. • at least 90 m in length • deck has water/electricity supply • deck capacity to hold at least 110 T of capping stack.	1, 3B, 3C
		9.3	Identify source control vessel availability within 24 hours and begin contracting process. Vessel mobilised to site for deployment within 16 days for conventional capping.	1, 3B, 3C
		9.4	ROV available on MODU ready for deployment within 48 hours to attempt initial BOP well intervention (CS-01 only).	1, 3B, 3C
		9.5	Hot Stab and/or well intervention attempt made using ROV and SFRT within 11 days.	1, 3B, 3C
		9.6	Capping stack on suitable vessel mobilised to site within 16 days. Deployment and well intervention attempt will be made once plume size is acceptable and safety and metocean conditions are suitable.	1, 3C
		9.7	Wild Well Control Inc (WWCI) equipment and staff available all year round to assist with the mobilisation, deployment, and operation of the capping stack and well intervention equipment.	1, 3B, 3C
		9.8	MODU mobilised to site for relief well drilling within 21 days.	1, 3C
		9.9	First well kill attempt completed within 64 days (CS-01) and 77 days (MEE-01).	1, 3B, 3C
		9.10	Open communication line(s) to be maintained between IMT and infield operations to ensure awareness of progress against plan(s).	1, 3A, 3B
		9.11	**CS-01:** Relief well peer review undertaken during well design which includes screening and identification of suitable MODU(s) with in-force Australian Safety Cases for relief well drilling	1, 3C
		9.12	Monthly monitoring of the availability of MODUs through existing market intelligence including current Safety Case history.	3C

Environmental Performance Outcome		To stop the flow of hydrocarbons into the marine environment		
Control measure		**Performance Standard**		**Measurement Criteria (Section 5.10)**
		9.13	**CS-01:** Prior to entering the reservoir, reconfirm that pre-identified/screened MODU(s) remain available for relief well drilling.	1, 3C
10	Support vessels	10.1	Access to 24/7 tracking software to monitor availability of suitable vessels to meet specifications for source control.	3C
		10.2	Frame agreements for installation support vessels (ISVs) require vessels to maintain in-force Safety Case approvals covering ROV operations and provide support in the event of an emergency.	1, 3B, 3C
		10.3	MODU and vessel contracts include clause outlining requirement for support in the event of an emergency	1, 3C
11	Safety Case	11.1	Woodside will prioritise MODU or vessel(s) for intervention work(s) that have an existing Safety Case	1, 3C
		11.2	Woodside Planning, Logistics, and Safety Officers (on roster/Call 24/7) to assist in expediting the Safety Case assessment process as far as practicable.	1, 3C
		11.3	Woodside will maintain minimum safe operating standards that can be provided to MODU and vessel operators for Safety Case guidance..	1, 3C

The resulting source control capability has been assessed against the WCCS. The range of techniques provide a feasible and viable approach to well intervention and, if necessary, relief well drilling operations to stop the well flowing.

The health and safety, financial, capital and operations/maintenance costs of implementing the alternative, additional or improved control measures identified and not carried forward are considered disproportionate to the insignificant environmental benefit gained and/or not reasonably practicable for this PAP.

Woodside has assessed the existing capability available and considered potential alternative, additional and improved control measures. Where control measures have been selected and implemented, they are included in Section 6.2.

5.3 Source Control via Vessel SOPEP

Vessel source control will be conducted, where feasible and in accordance with MARPOL 73/78 Annex I, by the Vessel Master under the Shipboard Oil Pollution Emergency Plan (SOPEP) triggered by any loss of containment from the PAP vessels.

The SOPEP provides guidance to the Master and Officers on board the vessel with respect to the extra steps to be taken when an unexpected pollution incident has occurred or is likely to occur. The SOPEP contains all information and operational instructions required by IMO Resolution MEPC.54 (32) adopted on 6 March 1992, as amended by resolution MEPC.86 (44) adopted on 13 March 2000.

Its purpose is to set in motion the necessary actions to stop or minimise oil discharge and mitigate its effects and outlines responsibilities, pollution reporting requirements, procedures and resources needed in the event of a hydrocarbon spill from vessel activities.

In the event of the WCCS vessel collision event, the vessel master may engage precautionary marine manoeuvres to avoid collision or commence pumping operations to transfer MGO and thus minimise the release.

5.3.1 Environmental performance based on need

Woodside has established control measures, environmental performance outcomes, performance standards and measurement criteria to be used for vessel-source oil spill response during the PAP which are detailed in Section 6.7 of the EP. The vessel master's roles and responsibilities are described in EP Section 7.5.

Performance standards for each contracted PAP vessel are detailed in the vessel's specific SOPEP.

These standards ensure that sufficient resources are available and are adequately tested to ensure implementation of the SOPEP in the event of a hydrocarbon spill.

5.4 Shoreline Protection and Deflection

The placement of containment, protection or deflection booms on and near a shoreline is a response technique to reduce the potential volume of hydrocarbons contacting or spreading along shorelines, which may reduce the scale of shoreline clean-up. Hydrocarbons contained by the booms would be collected where practicable.

Shorelines would be protected where accessible via vessel or shore. Where hydrocarbon contact has already occurred, there may still be value in deploying protection equipment to limit further accumulations and preventing remobilisation of stranded hydrocarbons.

Shoreline protection and deflection equipment would be mobilised to selected locations, where the following conditions were met:

- Sea-states and hydrocarbon characteristics are safe to deploy protection and deflection measures,
- Oil trajectory has been identified as heading towards identified RPAs.

5.4.1 Response need based on predicted consequence parameters

The following statements identify the key parameters upon which the response need can be based:

- The shortest timeframe that shoreline contact at response threshold (>100 g/m^2) is predicted within 24 hours at Dampier Archipelago and Legendre Island (MEE-02b only).
- Pre-emptive assessment and shoreline assessments (OM04 and OM05) will be mobilised prior to shoreline contact at 100 g/m^2, which occurs within 24 hours at Dampier Archipelago and Legendre Island (MEE-02b only).
- The duration of the spill may extend up to 59 and 77 days for CS-01 and MEE-01 respectively, and up to 8 hours for MEE-02b and CS-05 with response operations extending to 5 days (MEE-02b) based on the predicted time to complete shoreline clean-up operations.
- Arrangements for support organisations who provide specialist services (trained personnel, protection and deflection equipment) and/or resources and should be tested regularly.
- TRPs for RPAs along with other relevant plans, procedures and support documents need to be in place for operational and support functions. These should be reviewed and updated regularly.

In addition, a number of assumptions are required to estimate the response need for shoreline protection and deflection. These assumptions have been described in the table below.

Table 5-5: Response Planning Assumptions – Shoreline Protection and Deflection

Response Planning Assumptions	
Safety considerations	Shoreline protection and deflection operations cannot be implemented if the safety of response personnel cannot be guaranteed. This requires an initial and ongoing risk assessment of health and safety hazards and risks at the site. Personnel safety issues may include: • hydrocarbon gas and/or liquid exposure • safe for deployment and conditions within range of vessels • high ambient temperatures.
Shoreline Protection and Deflection	One Shoreline Protection and Deflection operation may include; • quantity of shoreline sealing boom (as outlined in TRP) • quantity of fence or curtain boom (as outlined in TRP) • 1-2 trained supervisors • 8-10 personnel/ labour hire Specific details of each operation would be tailored to the TRP implemented (where available).

5.4.2 Environmental performance based on need

Table 5-6: Environmental Performance – Shoreline protection and deflection

Environmental Performance Outcome		To stop hydrocarbons encountering particularly sensitive areas		
Control measure		**Performance Standard**		**Measurement Criteria (Section 5.10)**
12	Response teams	12.1	In liaison with WA DoT (for Level 2/3 incidents), relevant Tactical Response Plans (TRPs) will be identified in the First Strike plan for activation.	1, 3A, 3C, 4
		12.2	In liaison with WA DoT (for Level 2/3 incidents), mobilise teams to RPAs within 24 hours. Teams to contaminated RPAs comprised of: • 1-2 trained specialists per operation • 8-10 personnel/labour hire • personnel sourced through resource pool.	1, 2, 3B, 3C, 4
		12.3	In liaison with WA DoT (for Level 2/3 incidents), 1 operation mobilised within 24 hours to each identified RPA.	1, 3A, 3B, 4
		12.4	12 trained personnel available within 24 hours sourced through resource pool.	1, 2, 3A, 3B, 3C, 4
		12.5	Open communication line to be maintained between IMT and infield operations to ensure awareness of progress against plan(s)	1, 3A, 3B
		12.6	The safety of shoreline response operations will be considered and appropriately managed. During shoreline operations: • All personnel in a response will receive an operational/safety briefing before commencing operations • Gas monitoring and site entry protocols will be used to assess safety of an operational area before allowing access to response personnel.	1, 3B, 4
13	Response equipment	13.1	Equipment mobilised from closest stockpile within 24 hours.	1, 3A, 3C, 4
		13.2	Supplementary equipment mobilised from AMOSC and State stockpiles within 48 hours.	1, 3C, 3D, 4
		13.3	Supplementary equipment mobilised from OSRL within 48 hours.	
		13.4	Woodside maintains integrated fleet of vessels. Additional vessels can be sourced through existing contracts/frame agreements	1, 3A, 3C, 4
14	Management of environmental impact of the response risks	14.1	If vessels are required for access, anchoring locations will be selected to minimise disturbance to benthic primary producer habitats. Where existing fixed anchoring points are not available, locations will be selected to minimise impact to nearshore benthic environments with a preference for areas of sandy seabed where they can be identified	1
		14.2	Shallow draft vessels will be used to access remote shorelines to minimise the impacts associated with seabed disturbance on approach to the shorelines	

The resulting shoreline protection and deflection capability has been assessed against the WCCS. The range of techniques provide an ongoing approach to shoreline protection and deflection at identified RPAs.

Under optimal conditions, the capability available meets the need identified within 72 hours. It indicates that, the shoreline protection and deflection capability has the following expected performance:

- Deterministic modelling scenarios indicate that first shoreline impact within 24 hours at Dampier Archipelago and Legendre Island for the Pluto Facility Operations export pipeline loss of containment scenario near the State Water boundary (MEE-02b).
- Existing capability allows for mobilisation and deployment of 1-2 protection and deflection operations within 24 hours (if required).
- The most significant constraint on expanding the scale of response operations is the availability of accommodation and transport services in the region between Exmouth and Port Hedland, and the management of response generated waste. From previous assessment of accommodation in this

region, Woodside estimates that current accommodation can cater for a range of 500 - 700 personnel per day for an ongoing operation.

- TRPs have been developed for identified RPAs excepting international locations.
- Woodside has assessed the existing capability available and considered potential alternative, additional and improved control measures. Where control measures have been selected and implemented, they are included in Section 6.4.

5.5 Shoreline Clean-up

Shoreline clean-up may be undertaken using a broad range of techniques when floating hydrocarbons contact shorelines. The timing, location and extent of shoreline clean-up activities can vary from one scenario to another, depending on the hydrocarbon type, sensitivities and values contacted, shoreline type and access, degree of oiling, and area oiled.

Shoreline clean-up is typically undertaken as a three-phase process:

- phase one (gross contamination removal) involving the collection of bulk oil, either floating against the shoreline or stranded on it
- phase two (moderate to heavy contamination removal) involving removal or in-situ treatment of shoreline substrates such as sand or pebble beaches
- phase three (final treatment or polishing) involving removal of the remaining residues of oil.

As phase one typically involves recovery of floating and pooled oil, and phase three removes minor volumes, they have not been considered in the assessment of response need for the scenarios identified.

The *Shoreline Clean-up Operational Plan* details the mobilisation and resource requirements for a shoreline clean-up operation including the logistics, support and facility arrangements to manage the movement of personnel and resources.

The *Shoreline Clean-up Operational Plan* includes the process for the IMT to mobilise resources depending on the nature and scale of the spill. Woodside would activate and mobilise trained and competent personnel in shoreline assessment before or following shoreline contact at response thresholds.

Shoreline clean-up consists of different manual and mechanical recovery techniques to remove hydrocarbons and contaminated debris from a shoreline; this is to minimise ongoing environmental contamination and impact. The National Plan also provides guidance on shoreline clean-up techniques as outlined in National Plan Guidance *Response assessment and termination of cleaning for oil contaminated foreshores* (AMSA 2015).

5.5.1 Response need based on predicted consequence parameters

The following statements identify the key parameters upon which the response need can be based:

- The shortest timeframe that shoreline contact at response threshold (>100 g/m^2) is predicted within 24 hours at Dampier Archipelago and Legendre Island (MEE-02b only).
- The duration of the spill may extend up to 59 and 77 days for CS-01 and MEE-01 respectively, and up to 8 hours for MEE-02b and CS-05 with response operations extending to 5 days (MEE-02b) based on the predicted time to complete shoreline clean-up operations.
- Pre-emptive assessment and shoreline assessments (OM04 and OM05) will be mobilised to RPAs with predicted shoreline contact.
- Following Shoreline Assessment and agreement of prioritisation with WA Department of Transport, clean-up operations would commence until agreed termination criteria are reached.
- Arrangements for support organisations who provide specialist services (trained personnel, labour hire, shoreline clean-up, and site management equipment) and/or resources and should be tested regularly.
- TRPs for RPAs along with other relevant plans, procedures and support documents should be in developed and in place for operational and support functions. These should be reviewed and updated regularly.

In addition, assumptions are required to estimate the response need for shoreline clean-up. These are described in the table below.

Table 5-7: Response Planning Assumptions – Shoreline Clean-up

Response planning assumptions: Shoreline clean-up	
Safety considerations	Shoreline clean-up operations cannot be implemented if the safety of response personnel cannot be guaranteed. This requires an initial and ongoing risk assessment of health and safety hazards and risks at the site. Personnel safety issues may include: • hydrocarbon gas and/or liquid exposure • waves and/or sea states, tidal cycle and intertidal zone limits • presence of wildlife • high ambient temperatures.
Manual shoreline clean-up operation (Phase 2)	One, manual shoreline clean-up operation (Phase 2) may include: • 1–2 trained supervisor • 8–10 personnel/ labour hire • supporting equipment for manual clean-up including rakes, shovels, plastic bags etc.
Physical properties	Surface Threshold • Lower – 100 g/m^2–100% coverage of 'stain' – cannot be scratched off easily on coarse sediments or bedrock. Expected trigger to undertake detailed shoreline survey • Optimum – 250 g/m^2 – 25% coverage of 'coat' – can be scratched off with a fingernail on coarse sediments. Expected trigger to commence clean-up operations
Efficiency **(m^3 oil recovered per person per day)**	Manual shoreline clean-up (Phase 2) – approximately 0.25–1 m^3 oil recovered per person per 10 hour day is based on moderate to high coverage of oil (100 g/m^2–1000 g/m^2) with manual removal using shovels/rakes, etc. from studies of previous response operations and exercises.

Table 5-8: Shoreline Clean-up techniques and recommendations

Technique	Description	Shoreline type		Application
		Recommended	Not recommended	
Natural recovery	Allowing shoreline to self-clean; no intervention undertaken.	Remote and inaccessible shorelines for personnel, vehicles and machinery. Other clean-up techniques may cause more damage than allowing the shoreline to naturally recover. Natural recovery may be recommended for areas with mangroves and coral reefs due to their sensitivity to disturbance from other shoreline clean-up techniques. High-energy shorelines: where natural removal rates are high, and hydrocarbons will be removed over a short timeframe.	Low-energy shorelines: these areas tend to be where hydrocarbon accumulates and penetrates soil and substrates.	May be employed, if the operational NEBA identifies that other clean-up techniques will have a negligible or negative environmental impact on the shoreline. May also be used for buried or reworked hydrocarbons where other techniques may not recover these.
Manual recovery	Use of manpower to collect hydrocarbons from the shoreline. Use of this form of clean-up is based on type of shoreline.	Remote and inaccessible shorelines for vehicles and machinery. Areas where shorelines may not be accessible by vehicles or machinery and personnel can recover hydrocarbons manually. Where hydrocarbons have formed semi-solid to solid masses that can be picked up manually. Areas where nesting and breeding fauna cannot or should not be disturbed.	Coral reef or other sensitive intertidal habitats, as the presence of a response may cause more environmental damage then allowing them to recover naturally. For some high-energy shorelines such as cliffs and sea walls, manual recovery may not be recommended as it may pose a safety threat to responders.	May be used for sandy shorelines. Buried hydrocarbons may be recovered using shovels into small carry waste bags, but where possible the shoreline should be left to naturally recover to prevent any further burying of hydrocarbons (from general clean-up activities).

Technique	Description	Shoreline type		Application
		Recommended	Not recommended	
Sorbents	Sorbent boom or pads used to recover fluid or sticky hydrocarbons. Can also be used after manual clean-up to remove any residues from crevices or from vegetation.	When hydrocarbons are free-floating close to shore or stranded onshore. As a secondary treatment method after hydrocarbon removal and in sensitive areas where access is restricted.	Access for deploying and retrieving sorbents should not be through soft or sensitive habitats or affect wildlife.	Used for rocky shorelines. Sorbent boom will allow for deployment from small shallow draught vessels, which will allow deployment close to shore where water is sheltered and to aid recovery. Sorbents will create more solid waste compared with manual clean-up, so will be limited to cleaning rocky shorelines.
Vacuum recovery, flushing, washing	The use of high volumes of low-pressure water, pumping and/or vacuuming to remove floating hydrocarbons accumulated at shorelines.	Suited to rocky or pebble shores where flushing can remobilise hydrocarbons (to be broken up) and aid natural recovery. Any accessible shoreline type from land or water. May be mounted on barges for water-based operations, on trucks driven to the recovery area, or hand-carried to remote sites. Flushing and vacuum may be useful for rocky substrate. Medium- to high-energy shorelines where natural removal rates are moderate to high. Where flushed hydrocarbons can be recovered to prevent further oiling of shorelines.	Areas of pooled light, fresh hydrocarbons may not be recoverable via vacuum due to fire and explosion risks. Shorelines with limited access. Flushing and washing not recommended for loose sediments. High-energy shorelines where access is restricted.	High volume low pressure (HVLP) flushing and washing into a sorbent boom could be used for rocky substrate, if protection booming has been unsuccessful in deflecting hydrocarbons from these areas.
Sediment reworking	Movement of sediment to surf to allow hydrocarbons to be removed from the sediment and move sand via heavy machinery.	When hydrocarbons have penetrated below the surface. Recommended for pebble/cobble shoreline types. Medium- to high-energy shorelines where natural removal rates are moderate to high.	Low-energy shorelines as the movement of substrate will not accelerate the natural cleaning process. Areas used by fauna which could potentially be affected by remobilised hydrocarbons.	Use of wave action to clean sediment: appropriate for sandy beaches where light machinery is accessible.

Technique	Description	Shoreline type		Application
		Recommended	Not recommended	
Vegetation cutting	Cutting vegetation to prevent oiling and reduce volume of waste and debris.	Vegetation cutting may be recommended to reduce the potential for wildlife being oiled. Where oiling is restricted to fringing vegetation.	Access in bird-nesting areas should be restricted during nesting seasons. Areas of slow-growing vegetation.	May be used on shorelines where vegetation can be safely cleared to reduce oiling.
Cleaning agents (OSCA)	Application of chemicals such as dispersants to remove hydrocarbons.	May be used for manmade structures and where public safety may be a concern.	Natural substrates and in low-energy environments where sufficient mixing energy is not present.	Not recommended for shorelines. Could be used for manmade structures such as boat ramps.

5.5.2 Environmental performance based on need

Table 5-9: Environmental Performance – Shoreline Clean-up

Environmental Performance Outcome		To remove bulk and stranded hydrocarbons from shorelines and facilitate shoreline amenity habitat recovery.		
Control measure		**Performance Standard**		**Measurement Criteria (Section 5.10)**
15	Shoreline responders	15.1	In liaison with WA DoT (for Level 2/3 incidents), deployment of shoreline clean-up teams to contaminated RPAs comprised of: • 1-2 trained specialists per operation • 8-10 personnel/labour hire • Personnel sourced through resource pool within 48 hours of request from the IMT.	1, 2, 3A, 3B, 3C, 4
		15.2	Relevant Tactical Response Plans (TRPs) will be identified in the first strike plan for activation within 24 hours of a release.	1, 3A, 3C, 4
		15.3	Clean-up operations for shorelines in line with results and recommendations from SCAT outputs	1, 3A, 3B
		15.4	All shoreline clean-up sites will be zoned and marked before clean-up operations commence to prevent secondary contamination and minimise the mixing of clean and oiled sediment and shoreline substrates.	
		15.5	In liaison with WA DoT (for Level 2/3 incidents), mobilise and deploy 1-2 shoreline clean-up operations within 24 hours. .	1, 2, 3A, 3C, 4
		15.6	The safety of shoreline response operations will be considered and appropriately managed. During shoreline clean-up operations: • All personnel in a response will receive an operational/safety briefing before commencing operations. • Gas monitoring and site entry protocols will be used to assess safety of an operational area before allowing access to response personnel	1, 3B, 4
		15.7	Open communication line to be maintained between CIMT and infield operations to ensure awareness of progress against plan(s).	1, 3A, 3B
16	Shoreline clean up equipment	16.1	Contract in place with 3rd party providers to access equipment.	1, 3A, 3C, 4
		16.2	Equipment mobilised from closest stockpile within 24 hours.	
		16.3	Supplementary equipment mobilised from AMOSC and State stockpiles within 48 hours.	1, 3C, 3D, 4
		16.4	Supplementary equipment mobilised from OSRL within 48 hours.	
17	Management of environmental impact of the response risks	17.1	If vessels are required for access, anchoring locations will be selected to minimise disturbance to benthic primary producer habitats. Where existing fixed anchoring points are not available, locations will be selected to minimise impact to nearshore benthic environments with a preference for areas of sandy seabed where they can be identified	1
		17.2	Shallow draft vessels will be used to access remote shorelines to minimise the impacts associated with seabed disturbance on approach to the shorelines	
		17.3	Vehicular access will be restricted on dunes, turtle nesting beaches an in mangroves	
		17.4	Removal of vegetation will be limited to moderately or heavily oiled vegetation.	
		17.5	Shoreline access routes with the least environmental impact identified will be selected by a specialist in SCAT operations.	
		17.6	Oversight by trained personnel who are aware of the risks.	
		17.7	Trained unit leaders will brief personnel prior to operations of the environmental risks of presence of personnel on the shoreline.	

The resulting shoreline clean-up capability has been assessed against the WCCS. The range of techniques provide an ongoing approach to shoreline clean-up at identified RPAs. Woodside's existing capability can cover all required shoreline clean-up operations for the PAP within 72 hours.

Existing capability allows for mobilisation and deployment of 1-2 shoreline clean-up operations within 24 hours (if required).

The capability available meets the need identified for this activity. The shoreline clean-up capability has the following expected performance (if required during a response):

- Woodside has the capacity to mobilise and deploy up to 15–20 shoreline clean-up teams within 7 days at up to 6-10 RPAs using existing labour hire contracts with Woodside, AMOSC, Core Group and OSRL team leads.
- Assessment of response capability indicates that for a worst-case scenario the actual teams required would meet the available capability within 48 hours, with the response completed by day 5.
- Woodside has considered deployment of additional personnel to undertake shoreline clean-up operations but is satisfied that the identified level of resource is balanced between cost, time and effectiveness. The most significant constraint on expanding the scale of response operations is the availability of accommodation and transport services in the region between Exmouth and Port Hedland and management of response generated waste. From previous assessment of accommodation in this region, Woodside estimates that current accommodation can cater for a range of 500 - 700 personnel per day for an ongoing operation.
- TRPs have been developed for all identified RPAs excepting international locations.
- Woodside has assessed the existing capability available and considered potential alternative, additional and improved control measures. Where control measures have been selected and implemented, they are included in Section 6.5

5.6 Oiled wildlife response (including hazing)

Oiled wildlife response (OWR) includes wildlife surveillance/ reconnaissance, wildlife hazing, pre-emptive capture, and the capture, cleaning, treatment, and rehabilitation of animals that have been oiled. In addition, it includes the collection, post-mortem examination, and disposal of deceased animals that have succumbed to the effects of oiling.

For a petroleum activity spill in Commonwealth waters, Woodside will act as Control Agency and will be responsible for the wildlife response. In such circumstances, Woodside would implement a response in accordance with the *Oiled Wildlife Operational Plan*, the WA Oiled Wildlife Response Plan (WAOWRP) (DBCA, 2022a) and the WA OWR Manual (DBCA, 2022b). The *Oiled Wildlife Operational Plan* includes the process for the IMT to mobilise resources depending on the nature and scale of the spill. Oiled wildlife operations would be implemented with advice and assistance from the Oiled Wildlife Advisor from the Department of Biodiversity, Conservation and Attractions (DBCA).

The key plan for OWR in WA is the WAOWRP (DBCA, 2022a). The WAOWRP establishes the framework for preparing and responding to potential or actual wildlife impacts during a spill and sets out the management arrangements for implementing an OWR in conjunction with the DoT *State Hazard Plan – Maritime Environmental Emergencies* (SHP-MEE). It is the responsibility of DBCA to administer the WAOWRP under the direction of the DoT. The WA OWR Manual (DBCA, 2022b) supports, and should be used in conjunction with, the WAOWRP. The purpose of the WA OWR Manual is to standardise the operating procedures, protocols and processes for an OWR during a spill event in WA waters, and to create alignment between the wildlife response processes and the overall incident response (DBCA, 2022b).

If a spill occurs in WA State waters or enters State waters, DBCA is the Jurisdictional Authority for oiled wildlife response for level 2/3 spills and will also lead the oiled wildlife response under the control of the DoT. DBCA is the State Government agency responsible for administering the *Biodiversity Conservation Act 2016 (WA) (BC Act)*, which has provisions for authorising activities that affect wildlife.

For level 1 spills in State waters, Woodside will be the Control Agency, including for wildlife response. It is, however, also an expectation that for level 2/3 petroleum activity spills, Woodside will conduct the initial first-strike response actions for wildlife response and continue to manage those operations until DBCA is activated as the lead agency for wildlife response and formal handover occurs. Following formal handover, Woodside will function as a support organisation for the OWR and will be expected to continue to provide planning and resources as required.

Woodside retains specialist personnel to support and manage oiled wildlife operations, including trained and competent responders for deployment in Exmouth and Dampier. Additional personnel would be sourced through Woodside's arrangements to support an oiled wildlife response as required.

5.6.1 Response need based on predicted consequence parameters

Wildlife response protection areas and assessment of wildlife impact

French-McCay et al. (2002), based on a review of existing literature at the time, determined lethal thresholds for floating and shoreline oil for the external coating of wildlife to be 10 g/m^2 for floating, and 100 g/m^2 for shoreline accumulation. It should however be noted that toxicity thresholds for wildlife are likely to be highly variable due to differences in species sensitivity, type of hydrocarbon, type of exposure (ingestion or external oiling), life-stage, and on-water versus land habitat.

For planning purposes, determination of wildlife priority protection areas is based on stochastic modelling of the worst-case spill scenarios at 10 g/m^2 for floating, and 100 g/m^2 for shoreline accumulation (acknowledging that impacts to wildlife may occur at lower concentrations), the known presence of wildlife, and in consideration of the following:

- presence of high densities of wildlife, threatened species, and/or endemic species with high site fidelity
- greatest probability of shoreline accumulation
- shortest timeframe to contact.

At the time of a spill, identification and allocation of wildlife response protection areas should also take into consideration any key biological activities. Additional detail regarding species and their key

biological activities within the vicinity of the PAP are described in Section 4.6 of the Pluto Facility Operations EP.

For WA, although somewhat outdated, the Pilbara and Kimberley Regional Oiled Wildlife Plans (DBCA [formerly Department of Parks and Wildlife], 2014) provide useful information relating to wildlife priority response areas in their respective regions.

Table 5-10: Key at-risk species potentially in Priority Protection Areas and open ocean

Species	Dampier Archipelago	Keast Island	Legendre Island	Cape Bruguieres	Cohen Island	Montebello MP
Marine turtles	✓	✓	✓	✓	✓	✓
Whale sharks		✓	✓	✓	✓	✓
Seabirds and/or migratory shorebirds	✓	✓	✓	✓	✓	✓
Cetaceans – migratory whales	✓	✓	✓	✓	✓	✓
Cetaceans – dolphins and porpoises	✓	✓	✓	✓	✓	✓
Dugongs		✓	✓	✓	✓	
Sharks and rays	✓	✓	✓	✓	✓	✓

The following statements identify the key parameters upon which a wildlife response need can be based:

- The minimum time to floating contact receptors at >10 g/m^2 was 1 hour at Montebello Marine Park (CS-05).
- The minimum time to shoreline contact at response thresholds (>100 g/m^2) is 21 hours to the Dampier Archipelago and Legendre Island.
- At sea there are likely to be low numbers of at risk or impacted wildlife, and limited opportunities to rescue wildlife, given the distribution and behaviour of animals in the open marine environment. At sea, continued wildlife reconnaissance, carcass recovery, sampling of carcasses that cannot be retrieved and scientific monitoring are more likely to be the focus of response efforts.
- As the surface oil approaches shorelines and as oil accumulates on the shoreline, the potential for oiled wildlife impacts is likely to increase as well as opportunities to rescue wildlife.
- It is estimated that the wildlife impact would be medium, as defined in the WAOWRP (DBCA, 2022a) (**Table 5-11)**.

Table 5-11: WAOWRP Guide for rating wildlife impact of an oil spill (DBCA, 2022)

Wildlife Impact Rating	Low	Medium	High
What is the likely duration of the wildlife response?	<3 days	3-10 days	>10 days
What is the likely total intake of animals?	<10	11-25	>25
What is the likely daily intake of animals?	0-2	2-5	>5
Are threatened species, or species protected by treaty, likely to be impacted, either directly or by pollution of habitat or breeding areas?	No	Yes – possible	Yes – likely
Is there likely to be a requirement for building primary care facility for treatment, cleaning and rehabilitation?	No	Yes – possible	Yes – likely

Tactics

Where there is imminent or actual impact to wildlife, Woodside will activate the Wildlife Division and follow the oiled wildlife incident management framework and implementation plan outlined in the Woodside *Oiled Wildlife Operational Plan*.

In Commonwealth waters, Woodside will be responsible for the planning and implementation of the OWR in its entirety. Noting that at sea, and in comparison to the shoreline, there are likely to be less wildlife impacted by an oil spill and limited opportunities to rescue wildlife, given the distribution and behaviour of animals in the open marine environment. At sea, continued wildlife reconnaissance, carcass recovery, sampling of carcasses that cannot be retrieved and integration with scientific monitoring are more likely to be the focus of the OWR.

In State waters, Woodside will conduct the initial first-strike response actions for wildlife and continue to manage those operations until DBCA is activated as the lead agency for wildlife response and formal handover occurs. Following formal handover, Woodside will function as a support organisation for the OWR and will be expected to continue to provide planning and resources as required.

If a protracted response requiring preventative actions and/or wildlife rescue is likely, and formal handover to the Control Agency (in State waters) has not yet occurred, the Wildlife Division will be responsible for the development of the Wildlife Division portion of the IAP. Preventative actions, such as hazing, capture, intake and treatment, require a higher degree of planning, approval (licenses) and skills. These activities will be planned for and carried out under the IAP as outlined in the *Oiled Wildlife Operational Plan* and in accordance with the WAOWRP (DBCA, 2022a) and WA OWR Manual (DBAC, 20022b).

The oiled wildlife response technique targets key wildlife populations at risk within Commonwealth open waters and the nearshore waters as described in Section 4 of the EP.

5.6.2 Environmental performance based on need

Table 5-12: Environmental Performance – Oiled Wildlife Response

Environmental Performance Outcome		OWR is conducted in accordance with the Western Australian Oiled Wildlife Response Plan (WAOWRP, 2022) to meet legislative requirements to house, release or euthanise wildlife under the *Biodiversity Conservation Act 2016 (WA)*.		
Control measure		**Performance Standard**		**Measurement Criteria (Section 5.10)**
18	Wildlife response arrangements	18.1	Oiled Wildlife Operational Plan in place and utilised during a response to plan, coordinate, implement and terminate operations	1, 3A, 4
		18.2	Initiate a wildlife first strike response within 24 hours of confirmed or imminent wildlife contact as directed by relevant Operational Monitoring techniques (OM01-05) and in liaison with DBCA	1
19	Wildlife response equipment	19.1	Maintain contract with AMOSC for immediate access to oiled wildlife response equipment.	1, 3C, 3D, 4
		19.2	Maintain contract with OSRL to access additional oiled wildlife response equipment.	1, 3C, 3D, 4
20	Wildlife responders	20.1	Two Oiled Wildlife Team Members to supervise the oiled wildlife operations who have completed an Oiled Wildlife Response Management course.	1, 2, 3B
		20.2	Maintain contract with AMOSC for immediate access to trained OWR specialists	1, 3B, 3C
		20.3	Maintain contract with OSRL to access additional trained oiled wildlife response specialists	1, 3B, 3C
		20.4	Open communication line to be maintained between IMT and infield operations to ensure awareness of progress against plan(s).	1, 3A, 3B
21	Management of environmental impacts of response risks	21.1	Oiled wildlife operations (including hazing) would be implemented with advice and assistance from the Oiled Wildlife Advisor from the DBCA, and in accordance with the processes and methodologies described in the WA OWRP and the relevant regional plan.	1

The resulting wildlife response capability has been assessed against the WCCS. The range of techniques provide an ongoing approach to response at identified RPAs.

Under optimal conditions, during the subsea or surface release, the capability available meets the need identified. It indicates that, the wildlife response capability has the following expected performance to:

- undertake OWR first strike response including mobilisation of operational monitoring (OM01-05) to identify wildlife and RPAs contacted or at imminent risk of contact by hydrocarbons
- confirm availability and mobilisation of trained OWR personnel to supervise OWR activities
- access to wildlife resources (personnel and equipment) to meet the needs where there are medium or high levels of wildlife impact.

5.7 Waste Management

Waste management is considered a support technique to wildlife response, containment and recovery and shoreline clean-up. Waste generated and collected during the response that will require handling, management and disposal may consist of:

- liquids (hydrocarbons and contaminated liquids) collected during shoreline clean-up and oiled wildlife operations
- solids/semi-solids (oily solids, garbage, contaminated materials) and debris (e.g. seaweed, sand, woods, and plastics) collected during shoreline clean-up and oiled wildlife operations.

Expected waste volumes during an event are likely to vary depending on oil type, volume released, response techniques employed and how weathering of hydrocarbons. Waste management, handling and capacity should be scalable to maintain continuous response operations.

All waste management activities will follow the Environment Protection (Controlled Waste) Regulations 2004 (WA) and the waste will be managed to minimise final disposal volumes. Waste treatment techniques will consider contaminated solids treatment to allow disposal to landfill and solids with high concentrations of hydrocarbon will be treated and recycled where possible or used in clean fill if suitable.

The waste products would be transported from response locations to the nearest suitable staging area/waste transfer station for treatment, disposal or recycling. Waste will be transferred with appropriately licensed vehicles. Containers will be available for temporary waste storage and will be:

- labelled with the waste type
- provided with appropriate lids to prevent waste being blown overboard
- bunded if storing liquid wastes.

Processes will be in place for transfers of bulk liquid wastes and include:

- inspection of transfer hose undertaken prior to transfer
- watchman equipped with radio visually monitors loading hose during transfer
- tank gauges monitored throughout operation to prevent overflow.

The *Oil Spill Preparedness Waste Management Support Plan* details the procedures, capability and capacity in place between Woodside and its primary waste services contractor to manage waste volumes generated from response activities.

5.7.1 Response need based on predicted consequence parameters

Table 5-13: Response Planning Assumptions – Waste Management

Response planning assumptions: Waste management	
Waste loading per m^3 oil recovered (multiplier)	Shoreline clean-up (manual) – approximately 5-10x multiplier for oily solid and liquid wastes generated by manual clean-up.
	Oiled wildlife response – approximately 1 m^3 of oily solid and liquid waste generated for each wildlife unit cleaned

5.7.2 Environmental performance based on need

Table 5-14: Environmental Performance – Waste Management

Environmental Performance Outcome		To minimise further impacts, waste will be managed, tracked and disposed of in accordance with laws and regulations.		
Control measure		**Performance Standard**		**Measurement Criteria (Section 5.10)**
22	Waste Management	22.1	Contract with waste management services for transport, removal, treatment and disposal of waste	1, 3A, 3B, 3C, 4
		22.2	Access to at least 124 m^3 of solid and liquid waste storage available within 24 hours upon activation of 3rd party contract.	
		22.3	Access to up to 675 m^3 of solid and liquid waste storage available by end of day 4.	
		22.4	Recovered hydrocarbons and wastes will be transferred to licensed treatment facility for reprocessing or disposal.	
		22.5	Waste management provider support staff available year-round to assist in the event of an incident with waste management as detailed in contract.	
		22.6.	Open communication line to be maintained between IMT and waste management services to ensure the reliable flow of accurate information between parties.	1, 3A, 3B
		22.7	Waste management to be conducted in accordance with Australian laws and regulations	1, 3A, 3B, 3C, 4
		22.8	Waste management services available and employed during response	
23	Management of environmental impacts of response risks	23.1	Teams will segregate liquid and solid wastes at the earliest opportunity.	1, 3A, 3B, 3C, 4

The resulting waste management capability has been assessed against the WCCS. The range of techniques provide an ongoing approach to waste management at identified RPAs.

Given the largest shoreline volumes ashore are predicted within 24 hours (MEE-02b) at a maximum volume of 15 m^3, and up to 341 m^3 of waste is expected across all shoreline clean-up operations, the capability available exceeds the need identified.

It indicates that the waste management capability has the following expected performance:

- Shoreline and nearshore operations may generate 74 to 341 m^3 over 5 days of clean-up operations.
- Woodside has assessed the existing capability available and considered potential alternative, additional and improved control measures. Where control measures have been selected and implemented, they are included in Section 6.7.
- Woodside's waste contractor has access to approximately 120,000 m^3 to treat overall waste volumes. The waste management requirements are within Woodside's and its service providers existing capacity.

5.8 Scientific monitoring

A scientific monitoring program (SMP) would be activated following a Level 2 or 3 unplanned hydrocarbon release, or any release event with the potential to contact sensitive environmental receptors. This would consider receptors at risk (ecological and socio-economic) for the entire predicted EMBA and in particular, any identified Pre-emptive Baseline Areas (PBAs) for the credible spill scenario(s) or other identified unplanned hydrocarbon releases associated with the PAP (refer to Table 2-1: PAP credible spill scenarios).

The outputs of the stochastic hydrocarbon spill modelling are used to assess the environmental risk, in terms of delineating which areas of the marine environment are predicted to be exposed to hydrocarbons exceeding environmental threshold concentrations (refer to Table 2-6, Section 2.3.1.1). The summary of all the locations where hydrocarbon thresholds could be exceeded by any of the simulations modelled is defined as the EMBA. The PAP worst-case credible spill scenarios CS-01, MEE-01, MEE-02a, MEE02b and CS-05 (**Table 2-1**) define the EMBA and are the basis of the SMP approach presented in this section.

It should be noted that the resulting SMP receptor locations differ from the RPAs presented and discussed in Section 3 of this document due to the applicability of different hydrocarbon threshold levels. The SMP would be informed by the data collected via the Operational Monitoring Program (OMP) studies, however, it differs from the OMP in being a long-term program independent of, and not directing, the operational oil spill response or monitoring of impacts from response activities (refer to **Section 5.1**) for operational monitoring overview).

Key objectives of the Woodside oil spill scientific monitoring program are:

- assess the extent, severity and persistence of the environmental impacts from the spill event
- monitor subsequent recovery of impacted key species, habitats and ecosystems.

The SMP comprises ten targeted environmental monitoring programs to assess the condition of a range of physico-chemical (water and sediment) and biological (species and habitats) receptors including EPBC Act listed species, environmental values associated with protected areas and socio-economic values, such as fisheries. The ten SMPs are as follows:

- SM01 – assessment of the presence, quantity and character of hydrocarbons in marine waters (linked to OM01 to OM03)
- SM02 – assessment of the presence, quantity and character of hydrocarbons in marine sediments (linked to OM01 and OM05)
- SM03 – assessment of impacts and recovery of subtidal and intertidal benthos
- SM04 – assessment of impacts and recovery of mangroves/saltmarsh habitat
- SM05 – assessment of impacts and recovery of seabird and shorebird populations
- SM06 – assessment of impacts and recovery of nesting marine turtle populations
- SM07 – assessment of impacts to pinniped colonies including haul-out site populations
- SM08 – desktop assessment of impacts to other non-avian marine megafauna
- SM09 – assessment of impacts and recovery of marine fish (linked to SM03)
- SM10 – assessment of physiological impacts to important fish and shellfish species (fish health and seafood quality/safety) and recovery.

These SMPs have been designed to cover all key tropical and temperate habitats and species within Australian waters and broader, if required. A planning area for scientific monitoring is also identified to acknowledge potential hydrocarbon contact below the environmental threshold concentrations and beyond the EMBA. This planning area has been set with reference to the entrained low exposure value of 10 ppb detailed in NOPSEMA Bulletin #1 Oil Spill Modelling (2019), as shown in **Figure 5-1**.

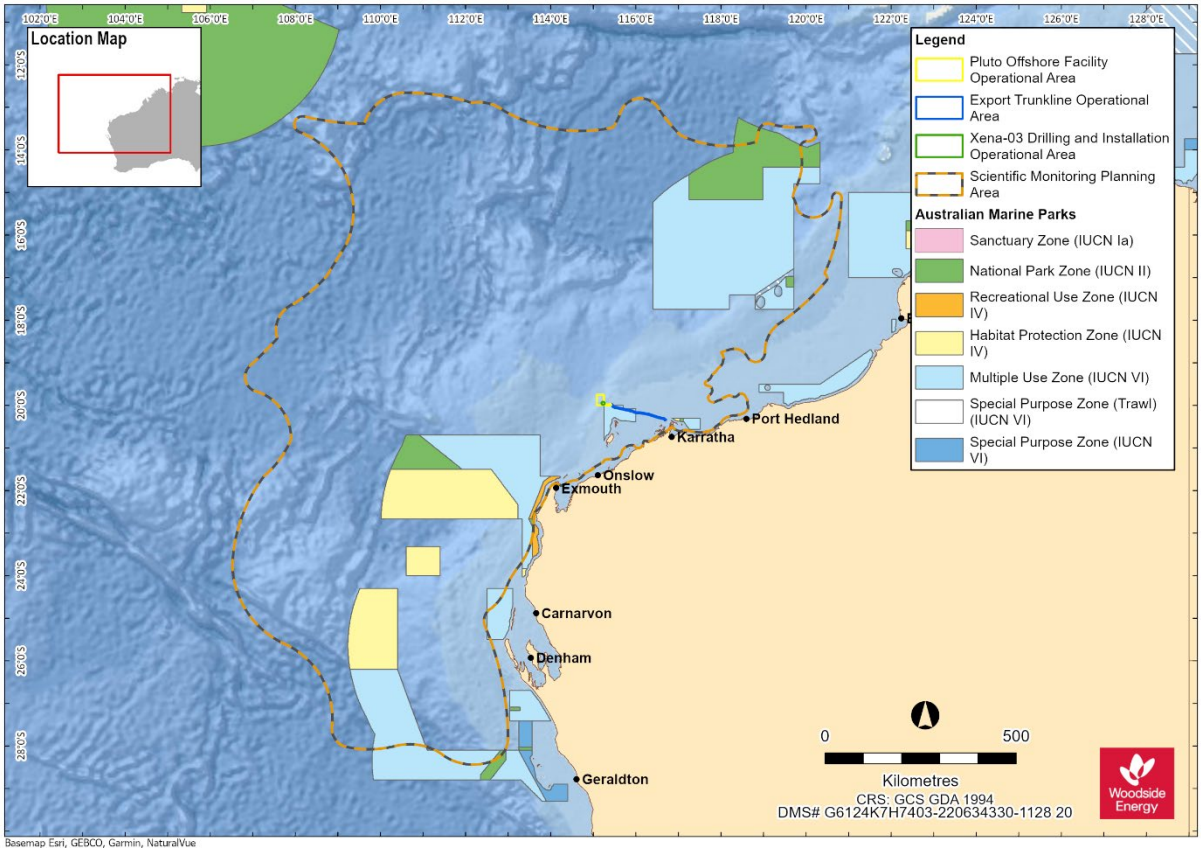

Figure 5-1: The planning area for scientific monitoring based on the area potentially contacted by the low (below ecological impact) entrained hydrocarbon threshold of 10 ppb in the event of the worst-case credible spill scenarios.

Please note that Figure 5-1 represents the overall combined extent of the oil spill model outputs based, on a total of 100 replicate simulations over an annual period each for CS-01, MEE-01, MEE-02a and MEE-02b, and 200 replicate simulations over an annual period for CS-05 and therefore represents the largest spatial boundaries of 100-200 oil spill combinations, not the spatial extent of a single spill.

5.8.1 Scientific Monitoring Deployment Considerations

Scientific monitoring deployment considerations	
Existing baseline studies for sensitive receptor locations predicted to be affected by a spill	PBAs of the following two categories: • PBAs within the predicted <10-day hydrocarbon contact time prediction: The approach is to conduct a desktop review of available and appropriate baseline data for key receptors for locations (if any) that are potentially impacted within 10 days of a spill and look to conduct baseline data collection to address data gaps and demonstrate spill response preparedness. Planning for baseline data acquisition is typically commenced pre-PAP and execution of studies undertaken with consideration of weather, receptor type, seasonality and temporal assessment requirements. • PBAs >10 days to predicted hydrocarbon contact in the event of an unplanned hydrocarbon release from the PAP. SMP activation (as per the Pluto Facility Operations First Strike Plan) directs the SMP team to follow the steps outlined in the SMP Operational Plan. The steps include: checking the availability and type of existing baseline data, with particular reference to any PBAs identified as >10 days to hydrocarbon contact. Such information is used to identify response phase PBAs and plan for the activation of SMPs for pre-emptive (i.e. pre-hydrocarbon contact) baseline assessment.
Pre-emptive Baseline in the event of a spill	Activation of SMPs in order to collect baseline data at sensitive receptor locations with predicted hydrocarbon contact time >10 days (as documented in ANNEX C).
Survey platform suitability and availability	In the event of the SMP activation, suitable survey platforms are available and can support the range of equipment and data collection methodologies to be implemented in nearshore and offshore marine environments.
Trained personnel to implement SMPs suitable and available.	Access to trained personnel and the sampling equipment contracted for scientific monitoring via a dedicated scientific monitoring program standby contract.
Metocean conditions	The following metocean conditions have been identified to implement SMPs: • Waves <1 m for nearshore systems • Waves <1.5 m for offshore systems • Winds <20 knots • Daylight operations only SMP implementation will be planned and managed according to HSE risk reviews and the metocean conditions on a day to day basis by SMP operations.

5.8.2 Response planning assumptions

Response Planning Assumptions	
PBAs	PBAs identified through the application of defined hydrocarbon impact thresholds during the Quantitative Spill Risk Assessment process and a consideration of the minimum time to contact at receptor locations fall into two categories: • PBAs for which baseline data exist or are planned for and data collection may commence pre-PAP (≤ 10 days minimum time to contact). • PBAs (> 10 days minimum time to contact) for which baseline data may be collected in the event of an unplanned hydrocarbon release. Response phase PBAs are prioritised for SMP activities due to vulnerability (i.e. time to contact and environmental sensitivity) to potential impacts from hydrocarbon contact and an identified need to acquire baseline data. Time to hydrocarbon contact of >10 days has been identified as a minimum timeframe within which it is feasible to plan and mobilise applicable SMPs and commence collection

	of baseline (pre-hydrocarbon contact) data, in the event of an unplanned hydrocarbon release from the Pluto Operations Facility. Pre-emptive Baseline Areas for the Pluto Operations facility are identified and listed in ANNEX D, Table D-1. The PBAs together with the situational awareness (from the operational monitoring) are the basis for the response phase SMP planning and implementation.
Pre-spill	A review of existing baseline data for receptor locations (refer to Annex D) with potential to be contacted by surface, dissolved or entrained hydrocarbons at environmental thresholds within ≤10 days, relating to the credible hydrocarbon release for Pluto Facility Operations has identified the following: • Rankin Bank[5] • Dampier Archipelago • Barrow, Lowendal and Montebello Island groups • Barrow Island MMA and Montebello State Marine Park Australian Marine Parks (AMPs) potentially affected include: • Dampier AMP • Montebello AMP Note: The AMPs are located in offshore, open waters where hydrocarbon exposure is possible on surface waters and in the upper water column (entrained hydrocarbons) only.
In the event of a spill	Receptor locations with >10 days to hydrocarbon contact, as well as the wider area, will be investigated and identified by the SMP team (in the Environment Unit of the CIMT) as the spill event unfolds and as the situational awareness provided by the OMPs permits delineation of the spill affected area (for example, updates to the spill trajectory tracking). The full list is presented in Annex D, based on the PAP credible spill scenario(s) (Table 2-1). To address the initial focus in a response phase SMP planning situation, receptor locations predicted to be contacted >10 days have been identified as follows: • Ningaloo Coast and the Muiron Islands (State Marine Park, MMA and WHA) • Pilbara Islands – Middle and Southern Island Groups • Glomar Shoal • Gascoyne AMP • Ningaloo AMP • Argo-Rowley Terrace AMP The unfolding spill affected area predictions and confirmation of appropriate baseline data will determine the selection of receptor locations and SMPs to be activated in order to gather pre-emptive (pre-hydrocarbon contact) data. Refer to ANNEX C for further details on scientific monitoring plan implementation and delivery). The timing of SMP activation and mobilisation of the individual SMPs to undertake data collection will be decided and documented by the Woodside SMP team following the process outlined in the SMP Operational Plan. In the event key receptors within geographic locations that are potentially impacted after 10 days following a spill event or commencement of the spill and where adequate and appropriate baseline data are not available, there will be a response phase effort to collect baseline data for the following purposes: i. Priority will be given to the collection of baseline data for receptors predicted to be within the spill affected area prior to hydrocarbon contact. The process is initiated with the investigation of available baseline and time to hydrocarbon contact (>10 days which is sufficient time to mobilise SMP teams and acquire data before hydrocarbon contact). With reference to the Pluto Facility Operations facility, priority would be

[5] Only entrained hydrocarbon contact is predicted at ≤ 10 days. This is based upon predicted upper water column entrained hydrocarbons which may extend to approximately 20 m depth and contact the submerged shoal benthic communities.

	focused on Ningaloo Coast and the Muiron Islands (State Marine Park, MMA and WHA), Pilbara Islands – Middle and Southern Island Groups and Glomar Shoal. ii. Collect baseline data for receptors predicted to be outside the spill affected area so reference datasets for comparative analysis with impacted receptor types can be assessed post-spill.
Baseline data	A summary of the spill affected area and receptor locations as defined by the EMBA for the PAP credible spill scenario(s) is presented Section 2. The key receptors at risk by location and corresponding SMPs based on the EMBA for the PAP are presented in ANNEX D, as per credible spill event scenario(s). This matrix maps the receptors at risk with their location and the applicable SMPs that may be triggered in the event of a Level 2 or 3 hydrocarbon release, or any release event with the potential to contact sensitive environmental receptors. Receptor locations and applicable SMPs are colour coded to highlight possible time to contact based on receptor types and locations. The status of baseline studies relevant to the PAP are tracked by Woodside through the maintenance of a Corporate Environment Environmental Baseline Database (managed by the Woodside Biodiversity and Science Team), as well as accessing external databases such as the Department of Water and Environmental Regulation (WA) Index of Marine Surveys for Assessment (IMSA)[1] (refer to ANNEX C: Oil Spill Scientific

5.8.3 Summary – scientific monitoring

The resulting scientific monitoring capability has been assessed against the PAP credible spill scenario(s). The range of techniques provide an ongoing approach to monitoring operations to assess and evaluate the scale and extent of impacts. All known reasonably practicable control measures have been adopted with the cost and organisational complexity of these options determined to be moderate and the overall delivery effectiveness determined to be medium. The SMP's main objectives can be met, with no additional, alternative or improved control measures providing further benefit.

5.8.4 Response planning: need, capability and gap – scientific monitoring

The receptor locations identified in Annex D provide the basis of the SMPs likely to be selected and activated. Once the Woodside SMP Delivery team and the SMP standby contractor have been stood up and the exact nature and scale of the spill becomes known, the SMPs to be activated will be confirmed as per the process set out in the SMP Operational.

Scope of SMP Operations in the event of a hydrocarbon spill

Receptor locations of interest for the SMP during the response phase are:

- Rankin Bank and Glomar Shoal
- Dampier Archipelago
- Barrow, Lowendal and Montebello Island groups
- Barrow Island MMA and Montebello State Marine Park

Documented baseline studies are available for certain receptor locations including Rankin Bank and Glomar Shoal (Annex D, Table D-2). The SMP approach in the response phase would still deploy SMP teams to maximise the opportunity to collect pre-emptive data at sensitive receptor locations i.e., the sections of the WA Coast not immediately contacted by hydrocarbons. As the exact locations where hydrocarbon contact occurs may be unpredictable, SM01 would be mobilised as a priority to detect hydrocarbons and track the leading edge of the spill to verify where hydrocarbon contact occurs which will assist in prioritising deployment of SMP resources to obtain pre-emptive baseline data.

The ALARP assessment for the SMP (Section 6.8) considers alternate, additional, and/or improved control measures on each selected response technique.

[1] https://biocollect.ala.org.au/imsa#max%3D20%26sort%3DdateCreatedSort

5.8.5 Environmental performance based on need

Table 5-15: Scientific monitoring

Environmental Performance Outcome		Woodside can demonstrate preparedness to stand up the SMP to quantitatively assess and report on the extent, severity, persistence and recovery of sensitive receptors impacted from the spill event		
Control measure		**Performance Standard**		**Measurement Criteria**
24	• Woodside has an established and dedicated SMP team comprising the Biodiversity and Science Team and additional Environment Advisers within the HSEQ Business Group.	24.1	SMP team comprises a pool of competent Environment Advisers (stand up personnel) who receive training regarding the SMP, SMP activation and implementation of the SMP on an annual basis	• Training materials • Training attendance registers • Process that maps minimum qualification and experience with key SMP role competency and a tracker to manage availability of competent people for the SMP team including redundancy and rostering
25	• Woodside has a SMP standby contractor to provide scientific personnel to resource a base capability of one team per SMP (SM01-SM10, see Table C-2, ANNEX C) as detailed in Woodside's SMP Implementation Plan, to implement the oil spill scientific monitoring programs. The availability of relevant personnel is reported to Woodside monthly via a simple report on the base-loading availability of people for each of the SMPs comprising field work for data collection (SMP resourcing report register. • In the event of a spill and the SMP is activated, the base-loading availability of scientific personnel will be provided by SMP standby contractor for the individual SMPs and where gaps in resources are identified, SMP standby contractor/Woodside will seek additional personnel (if needed) from other sources including Woodside's Environmental Services Panel.	25.1	Woodside maintains the capability to mobilise personnel required to conduct scientific monitoring programs SM01 – SM10 (except desktop based SM08): • Personnel are sourced through the existing standby contract with SMP standby, as detailed within the SMP Implementation Plan. • SMP Implementation Plan describes the process for standing up and implementing the scientific monitoring programs. • SMP team stand up personnel receive training regarding the stand up, activation and implementation of the SMP on an annual basis	• Hydrocarbon Spill Preparedness (HSP) Internal Control Environment (ICE) tracks the quarterly review of the Oil Spill Contracts Master. • SMP resource report of personnel availability provided by SMP contractor on monthly basis (SMP resourcing report register). • Training materials • Training attendance registers • Competency criteria for SMP roles • SMP annual arrangement testing and reporting
26	• Roles and responsibilities for SMP implementation are captured in Table C-1 (Annex C) and the SMP team (as per the organisational structure of the CIMT) is outlined in the Oil Spill Scientific Monitoring Program Operational Plan. Woodside has a defined Crisis and Incident Management structure including Source Control, Operations, Planning and Logistics Sections to manage a loss of well control response. • SMP Team structure, interface with SMP standby contractor (standby SMP contractor) and linkage to the CIMT is presented in Figure C-1, ANNEX C • Woodside has a defined Command, Control and Coordination structure for Incident and Emergency Management that is based on the ICS framework. • Woodside utilises online incident management software to coordinate and track key incident management Sections. This includes specialist modelling programs, geographic information systems (GIS), as well as communication flows within the Command, Control and Coordination structure. • SMP activated via the Oil Pollution First Strike Plan. • Step by step process for activation of individual SMPs provided in the SMP Operational Plan. • All decisions made regarding SMP logged in the online incident management software (SMP team members trained in its use). • SMP component input to the CIMT Incident Action Plan (IAP) as per the identified CIMT timed sessions and the SMP IAP logged on the online incident management software. • Woodside Biodiversity and Science Team provide awareness training on the activation and stand-up of the SMP for the Environment Advisers in Woodside who are listed on the SMP team on an annual basis. • Woodside Biodiversity and Science Team provide awareness training on the activation and stand-up of the Scientific Monitoring Programme (SMP) for the SMP standby contractor. • Woodside Biodiversity and Science Team co-ordinates an annual SMP arrangement testing exercise which the SMP standby contractor.	26.1	• Woodside have established an SMP organisational structure and processes to stand up and deliver the SMP.	• Oil Spill Scientific Monitoring Program Operational Plan • SMP Implementation Plan • SMP annual arrangement testing and reporting

27	• Chartered and mutual aid vessels. • Suitable vessels would be secured from the Woodside support vessels, regional fleet of vessels operated by Woodside and other operators and the regional charter market. • Vessel suitability will be guided by the need to be equipped to operate grab samplers, drop camera systems and water sampling equipment (the individual vessel requirements are outlined in the relevant SMP methodologies (refer to Table C-2, ANNEX C). • Nearshore mainland waters may use the same approach as for open water. Smaller vessels may be used where available and appropriate. Suitable vehicles and machinery for onshore access to nearshore SMP locations would be provided by Woodside's transport services contract and sourced from the wider market. • Dedicated survey equipment requirements for scientific monitoring range from remote towed video and drop camera systems to capture seabed images of benthic communities to intertidal/onshore surveying tools such as quadrats, theodolites and spades/trowels, cameras and binoculars (specific survey equipment requirements are outlined in the relevant SMP methodologies (refer to Table C-2, ANNEX C)). Equipment would be sourced through the existing SMP standby contract with SMP standby contractor for SMP resources and if additional surge capacity is required this would be available through the other Woodside Environmental Services Panel Contractors and specialist contractors. SMP standby contractor can also address equipment redundancy through either individual or multiple suppliers. MoUs are in place with one marine sampling equipment companies and one analytical laboratory (SMP resourcing report register). • Availability of SMP equipment for offshore/onshore scientific monitoring team mobilisation is within one week to ten days of the commencement of a hydrocarbon release. This meets the SMP mobilisation lead time that will support meeting the response objective of 'acquire, where practicable, the environmental baseline data prior to hydrocarbon contact required to support the post-response SMP.	27.1	Woodside maintains standby SMP capability to mobilise equipment required to conduct scientific monitoring programs SM01 – SM10 (except desktop based SM08): • Equipment is sourced through the existing standby contract with SMP standby contractor, as detailed within the SMP Implementation Plan.	• HSP Internal Control Environment tracks the quarterly review of the Oil Spill Contracts Master. • SMP standby monthly resource reports of equipment availability provided by SMP contractor (SMP resourcing report register). • SMP annual arrangement testing and reporting
28	Woodside's SMP approach addresses the pre-PAP acquisition of baseline data for Pre-emptive Baseline Areas (PBAs) with ≤10 days if required following a baseline gap analysis process. Woodside maintains knowledge of Environmental Baseline data through: • documentation of annual reviews of the Woodside Baseline Environmental Studies Database, and specific activity baseline gap analyses. • accessing external databases such as IMSA (refer to ANNEX C: Oil Spill Scientific Monitoring Program).	28.1	• Annual reviews of environmental baseline data • PAP specific Pre-emptive Baseline Area baseline gap analysis	• Annual review/update of Woodside Baseline Environmental Studies Database • Desktop review to assess the environmental baseline study gaps completed prior to EP submission • Accessing baseline knowledge via the SMP annual arrangement testing

Environmental Performance Outcome		SMP plan to acquire response phase monitoring targeting pre-emptive baseline data achieved		
Control measure		**Performance Standard**		**Measurement Criteria**
29	Woodside's SMP approach addresses: • scientific data acquisition for PBAs >10 days to hydrocarbon contact and activated in the response phase and • transition into post-response SMP monitoring.	29.1	**Pre-emptive Baseline Area (PBA) baseline data acquisition in the response phase** If baseline data gaps are identified for PBAs predicted to have hydrocarbon contact in >10 days, there will be a response phase effort to collect baseline data. Priority in implementing SMPs will be given to receptors where pre-emptive baseline data can be acquired or improved. SMP team (within the Environment Unit of the CIMT) contribute SMP component of the CIMT Planning Section in development of the IAP.	• Response SMP plan • Woodside's online Incident Management System Records • SMP component of the IAP.
		29.2	**Post Spill contact** For the receptors contacted by the spill where baseline data are available, SMPs to assess and monitor receptor condition will be implemented post spill (i.e. after the response phase):	• SMP planning document • SMP Decision Log • IAPs

Environmental Performance Outcome		Implementation of the SMP (response and post-response phases)		
Control measure		**Performance Standard**		**Measurement Criteria**
30	• Scientific monitoring will address quantitative assessment of environmental impacts of a level 2 or 3 spill or any release event with the potential to contact sensitive environmental receptors. The SMP comprises ten targeted environmental monitoring programs as listed in Section 5.8. • SMP supporting documentation: 1. Oil Spill Scientific Monitoring Operational Plan; (2) SMP Implementation Plan and (3) SMP Process and Methodologies Guideline • The Oil Spill Scientific Monitoring Operational Plan details the process of SMP selection, input to the IAP to trigger operational logistic support services. Methodology documents for each of the ten SMPs are accessible detailing equipment, data collection techniques and the specifications required for the survey platform support. • The SMP standby contractor holds a Woodside SMP implementation plan which details activation processes, linkage with the Woodside SMP team and the general principles for the planning and mobilisation of SMPs to deliver the individual SMPs activated. Monthly resourcing report are issued by the SMP standby contractor via the SMP resourcing report. All SMP documents and their status are tracked via SMP document register.	30.1	**Implementation of SM01** SM01 will be implemented to assess the presence, quantity and character of hydrocarbons in marine waters during the spill event in nearshore areas.	Evidence SM01 has been triggered: • Documentation as per requirements of the SMP Operational Plan • Woodside's online Incident Management System Records. • SMP component of the IAP • SMP data records from field
		30.2	**Implementation of SM02-SM10** SM02-SM10 will be implemented in accordance with the objectives and activation triggers as per Table C-2 of Annex C.	Evidence SMPs have been triggered: • Documentation as per requirements of the SMP Operational Plan • Woodside's online Incident Management System Records. • SMP component of the IAP • SMP Data records from field
		30.3	**Termination of SMP plans** The Scientific Monitoring Program will be terminated in accordance with termination triggers for the SMP's detailed in Table C-2 of Annex C, and the Termination Criteria Decision-tree for Oil Spill Environmental Monitoring (Figure C-3 of Annex C):	Evidence of Termination Criteria triggered: • Documentation and approval by relevant persons/ organisations to end SMPs for specific receptor types.

5.9 Incident Management System

The Incident Management System (IMS) is both a control measure and a measurement criterion. As a control measure the function of the IMS is to prompt, facilitate and record the completion of three key response planning processes detailed below. As a measurement criterion, the IMS records the evidence of the timeliness of all response actions included in the environmental performance standards and the plans used for the PAP.

As the IMS does not directly remove hydrocarbons spilt into the marine environment, there is no direct relationship to the response planning need.

5.9.1 Incident action planning

The CIMT will be required to collect and interpret information from the scene of the incident to determine support requirements to the site-based IMT, develop an IAP and assist the IMT with the execution of that plan. The site-based Incident Commander (IC) may request the CIMT to complete notifications internally within Woodside, to relevant persons/ organisations and government agencies as required. Depending on the type and scale of the incident the CIMT IC will be responsible for ensuring the development of the IAP. Incident Action Planning is an ongoing process that involves continual review to confirm the appropriateness of techniques to control the incident for the situation at the time.

5.9.2 Operational NEBA process

In the event of a response Woodside will confirm that the response techniques adopted at the time of Environment Plan/ Oil Pollution Emergency Plan (EP/ OPEP) acceptance remain appropriate to reduce the consequences of the spill. This process verifies that there is a continuing net environmental benefit associated with continuing the response technique through the operational NEBA process. This process manages the environmental risks and impacts of response techniques during the spill response. An operational NEBA will be undertaken throughout the response, for each operational period.

The operational NEBA will consider the risks and benefits of conducting and response activity. For example, if vessels are required for access to nearshore or onshore areas, anchoring locations will be selected to minimise disturbance to benthic habitats. Vessel cleanliness would be commensurate with the receiving environment. The operational NEBA will consider the risks and benefits of conducting other response techniques.

The operational NEBA process is also used to terminate a response. Using data from operational and scientific monitoring activities the response to a hydrocarbon spill will be terminated in accordance with the termination process outlined in the Oil Pollution Emergency Arrangements (Australia). In effect the operational NEBA will determine whether there is net environmental benefit to continue response operations.

5.9.3 Consultation process

Woodside will consult relevant persons/ organisations during the spill response in accordance with internal standards. This process requires that Woodside will:

- Undertake all required notifications (including government notifications) for relevant persons/ organisations in the region (identified in the First Strike Plan). This includes notification to mariners to communicate navigational hazards introduced through response equipment and personnel.
- In the event of a response, identify and engage with relevant persons/ organisations and continually assess and review.

5.9.4 Environmental performance based on need

Table 5-16: Environmental Performance – Incident Management System

Environmental Performance Outcome		To support the effectiveness of all other control measures and monitor/record the performance levels achieved.		
Control measure		**Performance Standard**		**Measurement Criteria (Section 5.10)**
31	Operational SIMA	31.1	Confirm that the response techniques adopted at the time of acceptance remain appropriate to reduce the consequences of the spill within 24 hours.	1, 3A
		31.2	Record the evidence and justification for any deviation from the planned response activities.	
		31.3	Record the information and data from operational and scientific monitoring activities used to inform the SIMA.	
32	Stakeholder engagement	32.1	Prompt and record all notifications (including government notifications) for relevant persons/ organisations in the region	
		32.2	In the event of a response, identification of relevant persons/ organisations will be re-assessed throughout the response period.	
		32.3	Undertake communications in accordance with: • External Communication and Continuous Disclosure Procedure • External Stakeholder Engagement Procedure	
33	Personnel required to support any response	33.1	Action planning is an ongoing process that involves continual review to confirm the appropriateness of techniques to control the incident for the situation at the time.	1, 3B
		33.2	A duty roster of trained and competent people will be maintained to confirm that minimum manning requirements are met all year round.	3C
		33.3	Immediately activate the IMT with personnel filling one or more of the following roles: • CIMT Incident Commander • CIMT Deputy Incident Commander • Operations Section Chief • Planning Section Chief • Logistics Section Chief • Documentation Unit Leader • Safety Officer • Environment Unit Leader • Human Resources Officer • Public Information Officer • Situation Unit Leader • Finance Section Chief • Source Control Section Chief	1, 2, 3B, 3C, 4
		33.4	Collect and interpret information from the scene of the incident to determine support requirements to the site-based IMT, develop an IAP and assist with the execution of that plan.	
		33.5	Security and Emergency Management advisors will be integrated into CIMT to monitor performance of all functional roles.	
		33.6	Continually communicate the status of the spill and support Woodside to determine the most appropriate response by delivering on the responsibilities of their role.	
		33.7	Follow the OPEA, Operational Plans, FSPs, support plans and the IAPs developed.	1, 2, 3A, 4
		33.8	Contribute to Woodside's response in accordance with the aims and objectives set by the Incident Commander.	1, 2, 3B, 3C, 4

5.10 Measurement criteria for all response techniques

Woodside measures compliance with environmental performance outcomes and standards through four primary mechanisms. The performance tables in the previous sections identify which of these four mechanisms monitors the readiness and records the effectiveness and performance of the control measures adopted.

1. The Incident Management System

The Incident Management System (IMS) supports the implementation of the Emergency and Crisis Management Procedure. The IMS provides a near real-time, single source of information for monitoring and recording an incident and measuring the performance of those control measures.

The Emergency and Crisis Management Procedure defines the management framework, including roles and responsibilities, to be applied to any size incident (including hydrocarbon spills). The organisational structure required to manage an incident is developed in a modular fashion and is based on the specific requirements of each incident. The structure can be scaled up or down.

The Incident Action Plan (IAP) process formally documents and communicates the:

- incident objectives
- status of assets
- operational period objectives
- response techniques (defined during response planning)
- the effectiveness of response techniques.

The information captured in the IMS (including information from personal logs and assigned tasks/close outs) confirms the response techniques implemented remain appropriate to reduce the consequences of the spill. The system also records all information and data that can be used to support the site-based IMT, and development and execution of the IAP.

2. The CEM Competency Dashboard

The CEM competency dashboard records the number of trained and competent responders that are available across Woodside to participate in a response.

This number varies dependent on expiry of competency certificates, staff attrition, internal rotations, leave and other absences. As such the Dashboard is designed to identify the minimum manning requirements and to identify sufficient redundancy to cater for the variances listed above.

Figure 5-1 shows the minimum manning numbers for the different hydrocarbon spill response roles and the number of qualified persons against those roles.

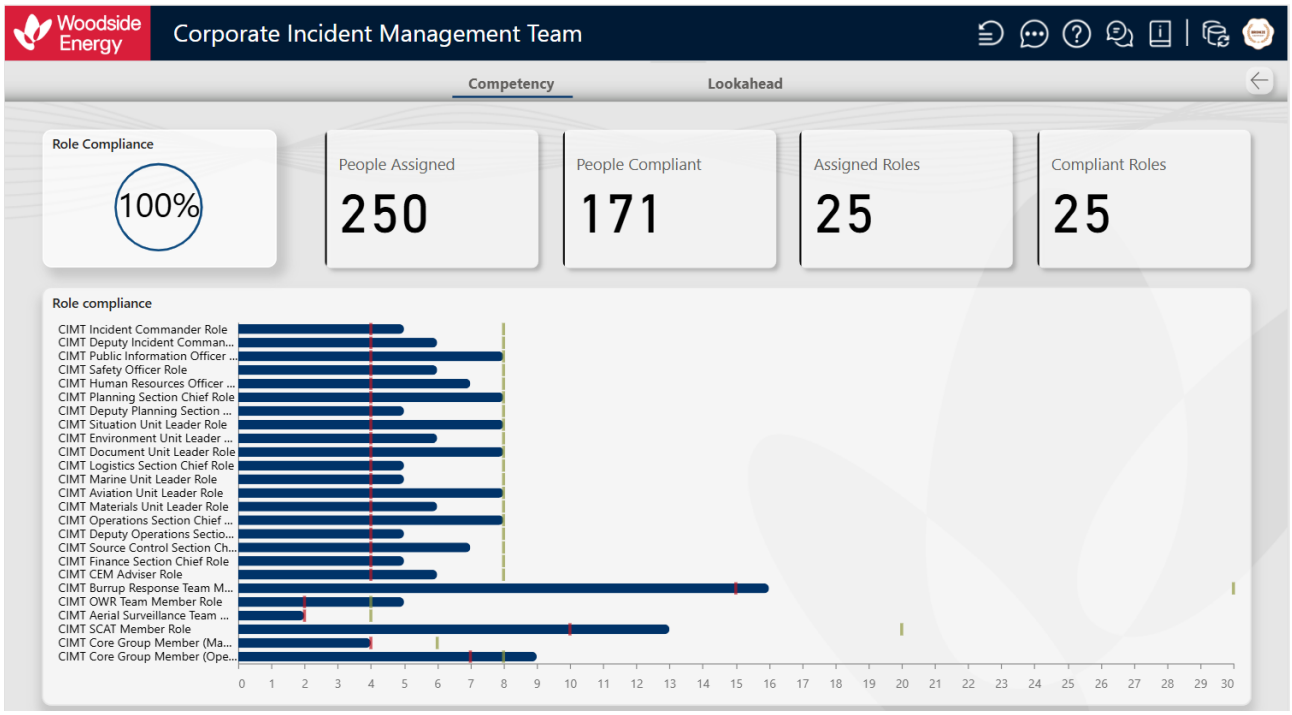

Figure 5-2: Example screenshot of the CEM dashboard

The Dashboard is one of Woodside's key means of monitoring its readiness to respond. It also demonstrates Woodside's ability to meet the requirements of the environmental performance standards that relate to filling certain response roles.

Figure 5-2 shows an example of the SCAT role and the training modules required to show competence.

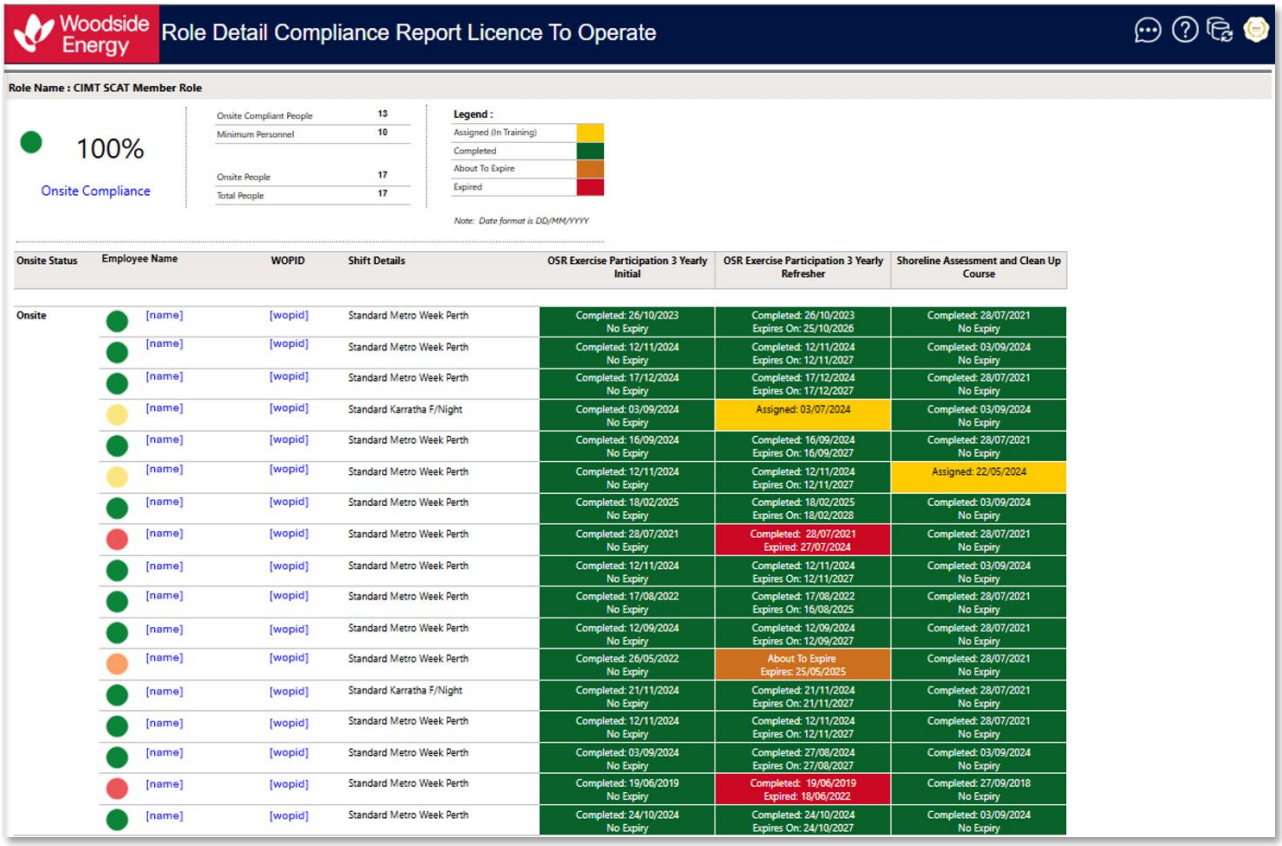

Figure 5-3: Example screenshot for the SCAT role

Woodside also maintains access to a pool of trained responders composed of but not limited to personnel from the following organisations:

- Australian Marine Oil Spill Centre (AMOSC) core group
- AMOSC
- Oil Spill Response Limited (OSRL)
- Marine Spill Response Corporation (MSRC)
- Woodside contracted workforce

3. The Hydrocarbon Spill Preparedness ICE Assurance Process

The Hydrocarbon Spill Response Team has developed a Hydrocarbon Spill Preparedness Internal Control Environment (ICE) process to align and feed into the Woodside Management System Assurance process for hydrocarbon spill. The process tracks compliance over four key control areas:

a) **Plans** – confirms all plans (including: Oil Pollution Emergency Arrangements, first strike plans, operational plans, support plans and tactical response plans) are current and in line with regulatory and internal requirements.

b) **Competency** – confirms the competency dashboard is up to date and minimum numbers of required personnel are maintained across CIMT, CMT and hydrocarbon spill response roles. The hydrocarbon spill training plan and exercise schedule, including testing of arrangements is also tracked. The Testing of Arrangements (ToA) register tracks the testing of all hydrocarbon spill response arrangements, key contracts and agreements in place with internal and external parties to meet compliance requirements.

c) **Capability** – tracks and monitors the capability that could be required in a hydrocarbon incident, including integrated fleet[6] vessel schedule, dispersant availability, rig/vessels monitoring, equipment stockpiles, tracking buoy locations and the CIMT duty roster.

d) **Compliance and Assurance** – confirms all regulator inspection outcomes are actioned and closed out, the global legislation register is up to date and that the key assurance components are tracked and managed. Assurance activities (including audits) conducted on memberships with key Oil Spill Response Organisations (OSROs), including AMOSC and OSRL are also tracked and recorded in the ICE.

The ICE assurance process records how each commitment listed in the performance tables above is managed for ongoing compliance monitoring. The level of compliance can be reviewed in real time and is reported monthly through the S&EM Business Group.

The completion of the assurance checks (over and above the ICE process) is also applied via the Woodside Integrated Risk and Compliance System (WiRCs) and subject to the requirements of Woodside's Provide Assurance Procedure.

4. The Hydrocarbon Spill Preparedness and Response Procedure

This procedure sets out how to plan and prepare for a liquid hydrocarbon spill to the marine environment.

This procedure details the:

- requirement for an Oil Pollution Emergency Plan (OPEP) to be developed, maintained, reviewed, and approved by appropriate regulators (where applicable) including:
  - defining how spill scenarios are developed on an activity specific basis
  - developing and maintaining all hydrocarbon spill related plans
  - ensuring the ongoing maintenance of training and competency for personnel
  - developing the testing of spill response arrangements
  - maintaining access to identified equipment and personnel.
- planning for hydrocarbon spill response preparedness

[6] The Integrated fleet consists of vessels from multiple operators that have been contracted to Woodside to undertake a number of duties including hydrocarbon spill response

- accountabilities for hydrocarbon spill response preparedness
- spill training requirements
- requirements for spill exercising / testing of spill response arrangements
- spill equipment and services requirements.

The procedure also details the roles and responsibilities of the dedicated Woodside Hydrocarbon Spill Preparedness team. This team is responsible for:

- assuring that Woodside hydrocarbon spill responders meet competency requirements.
- establishing the competency requirements, annual training schedule and a training register of trained personnel.
- establishing and maintaining the total numbers of trained personnel required to provide an effective response to any hydrocarbon spill incident.
- ensuring equipment and services contracts are maintained
- establishing OPEPs
- establishing OPEAs
- priority response receptor determination
- ALARP determination
- ensuring compliance and assurance is undertaken in accordance with external and internal requirements.

6 ALARP EVALUATION

This Section should be read in conjunction with Section 5 which is the capability planned for this activity.

6.1 Operational Monitoring – ALARP Assessment

Alternative, additional and improved control measure options have been identified and assessed against the base capability described in Section 5. Those that have been selected for implementation are highlighted in green. Items highlighted in red have been considered and rejected on the basis that they are not feasible, the costs are disproportionate to the environmental benefit, and/or the option is not reasonably practical. Control measures where there is not a clear justification for their inclusion or exclusion may be subject to a detailed ALARP assessment.

6.1.1 Operational Monitoring – Control Measure Options Analysis

6.1.1.1 Alternative Control Measures

Alternative Control Measures considered *Alternative control measures, including potentially more effective and/or novel control measures are evaluated as replacements for an adopted control*					
Option considered	**Environmental consideration**	**Feasibility**	**Approximate Cost**	**Assessment conclusions**	**Implemented**
Aerostat (or similar inflatable observation platform) for localised aerial surveillance.	Lead time to Aerostat surveillance is disproportionate to the environmental benefit. The system also provides a very limited field of visibility around the vessel it is deployed from.	Long lead time to access (>10 days). Each system would require an operator to interpret data and direct vessels accordingly. Requires multiple systems for shoreline use.	Purchase cost per system is approximately A$300,000.	This option is not adopted as the minimal environmental benefit gained is disproportionate to the cost and complexity of its implementation.	**No**

6.1.1.2 Additional Control Measures

Additional Control Measures considered *Additional control measures are evaluated in terms of them reducing an environmental impact or an environmental risk when added to the existing suite of control measures*					
Option considered	**Environmental consideration**	**Feasibility**	**Approximate Cost**	**Assessment conclusions**	**Implemented**
Additional personnel trained to use systems.	Current arrangement provides an environmental benefit in the availability of trained personnel facilitating access to operational monitoring data used to inform all other response techniques. No improvement required.	Woodside considers no improvement can be made, all personnel in technical roles e.g. intelligence unit are trained and competent on the software systems. Personnel are trained and exercised regularly. Use of the software and systems forms part of regular work assignments and projects.	Cost for training in-house staff would be approximately A$25,000.	This option is not adopted as the current capability meets the need.	**No**
Additional satellite tracking buoys to enable greater area coverage.	Increased capability does not provide an environmental benefit compared to the disproportionate cost in having an additional contract in place.	Tracking buoy on location at manned facility and additional needs are met from Woodside-owned stocks in King Bay Support Facility (KBSF) and Exmouth or can be provided by service provider.	Cost for an additional satellite tracking buoy would be A$200 per day or A$6000 to purchase.	This option is not adopted as the current capability meets the need, but additional units are available if required.	**No**
Additional trained aerial observers.	Current capability meets need. Woodside has access to a pool of trained, competent observers at strategic locations to allow timely and sustainable response. Additional observers are available through current contracts with AMOSC and OSRL.	Aviation standards and guidelines confirm all aircraft crews are competent for their roles. Woodside maintains a pool of trained and competent aerial observers with various home base locations to be called upon at the time of an incident. Regular audits of oil spill response organisations maintain training and competency.	Cost for additional trained aerial observers would be A$2000 per person per day.	This option is not adopted as the current capability meets the need, but additional observers are available via response contractors if required.	**No**

6.1.1.3 Improved Control Measures

Improved Control Measures considered *Improved control measures are evaluated for improvements they could bring to the effectiveness of adopted control measures in terms of functionality, availability, reliability, survivability, independence and compatibility*					
Option considered	**Environmental consideration**	**Feasibility**	**Approximate Cost**	**Assessment conclusions**	**Implemented**
Faster turnaround time from modelling contractor.	Improved control measure does not provide an environmental benefit compared to the disproportionate cost in having an additional contract in place.	External contractor on CIMT roster to be called as soon as required. However initial information needs to be gathered by CIMT team to request an accurate model. External contractor has person on call to respond from their own location.	Modelling service with a faster activation time would be achieved via membership of an alternative modelling service at an annual cost of A$50,000 for 24hr access plus an initial A$5,000 per modelling run.	This option is not adopted as the minimal environmental benefit gained is disproportionate to the cost and complexity of its implementation.	**No**
Nighttime aerial surveillance.	The risk of undertaking the aerial observations at night is disproportionate to the limited environmental benefit. The images would be of low quality and as such the variable is not adopted.	Flights will only occur when deemed safe by the pilot. The risk of night operations is disproportionate to the benefit gained, as images from sensors (IR, UV, etc). will be low quality. Flight time limitations will be adhered to.	No improvement can be made without risk to personnel health and safety and breaching Woodside's Golden Safety Rules.	This option is not adopted as the safety considerations outweigh any environmental benefit gained.	**No**
Faster mobilisation time (for water quality monitoring).	Due to the restriction on accessing the spill location on day one, there is no environmental benefit in having vessels available from day one. The cost of having dedicated equipment and personnel is disproportionate to the environmental benefit. The availability of vessels and personnel meets the response need. Shortening the timeframes for vessel availability would require dedicated response vessels on standby in KBSF.	Operations are not feasible on day one as the hydrocarbon will take time to surface, and volatility has potential to cause health concerns within the first 24 hours of the response.	The cost and organisational complexity of employing two dedicated response vessels (approximately A$15m per year per vessel) is considered disproportionate to the potential environmental benefit to be realised by adopting this delivery options. Cost for purchase of equipment is approximately A$200,000. Ongoing costs per annum for cost of hire and pre-positioning for life of asset/activity would be larger than the purchase cost. Dedicated equipment and personnel, living locally and on short notice to mobilise. The cost would be approximately A$1 m per annum, which is disproportionate to the incremental benefit this would provide, assets are already available on day one. two integrated fleet vessels are available from day one, however these could be tasked with other operations.	This option is not adopted as the area could not be accessed earlier due to safety considerations. Additionally, the cost and complexity of implementation outweighs the benefits.	**No**

6.1.2 Selected Control Measures

Following review of alternative, additional and improved control measures as outlined above, the following controls were selected for implementation for the PAP:

- alternative
  - none selected
- additional
  - none selected
- improved
  - none selected

6.2 Source Control – ALARP Assessment

Woodside has based its response planning on the worst-case scenarios for Xena-03 drilling activities (CS-01) and Pluto Facility Operations (MEE-01) as described in **Table 2-1**. This includes the following selection of primary source control and well intervention techniques which would be conducted concurrently:

- direct remotely operated vehicle (ROV) intervention on BOP (CS-01) or Xmas tree (MEE-01)
- debris clearance and/or removal
- capping stack
- relief well drilling.

6.2.1 ROV Intervention

Following confirmation of an emergency event, Woodside would mobilise inspection class ROVs to assess the status of the wellhead and Xmas tree. For CS-01, the ROV available on the MODU can be deployed for this purpose within 48 hours. Work class ROVs for well intervention are available through the existing frame agreements.

As Woodside holds frame agreements for vessels along with contracts for ROV providers and pilots, inspection activities using ROVs are expected to commence within seven days of an emergency event.

A hydraulic accumulator contained as part of the SFRT can be mobilised and deployed with well intervention attempted within 11 days.

Table 6-1: ROV timings

	Estimate ROV inspection duration for Xena-03 tie-back activities (days) – CS-01	Estimate ROV inspection duration for Pluto Facility Operations (days) – MEE-01
Source and mobilise vessel with work class ROV	2 days	2 days
Liaise with Regulator regarding risks and impacts*	4 days	4 days
Undertake ROV Inspection	1 day	1 day
TOTAL	**7 days***	**7 days***

** Based on timings from the Report into the Montara Commission of Enquiry, submission and discussion of revised documentation for limited activities inside the Petroleum Safety Zone (water deluge operations) to manage personnel risks and impacts was up to 20 days.*

6.2.1.1 Safety Case considerations

Woodside has assessed against the NOPSEMA Safety Case guidance (NOPSEMA N-09000-GN1661), confirming that vessels conducting subsea intervention operations are not classified as an “associated offshore place” but as a facility and therefore require the appropriate Safety Case arrangements to be in place. In the event of an emergency, Woodside has access to suitable installation support vessels (ISVs) for well intervention through existing frame agreements. The frame agreements for ISV vessels require the vessels to maintain in-force Safety Case approval covering a range of subsea activities. This would cover the requirement for intervention operations such as subsea manifold installation, maintenance and repair, commissioning, cargo transfer (including bulk liquids) and ROV operations. With frame agreements in place, the credible Safety Case scenario from those presented in **Figure 6-4** and **Figure 6-5** for implementing this response would be “no Safety Case revision required”. Timeframes for well intervention are detailed in Figure 6-2 and **Figure 6-3** would be implemented concurrently to the actions required by the “no Safety Case” revision scenario detailed in **Figure 6-4** and **Figure 6-5**, therefore, the Safety Case scenario will have no impact on the delivery of the strategy.

6.2.2 Debris clearance and/or removal

The Woodside Source Control Response Procedure details the mobilisation and resource requirements for implementing this strategy. Debris clearance may be required as a prerequisite to deployment of the capping stack. The AMOSC SFRT would be mobilised from Fremantle. The mobilisation of the SFRT would take place in parallel with mobilisation of the capping stack to allow initial ROV surveys and debris clearance have commenced before the arrival of the capping stack. The SFRT comprises ROV-deployed cutters and tools that are used to remove damaged or redundant items from the wellhead and allow improved access to the well. The SFRT can be mobilised and deployed with well intervention attempted within 11 days.

6.2.2.1 Safety Case considerations

Woodside has assessed against the NOPSEMA Safety Case guidance (NOPSEMA N-09000-GN1661) and can confirm that vessels conducting debris clearance and removal operations are not classified as an “associated offshore place” but as a facility and therefore require the appropriate Safety Case arrangements in place. In the event of an emergency, Woodside has access to suitable ISVs for these operations through existing frame agreements. The frame agreements for ISVs require the vessels to maintain in-force Safety Case approval covering a range of subsea activities. This would cover the requirement for debris clearance and removal operations such as subsea manifold installation, commissioning, cargo transfer (including bulk liquids) and ROV operations. With frame agreements in place, the credible Safety Case Scenario, from those presented in **Figure 6-4** and **Figure 6-5** for implementing this response would be “no Safety Case revision required”. Timeframes for debris clearance and removal equipment deployment are detailed in Figure 6-2 and **Figure 6-3** would be implemented concurrently to the actions required by the “No Safety Case” revision scenario detailed in **Figure 6-4** and **Figure 6-5**, therefore, the Safety Case scenario will have no impact on the delivery of the strategy.

6.2.3 Capping stack

The Woodside Source Control Emergency Response Planning Guideline details the mobilisation and resource requirements for implementing capping stack deployment. A capping stack is designed to be installed on a subsea well and provides a temporary means of sealing the well, until a permanent well kill can be performed through either a relief well or well re-entry.

In the event of a loss of well containment, the use of a subsea deployment method such as a heavy lift vessel, which is more commonly used in industry, is a more reliable and, in turn, an ALARP approach. If environmental conditions permit (wind speed, wave height, current and plume radius), deployment of a capping stack with a heavy lift vessel with a 150 T crane capacity in shallower waters or 250 T crane in deeper waters could be feasible.

Woodside assumes that sourcing conventional capping stack deployment vessels would be per the Woodside Source Control Emergency Response Planning Guideline. This plan has pre-identified vessel specifications for the capping stack deployment. Woodside maintains several frame agreements with various vessel service providers and maintains the ability to call off services with a capping stack and debris clearance agreement.

A capping stack can be mobilised to site within 16 days. Woodside will monitor the conditions around the wellsite and deployment for a well intervention attempt will be undertaken once plume size is acceptable and safety and metocean conditions are suitable.

6.2.3.1 Safety Case considerations

Woodside has assessed against the NOPSEMA Safety Case guidance (NOPSEMA N-09000-GN1661) and can confirm that vessels conducting deployment of the capping stack are not classified as an “associated offshore place” but as a facility and therefore require the appropriate Safety Case arrangements in place.

The 16-day timeframe to mobilise the vessel is based on the following assumptions:

- An existing frame agreement vessel, located outside the region with approved Australian Safety Case
- A Safety Case revision and scope of validation is required

- The vessel meets the technical requirements for deploying capping stack as per the Source Control Emergency Response Planning Guideline
- The vessel has an active heave compensated crane, rated to at least 150 T for shallow waters or 250 T in deeper waters and at least 90 m in length and a deck capacity to hold at least 110 T of capping stack.

Timeframes for capping stack deployment detailed in Figure 6-2 and **Figure 6-3** would be implemented concurrently with the actions required for the Safety Case revision development scenarios detailed in **Figure 6-4**, **Figure 6-5** and **Table 6-3**. Woodside will execute the capping stack response within the timeframes detailed in Figure 6-2 and **Figure 6-3** , dependent upon presence of required safety and metocean conditions. Woodside has considered a broad range of alternate, additional, and improved options as outlined later in Section 6.2.5.

6.2.4 Relief Well drilling

The options analysis detailed in this section considers options to source, contract and mobilise a MODU and obtain necessary regulatory approvals to meet timelines for relief well drilling. The screening for relief well drilling MODUs is based on the following three approaches and is illustrated in Figure 6-1:

- Primary – review internal Woodside drilling programs and MODU availability to source an appropriate MODU operating within Australia with an approved Safety Case.
- Alternate – source and contract a MODU through AEP MOU that is operating within Australia with an approved Safety Case.
- Contingency – source and contract a MODU outside Australia with an approved Australian Safety Case.

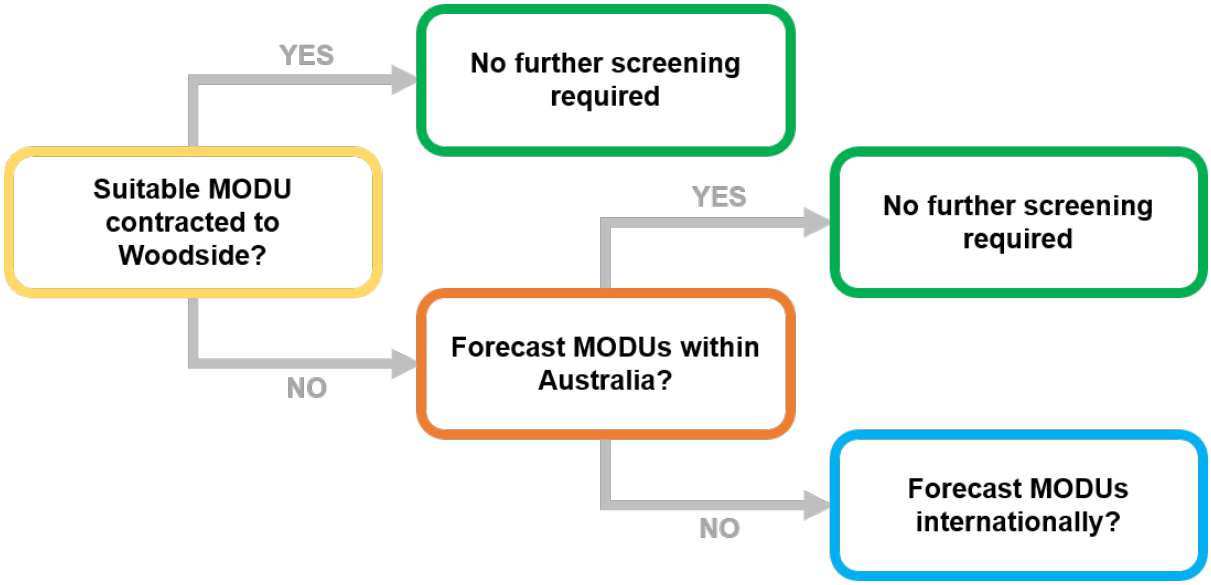

Figure 6-1: Pluto Facility Operations process for sourcing relief well MODU

Screening of a relief well MODU from international waters is undertaken only if required, i.e. there is low confidence in local (Australian) availability. The capability, location and Australian Safety Case status is assessed for each Woodside contracted MODU. In the event the Woodside contracted MODUs are unsuitable, screening is extended to all MODUs operating in Australian Waters.

Based on the detail provided, the primary and alternate approaches are expected to be achieved within the 21-day period.

The internal and external availability of MODUs, plus MODU activities of registered operators and MODUs with approved Safety Cases, are tracked by Woodside to allow the best available options to be sourced and utilised in the event of the worst-case scenario.

If the above forecast indicates a gap in availability of a suitable MODU for relief well drilling within Australia, screening would be extended to MODUs with a valid Safety Case outside Australia. If an international MODU with an Australian Safety Case is not identified, an internal review will be

undertaken, NOPSEMA notified and the issue tabled at the AEP DISC. A review of the significance of the change in risk will be undertaken in accordance with Woodside's environment management of change requirements and relevant regulatory triggers. The aforementioned lookahead process would allow two years' warning of any potential gap.

The detail of these arrangements demonstrates that the risks have been reduced to ALARP and an acceptable level through the control measures and performance standards outlined in Section 5.2.

6.2.4.1 Relief Well drilling timings

The duration of a blowout (from initiation to a successful kill) is assessed as 64 days for the Xena-03 drilling operations (CS-01) and 77 days for the Pluto Facility Operations (MEE-01). Relief wells for other wells within the field are expected to be similar duration.

Details on the steps and time required to drill a relief well is shown in **Table 6-2**. DP and moored MODUs are suitable for the Pluto Facility Operations PAP. A moored MODU has been used as the basis for the time estimate below.

To validate the effectiveness of the relief MODU supply arrangements through the AEP MoU, an exercise to test the 21-day mobilisation period forms part of Woodside's three-yearly Hydrocarbon Spill Arrangements Testing Schedule. Testing of these arrangements are facilitated by an external party and includes suspension of the assisting operator's activities, contracting the MODU, vessel Safety Case revision and transit to location.

Table 6-2: Relief well drilling timings

Estimated Relief Well Duration	Moored days: Xena-03 drilling (CS-01)	Moored days: Pluto Operations (MEE-01)	
Rig Mobilisation			
Secure and suspend well. Complete Relief well design. Secure relief well materials.	8.0	8.0	21 days
Transit to location based on mobilisation from within the region	2.0	2.0	
Backload and loadout bulks and equipment, complete internal assurance of relief well design.	2.0	2.0	
Contingency for unforeseen event	9.0	9.0	
Mooring activities and relief well construction operations	**29.0**	**42.0**	
Intersection & well kill comprising the following stages:			
Drill out shoe, conduct formation integrity test and drill towards intersection point	1.5	1.5	14 days
Execute well-specific ranging plan to accurately intersect wellbore in minimum timeframe	9.5	9.5	
Pump kill weight drilling fluid per the relief well plan. Confirm well is static with no further flow	0.5	0.5	
Contingency for unforeseen technical issues	2.5	2.5	
Total Discharge Duration	**64 days**	**77 days**	

Woodside has considered a broad range of alternate, additional, and improved options as outlined in Section 6.2.5.

Intersect and kill duration is estimated at 14 days. This is a moderately conservative estimate. During the intersect process, the relief well will be incrementally drilled and logged to accurately approach and locate the existing well bore. This will result in the highest probability of intersecting the well on the first attempt and thus will reduce the overall time to kill the well.

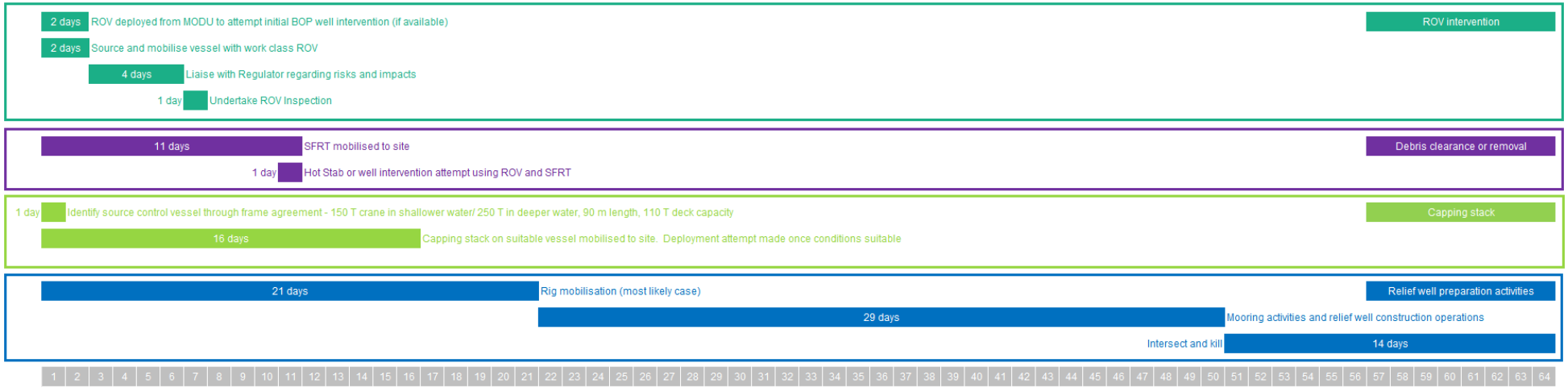

Figure 6-2: Source control and well intervention response strategy deployment timeframes for Xena-03 drilling – CS-01

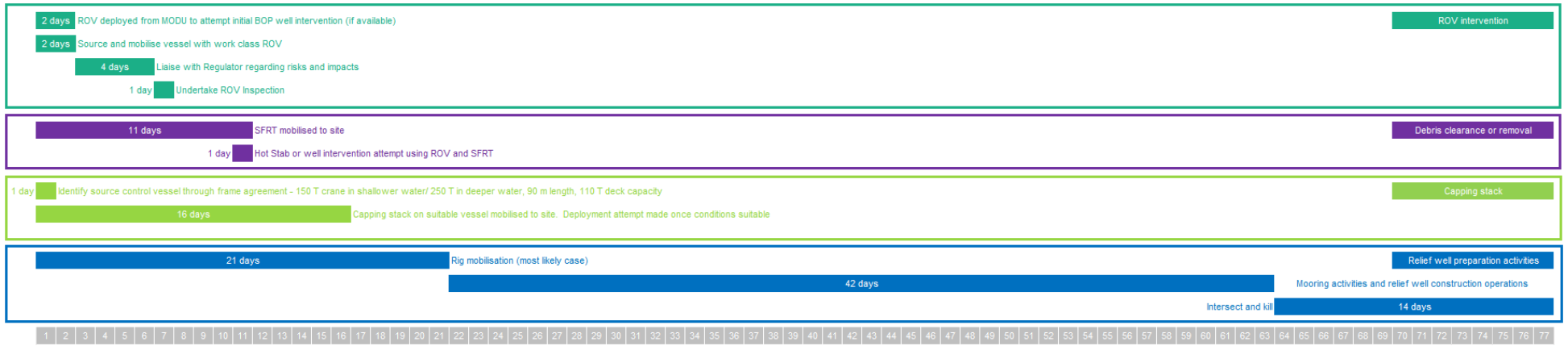

Figure 6-3: Source control and well intervention response strategy deployment timeframes for Pluto Facility Operations – MEE-01

6.2.4.2 Safety Case considerations

Woodside recognises that it will not be the Operator or holder of the Safety Case for the MODU and/or vessels involved in relief well activities. If a revision to the Operator's Safety Case is required for relief well drilling, Woodside has identified measures to enable timely response and optimise preparedness as far as practicable that can be undertaken to expedite a straightforward Safety Case revision for a MODU/ vessel to commence drilling a relief well. Performance standards associated with these measures have been included in Section 5.2.

These include;

- access to Safety and Risk discipline personnel with specialist knowledge.
- monitoring internal and external MODUs and vessel availability in the region and extended area through contracted arrangements, with a two-year lookahead.
- prioritisation of MODUs/vessels with current or historical contracting arrangements with Woodside maintaining records of previous contracting arrangements and companies and all current contracts for vessels and MODUs that are required to support Woodside in the event of an emergency.
- leverage mutual aid arrangements such as the AEP MOU for vessel and MODU support.
- Woodside Planning and Logistics, and Safety Officers (on-roster/ call 24/7) who can articulate need for, and deliver Woodside support, in key delivery tasks including those sitting with potential outside operators
- ongoing strategic industry engagement and collaboration with NOPSEMA to work toward time reductions in regulatory approvals for emergency events.

Woodside has identified three Safety Case revision development and submission scenarios for a MODU and plotted these alongside the relief well preparation activities in **Figure 6-4** and **Figure 6-5**. The assumptions for each of the cases are detailed in subsequent **Table 6-3**.

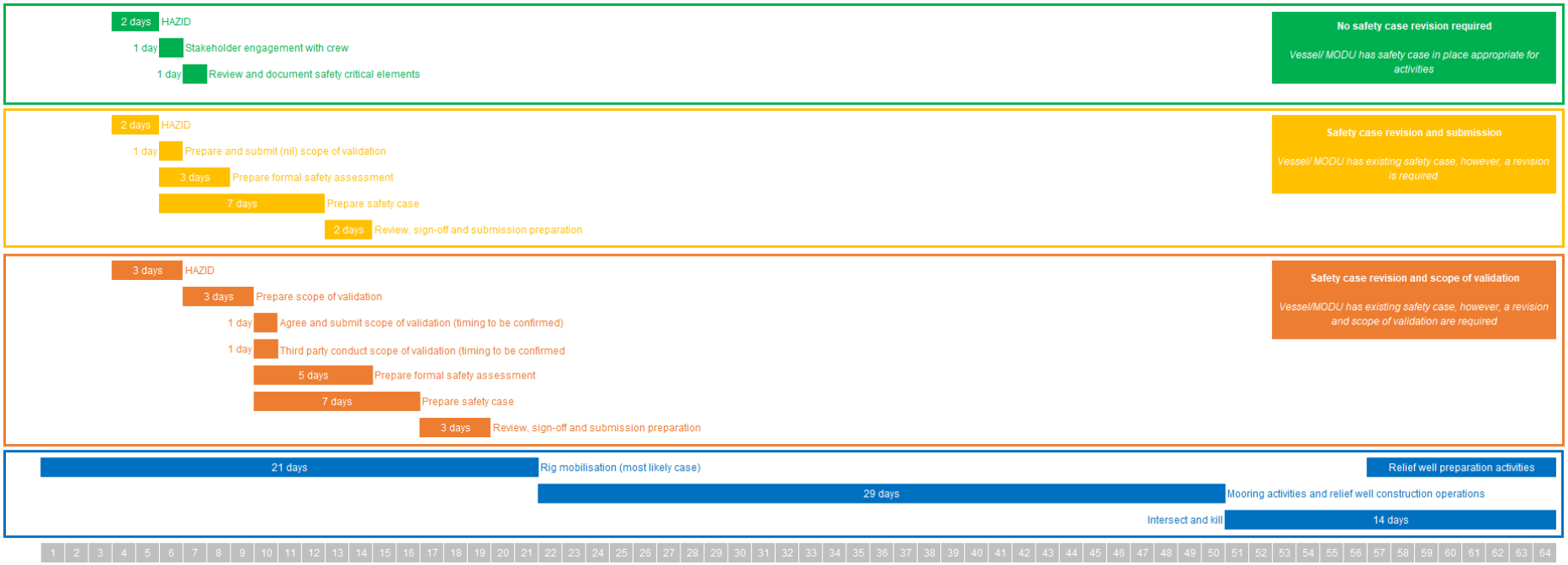

Figure 6-4: Timeline showing Safety Case revision timings alongside other relief well preparation activity timings for Xena-03 drilling – CS-01

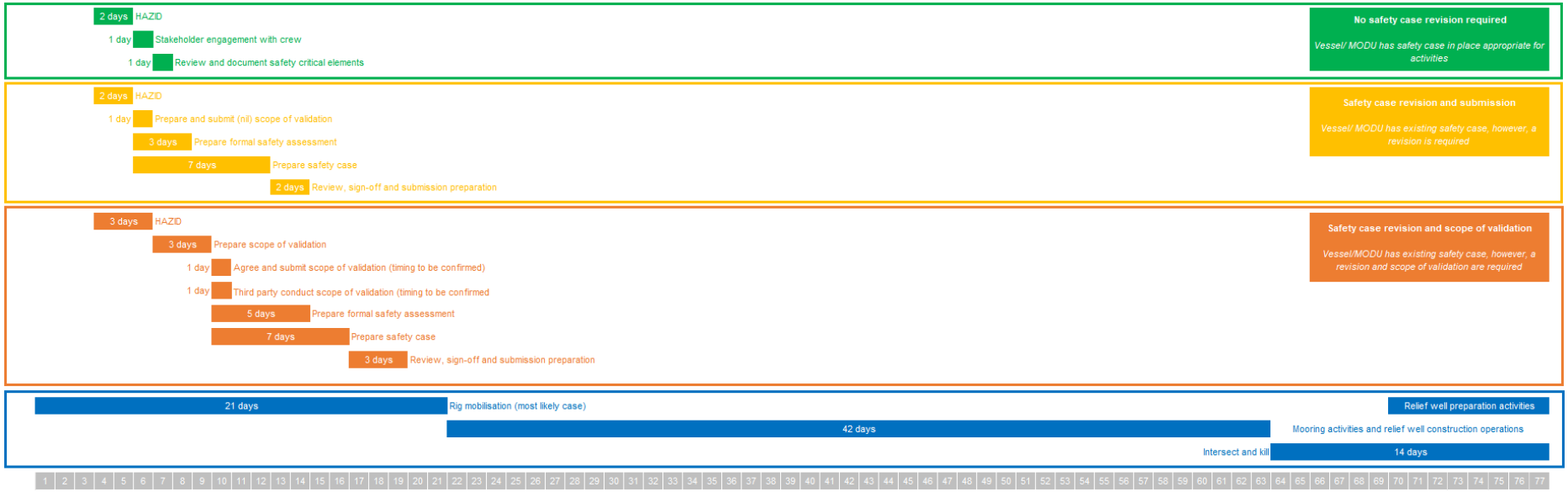

Figure 6-5: Timeline showing Safety Case revision timings alongside other relief well preparation activity timings for PLA02 (Pluto Facility Operations well)

Table 6-3: Safety case revision conditions and assumptions

Case	No Safety Case revision required	Safety Case revision and submission	Safety Case revision and scope of validation
Description	Vessel/MODU has a Safety Case in place appropriate for activities.	Vessel/MODU has an existing Safety Case, however, a revision is required.	Vessel/MODU has an existing Safety Case, however, a revision is required plus scope of validation.
Conditions/ assumptions	Assumes that existing vessel/ MODU Safety Case covers working under the same conditions or the loss of containment is not severe enough to result in any risk on the sea surface.	Safety case timing assumes vessel/ MODU selected and crew are available for workshops and Safety Case studies.	Safety case timing assumes vessel/ MODU selected and crew are available for workshops and Safety Case studies.
		Assumes nil scope of validation. This assumes that the vessel for source control allows for working in a hydrocarbon environment and control measures are already in place in the existing Safety Case. For MODU, it assumes that the relief well equipment is already part of the MODU facility and MODU Safety Case.	Validation will be required for new facilities only. The time needed for the validator to complete the review (from the last document received) and prepare validation statement is undetermined. This is not accounted for here as the Safety Case submission is not dependent on the validation statement, however the Safety Case acceptance is.
		Assumes Safety Case preparation is undertaken 24/7.	Assumes Safety Case preparation is undertaken 24/7.

6.2.5 Source Control – Control Measure Options Analysis

The assessment described in Section 6.2.1, 6.2.2, 6.2.3 and 6.2.4 outline the primary, alternate and contingency approaches respectively that Woodside would implement for relief well drilling**.**

Woodside has outlined the options considered against the activation, mobilisation (improved options), deployment (alternate and additional options) process described in Section 2.1.1 that provides an evaluation of:

- predicted cost associated with adopting the option
- predicted change/environmental benefit
- predicted effectiveness/feasibility of the option.

Alternative, additional and improved control measure options have been identified and assessed against the base capability described in Section 5. Those that have been selected for implementation are highlighted in green. Items highlighted in red have been considered and rejected on the basis that they are not feasible, the costs are disproportionate to the environmental benefit, and/or the option is not reasonably practical. The control measure options are defined as:

- Alternative control measures are potentially more effective and/or novel control measures that are evaluated as replacements for an adopted control.
- Additional control measures are evaluated in terms of their ability to reduce an impact or risk when added to the existing suite of control measures.
- Improved control measures are evaluated for improvements they could bring to the effectiveness of adopted control measures in terms of functionality, availability, reliability, survivability, independence and compatibility.

Options where there is not a clear justification for their inclusion or exclusion may be subject to a detailed assessment.

6.2.6 Activation/Mobilisation – Control Measure Options Analysis

This section details the assessment of alternative, additional or improved control measures that were considered to meet the selected level of performance in Section 5.2 and reduce the risk to ALARP. The alternative, additional and improved control measures that have been assessed and selected are highlighted in green and the relevant performance of the selected control is cross referenced. Items highlighted in red have been considered and rejected on the basis that they are not feasible or the costs are disproportionate compared to the environmental benefit.

6.2.6.1 Alternative Control Measures

Alternative Control Measures considered *Alternative control measures, including potentially more effective and/or novel control measures are evaluated as replacements for an adopted control*					
Option considered	**Environmental consideration**	**Feasibility**	**Approximate Cost**	**Assessment conclusions**	**Implemented**
Standby MODU shared for all Woodside activities	A standby MODU shared across all Woodside activities is likely to provide a moderate environmental benefit as it may reduce the 21-day sourcing, contracting and mobilisation time by up to 10 days (to 11 days). This would reduce the volume and duration of release and may reduce impacts on receptors and sensitivities.	This option is not considered feasible for all Woodside activities as there are a large range of well depths, complexities, geologies and geophysical properties across all Woodside's operations. The large geographic area of Woodside activities also means that the MODU is unlikely to be in the correct location at the right time when required.	Even with costs shared across Woodside operations, the costs (approximately A$219 m per annum, A$1,095 bn over the five years) of maintaining a shared MODU are considered disproportionate to the environmental benefit potentially achieved by reducing mobilisation times by up to 10 days.	The costs and complexity of having a MODU and maintaining this arrangement for the duration of the PAP are disproportionate to the environmental benefit gained above finding a MODU through the MOU agreement for all spill scenarios.	**No**
Standby MODU shared across AEP MOU Titleholders	A standby MODU shared across all titleholders who are signatories to the AEP MOU is likely to provide a minor environmental benefit as it may reduce the 21-day sourcing, contracting and mobilisation time by up to seven days (to 14 days). This would reduce the volume and duration of release and may reduce impacts on receptors and sensitivities.	This option is not considered feasible for many titleholders due to the remote distances in Australia as well as a substantial range of well depths, types, complexities, geologies and geophysical properties across a range of Titleholders	As the environmental benefit is only considered minor and the reduction in timing would only be for the mobilisation period (reduction from 21 days to 14 days) the costs are considered disproportionate to the minor benefit gained.	The costs and complexity of having a MODU and maintaining a shared arrangement for the duration of the PAP are disproportionate to the environmental benefit gained above finding a MODU through the MOU agreement for all spill scenarios.	**No**

6.2.6.2 Additional Control Measures

Additional Control Measures considered *Additional control measures are evaluated in terms of them reducing an environmental impact or an environmental risk when added to the existing suite of control measures*					
Option considered	**Environmental consideration**	**Feasibility**	**Approximate Cost**	**Assessment conclusions**	**Implemented**
Implement and maintain minimum standards for Safety Case development	Woodside's contingency planning consideration would be to source a rig from outside Australia with an existing Safety Case. This would require development and approval of a Safety Case revision for the rig and activities prior to commencing well kill operations.	This option is considered feasible and would require Woodside to develop minimum standards for safe operations for relevant Safety Case input along with maintaining key resources to support review of Safety Cases. Woodside would not be the operator for relief well drilling and would therefore not develop or submit the Safety Case revision. Woodside's role as Titleholder would be to provide minimum standard for safe operations that MODU operators would be required to meet and/or exceed.	Woodside has outlined control measures and performance standards regarding template Safety Case documentation and maintenance of resources and capability for expedited Safety Case review.	This option has been selected based on its feasibility, low cost and the potential environmental benefits it would provide.	**Yes**

6.2.6.3 Improved Control Measures

Improved Control Measures considered *Improved control measures are evaluated for improvements they could bring to the effectiveness of adopted control measures in terms of functionality, availability, reliability, survivability, independence and compatibility*					
Option considered	**Environmental consideration**	**Feasibility**	**Approximate Cost**	**Assessment conclusions**	**Implemented**
Monitor internal drilling programs for rig availability	Woodside may be conducting other campaigns that overlap with the PAP, potentially providing availability of a relief well drilling rig within Woodside. The environmental benefit of monitoring other drilling programs internally is for Woodside to understand what other rigs may be rapidly available for relief well operations if required, potentially reducing the time to drill the relief well, resulting in less hydrocarbon to the environment.	Woodside monitors vessel and MODU availability through market intelligence services for location. Woodside will continually monitor other drilling and exploration activities within Australia and as available throughout the region to track rigs and explore rig availability during well intervention operations.	Associated cost of implementation is minimal to the environmental benefit gained. Woodside has outlined control measures and performance standards.	This option is a low-cost control measure with potential to reduce the volume of hydrocarbon released to the environment.	**Yes**
Monitor external activity for rig availability	The environmental benefit achieved by monitoring drilling programs and rig movements across industry provides the potential for increased availability of suitable rigs for relief well drilling. Additional discussions with other Petroleum Titleholders may be undertaken to potentially gain faster access to a rig and reduce the time taken to kill the well and therefore volume of hydrocarbons released.	Woodside will source a relief well drilling rig in accordance with the AEP MOU on rig sharing in the unlikely event this is required. Commercial and operational provisions do not allow WEL to discuss current and potential drilling programs in detail with other Petroleum Titleholders.	Associated cost of implementation is moderate to the environmental benefit gained. Woodside will continually engage with other Titleholders and Operators regarding activities within Australia and as available throughout the region to track rigs and explore rig availability during well intervention operations.	This option is a low-cost control measure with potential to reduce the volume of hydrocarbon released to the environment.	**Yes**
Monitor status of Registered Operators/ Approved Safety cases for rigs	Woodside can monitor the status of Registered Operators for rigs operating within Australia (and therefore Safety Case status) on a monthly basis. This allows for a prioritised selection of rigs in the event of a response with priority given to those with an existing Safety Case.	The environmental benefit of monitoring rigs is for Woodside to understand what other rigs may be rapidly available for relief well operations if required, potentially reducing the time to drill the relief well, resulting in less hydrocarbon to the environment.	The cost is minimal.	This option is a low-cost control measure with potential to reduce the volume of hydrocarbon released to the environment.	**Yes**

6.2.7 Deployment Options Analysis

6.2.7.1 Alternative Control Measures

Alternative Control Measures considered *Alternative control measures, including potentially more effective and/or novel control measures are evaluated as replacements for an adopted control*					
Option considered	**Environmental consideration**	**Feasibility**	**Approximate Cost**	**Assessment conclusions**	**Implemented**
No reasonably practical alternative control measures identified					

6.2.7.2 Additional Control Measures

Additional Control Measures considered *Additional control measures are evaluated in terms of them reducing an environmental impact or an environmental risk when added to the existing suite of control measures*					
Option considered	**Environmental consideration**	**Feasibility**	**Approximate Cost**	**Assessment conclusions**	**Implemented**
Offset capping alternative to conventional capping stack deployment	While the use of an offset capping system could reduce the quantity of hydrocarbon entering the marine environment, deployment of an offset capping deployment in the water depths at the Pluto Facility Operations (829 m) is not deemed feasible – maximum safe water depths are stated by OSRL to be 600 m. Additionally, the mobilisation lead times for both a cap and required vessels/ support equipment, would minimise any environmental benefit gained for both PLA02 and Xena-03 wells.	Technical feasibility: • The base case considerations for OIE requires a coordinated response by 4 to 7 vessels working simultaneously outside of the 500m exclusion zone. In the event of a worst-case shallow water gas discharge, the 10% LEL modelled radius extends beyond the area of activity required for the OIE deployment thereby introducing health and safety risk to any vessels required for the initial deployment of the carrier and subsequent operations with ROV during capping operations. Though manageable for single vessels, it is prohibitive for operations requiring SIMOPs with numerous vessels working at 180 degrees from one another. • Water depth is also a key consideration as buoyancy modules have not been proven for use in 829 m water depth (PLA02) or with the expected worst-case gas blowout rates. Other factors: • Due to the OIE's size and scale, fabrication of equipment, e.g. mooring anchors, outside of the contractor's scope of supply is likely to require engagement of international suppliers, further increasing complexity and uncertainty in associated time frames. • Screening indicates that mobilising some components of the OIE, based in Italy, can only be done so by sea and is likely to erode any time savings realised through killing the well via a relief well. The March 2019 OSRL exercise in Europe tested deployment of the OIE and highlighted that it will require a 600+MT crane vessel for deployment to ensure there is useable hook height for the crane to conduct the lift of the carrier. Vessels with such capability and a current Australian vessel Safety Case are not locally or readily available.	Due to risks, uncertainty and complexity of this option, and the inability to realise any environmental gains, any cost would be disproportionate to the benefits gained.	Woodside has confidence in availability of suitable relief well MODUs across the required drilling time frame thus the OIE would provide no advantage. Implementation of OIE has been assessed as a complex and unfeasible SIMOPs operation, precluded by a combination of the site-specific metocean and worst-case discharge conditions at the Pluto location. Implementation of a novel technology such as OIE culminates in low certainty of success while at the same time increasing associated health and safety risks. As such the primary source control response and ALARP position remains drilling a relief well.	**No**

Dual vessel capping stack deployment	While the use of dual vessel to deploy the capping system could reduce the quantity of hydrocarbon entering the marine environment, this is an unproven technology. Additionally, mobilisation lead times for both a cap and required vessels and support equipment, would minimise any environmental benefit.	A dual vessel deployment is somewhat feasible provided a large enough deck barge can be located. Deck barges of 120 m are not, however, very common and will present a logistical challenge to identify and relocate to the region. Furthermore, the longer length barges may need mooring assist to remain centred over the well. The capping stack would be handed off from a crane vessel to the anchor handler vessel (AHV) work wire outside of the exclusion zone. The AHV would then manoeuvre the barge into the plume to get the capping stack over the well. In this method, the barge would be in the plume, but the AHV and all personnel would be able to maintain a safe position outside of the gas zone. The capping stack would actually be lowered on the AHV work wire so a crane would not be required on the barge.	Due to there being minimal environmental benefits gained by the prolonged lead times needed to execute this technique, plus a potential increase in safety issues, any cost would be disproportionate to the benefits gained.	Given there is minimal environmental benefit and an increase in safety issues surrounding SIMOPS and deployment in shallow waters, this option would not provide an environmental or safety benefit.	**No**
Subsea Containment System alternative to capping stack deployment	While the use of a subsea containment system could reduce the quantity of hydrocarbon entering the marine environment, this is an unproven technology. Additionally, the system is unlikely to be feasibly deployed and activated for at least 90 days following a blowout due to equipment requirements and logistics. No environmental benefit is therefore predicted given the release durations of 64 days (CS-01) and 77 days (MEE-01) before drilling of a relief well under the adopted control measure.	The timing for mobilisation, deployment and activation of the subsea containment system is likely to be longer (>90 days), than the expected 64 days (CS-01) and 77 days (MEE-01) relief well drilling timing based on the location, size and scale of the equipment required, including seabed piles that can only be transported by vessel.	Woodside has investigated the logistics of reducing this timeframe by pre-positioning equipment but the costs of purchasing dedicated equipment by Woodside for this PAP is not considered reasonably practical and are considered disproportionate to the environmental benefit gained.	This option would not provide an environmental benefit.	**No**
Pre-drilling top-holes	This option represents additional environmental impacts associated with discharge of additional drill cuttings and fluids along with benthic habitat disturbance. It is also not expected to result in a significant decrease in relief well timings	This option is not considered feasible due to the uncertainties related to the location and trajectory of the intervention well, which may vary according to the actual conditions at the time the loss of containment event occurs. Additionally, there is only expected to be a minor reduction in timing for this option of 1-2 days based on the drilling schedule. Duration to drill and kill may be reduced by 1-2 days, but top-hole may have to be relocated, due to location being unsafe or unsuitable and further works will be required each year to maintain the top holes.	Utilising an existing MODU and pre-drilling top-hole for relief well commencement would significantly increase costs associated the PAP. Estimated cost over the program's life is approximately A$555,000 per day over the PAP based on 2-4 days of top-hole drilling (plus standby time) for the 5 wells as the worst-case scenarios.	This option would not provide an environmental benefit due to the additional environmental impacts coupled with a lack of improved relief well timings.	**No**
Purchase and maintain mooring system	Purchasing and maintaining a mooring system could provide a moderate environmental benefit as it may reduce equipment sourcing time. However, due to the continued need for specialists to install the equipment plus sourcing a suitable vessel, the timeframe reduction would be minimal.	Woodside is not a specialist in installing and maintaining moorings so would require specialists to come in to install the moorings and would also require specialist vessels to be sourced to undertake the work.	The cost of purchasing, storing and maintaining pre-lay mooring systems with anchors, chains, buoys and ancillary equipment is considered grossly disproportionate to the environmental benefit gained.	This option would not provide an environmental benefit as timeframe reductions would be minimal.	**No**
Contract in place with Wild Well Control and Oceaneering	Woodside has an agreement in place with Wild Well Control Inc and Oceaneering to provide trained personnel in the event of an incident. This will ensure that competent personnel are available in the shortest possible timeframe.	Having contracts in place to access trained, competent personnel in the event of an incident would reduce mobilization times. This option is considered reasonably practicable.	Minimal cost implications – Woodside has standing contract in place to provide assistance across all activities.	This control measure is adopted as the costs and complexity are not considered disproportionate to any environmental benefit that might be realised.	**Yes**

6.2.7.3 Improved Control Measures

Improved Control Measures considered
Improved control measures are evaluated for improvements they could bring to the effectiveness of adopted control measures in terms of functionality, availability, reliability, survivability, independence and compatibility

Option considered	Environmental consideration	Feasibility	Approximate Cost	Assessment conclusions	Implemented
Maintaining relief well drilling supplies	There is not predicted to be any reduction in relief well timing or spill duration from Woodside maintaining stocks of drilling supplies (mud, casing, cement, etc.)	It would be feasible to source some relief well drilling supplies such as casing but the actual composition of the cement and mud required will need to be specific to the well. This option is also not deemed necessary as the lead time for sourcing and mobilising these supplies is included in the 21 days for sourcing and mobilising a rig.	The capital cost of Woodside purchasing relevant drilling supplies is expected to be approximately A$600 k with additional costs for storage and ongoing costs for replenishment. These costs are considered disproportionate to the environmental benefit gained.	This option would not provide an environmental benefit.	**No**

6.2.8 Selected Control Measures

Following review of alternative, additional and improved control measures as outlined above, the following controls were selected for implementation for the PAP.

- alternative
  - none selected
- additional
  - implement and maintain minimum standards for Safety Case development
  - contract in place with Wild Well Control and Oceaneering to supply trained, competent personnel
- improved
  - monitor internal drilling programs for MODU availability
  - monitor external activity for MODU availability
  - monitor status of registered operators / approved Safety cases for MODUs.

6.3 Source Control via Vessel SOPEP – ALARP Assessment

Alternative, additional and improved control measure options have been assessed against the base capability described in Section 5. Those that have been selected for implementation highlighted in green. Items highlighted in red have been considered and rejected on the basis that they are not feasible, the costs are disproportionate to the environmental benefit, and/or the option is not reasonably practical. Control measures where there is not a clear justification for their inclusion or exclusion may be subject to a detailed ALARP assessment.

6.3.1 Source Control via Vessel SOPEP – Control Measure Options Analysis

6.3.1.1 Alternative Control Measures

Alternative Control Measures considered
Alternative control measures, including potentially more effective and/or novel control measures are evaluated as replacements for an adopted control

Option considered	Environmental consideration	Feasibility	Approximate Cost	Assessment conclusions	Implemented
No reasonably practical alternative control measures identified					

6.3.1.2 Additional Control Measures

Additional Control Measures considered
Additional control measures are evaluated in terms of them reducing an environmental impact or an environmental risk when added to the existing suite of control measures

Option considered	Environmental consideration	Feasibility	Approximate Cost	Assessment conclusions	Implemented
No reasonably practical additional control measures identified					

6.3.1.3 Improved Control Measures

Improved Control Measures considered
Improved control measures are evaluated for improvements they could bring to the effectiveness of adopted control measures in terms of functionality, availability, reliability, survivability, independence and compatibility

Option considered	Environmental consideration	Feasibility	Approximate Cost	Assessment conclusions	Implemented
No reasonably practical improved control measures identified					

6.3.2 Selected control measures

Following review of alternative, additional and improved control measures, the following controls were selected for implementation for the PAP.

- alternative
  - none selected
- additional
  - none selected
- improved
  - none selected.

6.4 Shoreline Protection and Deflection - ALARP Assessment

Alternative, additional and improved control measure options have been identified and assessed against the base capability described in Section 5. Those that have been selected for implementation are highlighted in green. Items highlighted in red have been considered and rejected on the basis that they are not feasible, the costs are clearly disproportionate to the environmental benefit, and/or the option is not reasonably practical. Control measures where there is not a clear justification for their inclusion or exclusion may be subject to a detailed ALARP assessment.

6.4.1 Existing Capability – Shoreline Protection and Deflection

Woodside's existing level of capability is based on internal and third-party resources that are available 24 hours, 7 days per week. The capability presented below is displayed as ranges to incorporate operational factors such as weather, crew/ vessel/ aircraft/ vehicle location and duties, survey or classification society inspection requirements, overflight/ port/ quarantine permits and inspections, crew/pilot duty and fatigue hours, refuelling/ re-stocking provisions, and other similar logistic and operational limitation that are beyond Woodside's direct control.

6.4.2 Response Planning: Pluto Facility Operations – Shoreline Protection and Deflection

Planning for shoreline protection is based upon identification of RPAs from deterministic modelling and the logistics associated with deploying protection at these locations. The response planning scenarios indicate that this would require effective mobilisation to priority shorelines and maintenance of protection until operational monitoring confirms that the locations are no longer at risk. Woodside has identified the RPAs from deterministic modelling results provided from specific scenarios.

The control measures selected provide capability to mobilise shoreline protection equipment within 24 hours (if required). Deterministic modelling indicates that first shoreline impact at Dampier Archipelago and Legendre Island within 24 hours for the Pluto Facility Operations export pipeline loss of containment scenario (MEE-02b). The existing capability is considered sufficient to mobilise and deploy protection at RPAs within 72 hours, guided by the ongoing operational monitoring. The full list of RPAs predicted to be contacted by oil above response thresholds are detailed in Table 3-1.

Tactical response plans exist for many of the RPAs identified. The plans identify values and sensitivities that would be protected at location. To allow for the best use of available shoreline protection and deflection resources, operational monitoring (OM01 and OM02) will inform the response, targeting RPAs where contact is predicted above response threshold levels.

Table 6-4 below outlines the capability required (number of RPAs predicted to be impacted) against the capability available (number of shoreline protection and deflection operations that can be mobilised and deployed). As can be seen from the table below, Woodside's capability meets the response planning need identified for shoreline protection and deflection operations at identified RPAs within 72 hours.

Table 6-4: Response Planning – Shoreline Protection and Deflection

Pluto Facility Operations - export pipeline loss of containment		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Week 2	Week 3	Week 4	Month 2	Month 3
	Oil on shoreline (from deterministic modelling) m^3	15	12	0	0	0	0	0	0	0	0	0	0
A	Capability Required												
A1	Number of RPAs contacted (> 100 g/m^2)	2	3	0	0	0	0	0	0	0	0	0	0
B	Capability Available (operations per day)												
B1	SPD operations available – per day (lower)	0	1	1	2	2	4	6	70	70	70	330	330
B2	SPD operations available – per day (upper)	1	2	3	4	6	8	10	84	84	848	336	336
C	Capability Gap (operations per day)												
C1	SPD operations gap – per day (lower)	2	2	-1	-2	-2	-4	-6	-70	-70	-70	-330	-330
C2	SPD operations gap – per day (upper)	3	4	-3	-4	-6	-8	-10	-84	-84	-84	-336	-336

A1– the number of Response Protection Areas contacted by surface hydrocarbons above 100 g/m^2
B1 and B2 – the upper and lower number of shoreline protection and deflection operations available (based on response planning assumptions in Section 5.4),
C1 and C2 – the gap between the upper and lower number of shoreline protection and deflection operations required in A1 compared to the operations available in B1 and B2

Table 6-5: Indicative Tactical response plan, aims and methods for identified RPAs

Tactical Response Plan	Response aims and methods
Dampier Archipelago – applicable to RPAs including: Keast Island, Cape Bruguieres, and Cohen Island)	**First response objective:** Ongoing operational monitoring and evaluation of the hydrocarbon spill to adapt aims and response tactics to the evolving nature of the incident and to assist in locating relevant booming areas. **Second response objective**: Recovery of floating oil at sea where possible through the use of skimming systems and other appropriate recovery devices to reduce shoreline impact. **Third response objective:** Protection of sensitive shorelines within Dampier Archipelago through use of shoreline booms. Formation types to deploy will be dependent on the time available until the hydrocarbon impacts the shoreline and local geographical and tidal/weather conditions. **Fourth response objective**: Clean-up of the shoreline. Manual clean up techniques, use of mechanical recovery methods and techniques where appropriate. NOTES: • Relevant permissions must be sought from DBCA to carry out any response operations within the limits of the area. • In the event that the existing Woodside equipment stockpile at the King Bay Supply Base becomes exhausted, Woodside has an MoU with AMSA and the DoT to provide surplus equipment from their stockpile. Additionally, Woodside is a member of both AMOSC and OSRL and has the ability to call upon their relevant technical advisory services and equipment stockpiles 24/7. This TRP should be considered a draft until it has been verified and tested.
Legendre Island – Dampier	**First Response objective:** Ongoing operational monitoring and evaluation of hydrocarbon spill to adapt aims and response tactics to evolving nature of the incident and to assist in locating relevant booming areas. **Second Response objective:** Protection of sensitive shorelines (mangrove) at Legendres Island through use of shoreline booms. Formation types to deploy will be dependent on the time available until the hydrocarbon impacts the shoreline and local geographical and tidal/ weather conditions. **Third Response objective:** Clean-up impacted shoreline. Manual clean-up techniques, use of mechanical recovery methods and techniques where appropriate. **Fourth response aim:** Collection and specialist cleaning/ rehabilitation of oiled wildlife NOTES: • Relevant permissions must be sought from DBCA to carry out any response operations within the limits of the area. • In the event that the existing Woodside equipment stockpile at the King Bay Supply Base becomes exhausted, Woodside has an MoU with AMSA and the DoT to provide surplus equipment from their stockpile. Additionally, Woodside is a member of both AMOSC and OSRL and has the ability to call upon their relevant technical advisory services and equipment stockpiles 24/7. This TRP should be considered a draft until it has been verified and tested.

Pre-emptive mobilisation of equipment and personnel would commence as soon as practicable prior to oil contact. Additional resources would be mobilised depending on the scale of the event to increase the length or number of shorelines being protected.

A shoreline protection and deflection response would be launched only when operational monitoring operations identify a spill heading towards RPA(s) and there is sufficient time for deployment prior to shoreline contact.

6.4.3 Shoreline Protection and Deflection – Control Measure Options Analysis

6.4.3.1 Alternative Control Measures

Alternative Control Measures considered *Alternative control measures, including potentially more effective and/or novel control measures are evaluated as replacements for an adopted control*					
Option considered	**Environmental consideration**	**Feasibility**	**Approximate Cost**	**Assessment conclusions**	**Implemented**
Pre-position equipment at Response Protection Areas (RPAs)	Additional environmental benefit of having equipment prepositioned is considered minor as the RPAs predicted to be contacted are based on modelling outputs and thus may differ under the prevailing conditions of a real event making it impractical to preposition equipment in advance. Equipment is currently available to protect RPAs, however, deployment may be constrained by levels of volatile hydrocarbons arising from a condensate or MGO spill.	The incremental environmental benefit associated with these delivery options is unlikely to reduce the environmental consequence of a significant hydrocarbon release beyond the adopted delivery options. Considering the highly unlikely nature of a significant hydrocarbon release, the costs and organisational complexity associated with prepositioning and maintenance of equipment, the sacrifice is considered disproportionate to the environmental benefit that might be realised. Furthermore, these options would conflict with the mutual aid philosophy being adopted under the selected delivery options. The selected delivery options for shoreline protection and deflection meet the relevant objectives of this control measure and do not require prepositioned or additional equipment.	Total cost to preposition protection/ deflection packages at each site of potential impact would be approximately A$6100 per package per day.	This option is not adopted as pre-positioning shoreline protection and deflection capability is not considered practicable due to uncertainty of the sites that may be contacted during a real spill event and the predicted time frames prior to contact. Safety factors have also been considered, including the potential for personnel to be exposed to volatile hydrocarbons in the early stage of the response. Given the rapid natural weathering rate of condensate and MGO, mobilising additional capability is not expected to provide a material net environmental benefit, therefore the current capability is considered to reduce the risk to ALARP.	**No**

6.4.3.2 Additional Control Measures

Additional Control Measures considered *Additional control measures are evaluated in terms of them reducing an environmental impact or an environmental risk when added to the existing suite of control measures*					
Option considered	**Environmental consideration**	**Feasibility**	**Approximate Cost**	**Assessment conclusions**	**Implemented**
Supplemented stockpiles of equipment to protect additional shorelines	Additional equipment would increase the number of receptor areas that could be protected from hydrocarbon contact. However, current availability of personnel and equipment is capable of protecting up to 30 km of shoreline, commensurate with the scale and progressive nature of shoreline impact. Additional stocks would be made available from international sources if long term up scaling were necessary. A reduction in environmental consequence from a 'B' rating is unlikely to be realised as a result of having more equipment available locally.	The incremental environmental benefit associated with these delivery options is considered minor and unlikely to reduce the environmental consequence of a significant hydrocarbon release beyond the adopted delivery options. Considering the highly unlikely nature of a significant hydrocarbon release and the costs and organisational complexity associated with prepositioning and maintenance of equipment, the sacrifice is considered disproportionate to the limited environmental benefit that might be realised. Furthermore, these options would conflict with the mutual aid philosophy being adopted under the selected delivery options. The selected delivery options for shoreline protection and deflection meet the relevant objectives of this control measure and do not require prepositioned or additional equipment.	Total cost for purchase supplemental protection and deflection equipment would be approximately A$455,000 per package.	This option is not adopted as addition shoreline protection and deflection capability is not considered practicable in the time frame prior to contact. Whilst modelling for this activity predicts contact at 8 RPAs within 24-48 hours, it should be noted that this is based upon 200 stochastic model runs thus it is unfeasible for this to all occur from a single release. Safety factors have also been considered, including the potential for personnel to be exposed to volatile hydrocarbons in the early stage of the response. Given the rapid natural weathering rate of condensate and MGO, mobilising additional capability is not expected to provide a material net environmental benefit, therefore the current capability is considered to reduce the risk to ALARP.	**No**
Additional trained personnel	The level of training and competency of the response personnel allows the shoreline protection and deflection operation to be delivered with minimum secondary impact to the environment. Training additional personnel does not provide an increased environmental benefit.	Additional personnel required to sustain an extended response can be sourced through the Woodside *People & Global Capability Surge Labour Requirement Plan*. Additional personnel sourced from contracted OSROs (OSRL/AMOSC) to manage other responders. Response personnel are trained and exercised regularly in shoreline response techniques and methods. All personnel involved in a response will	Additional specialist personnel would cost A$2000 per person per day.	This option is not adopted as the existing capability meets the need. Safety factors have also been considered, including the potential for personnel to be exposed to volatile hydrocarbons in the early stage of the response. Given the rapid natural weathering rate of condensate and MGO, mobilising additional capability is not expected to provide a material net environmental benefit, therefore the	**No**

		receive a full operational/safety briefing prior to commencing operations.		current capability is considered to reduce the risk to ALARP.	

6.4.3.3 Improved Control Measures

Improved Control Measures considered *Improved control measures are evaluated for improvements they could bring to the effectiveness of adopted control measures in terms of functionality, availability, reliability, survivability, independence and compatibility*					
Option considered	**Environmental consideration**	**Feasibility**	**Approximate Cost**	**Assessment conclusions**	**Implemented**
Faster response/ mobilisation time	Modelling predicts floating or shoreline accumulation at threshold on day 1 at Dampier Archipelago and Legendre Island (MEE-02b), thus faster response times are not practicable.	Response teams, trained personnel, contracted oil spill response service providers, government agencies and the associated mitigation equipment required to enact an initial protection and deflection response will be available for mobilisation within 24-48 hrs of activation. Additional equipment from existing stockpiles and oil spill response service providers can be on scene within days.	The cost of establishing a local stockpile of new mitigation equipment (including protection and deflection boom) closer to the expected hydrocarbon stranding areas is not commensurate with the need.	This option is not adopted as addition shoreline protection and deflection capability is not considered practicable in the time frames prior to contact. Safety factors have also been considered, including the potential for personnel to be exposed to hydrocarbon gas vapours in the early stage of the response. Given the rapid natural weathering rate of Pluto Condensate, faster mobilisation is not expected to provide a material net environmental benefit, therefore the current capability is considered to reduce the risk to ALARP.	**No**

6.4.4 Selected Control Measures

Following review of alternative, additional and improved control measures as outlined above, the following controls were selected for implementation for the PAP.

- alternative
  - none selected
- additional
  - none selected
- improved
  - none selected.

6.5 Shoreline Clean-up – ALARP Assessment

Alternative, additional and improved control measure options have been identified and assessed against the base capability described in Section 5. Those that have been selected for implementation are highlighted in green. Items highlighted in red have been considered and rejected on the basis that they are not feasible, the costs are disproportionate to the environmental benefit, and/or the option is not reasonably practical. Control measures where there is not a clear justification for their inclusion or exclusion may be subject to a detailed ALARP assessment.

6.5.1 Existing Capability – Shoreline Clean-up

Woodside's existing level of capability is based on internal and third-party resources that are available 24 hours, 7 days per week. The capability presented below is displayed as ranges to incorporate operational factors such as weather, crew/vessel/aircraft/vehicle location and duties, survey or classification society inspection requirements, overflight/port/quarantine permits and inspections, crew/pilot duty and fatigue hours, refuelling/re-stocking provisions, and other similar logistic and operational limitation that are beyond Woodside's direct control.

6.5.2 Response planning: Pluto Facility Operations – Shoreline Clean-up

Woodside has assessed existing capability against the WCCS and has identified that the range of techniques provide an ongoing approach to shoreline clean-up at identified RPAs. Woodside's capability can cover all required shoreline clean-up operations for the PAP.

Modelling predicts shoreline contact within 24 hours at Dampier Archipelago (9 m^3) and Legendre Island (6 m^3) for the MEE-02b. No shoreline contact is expected at 100 g/m^2 threshold from any other modelled scenario. The largest volumes ashore are Dampier Archipelago with approximately 9 m^3 predicted within 24 hours. These volumes assume no treatment of floating surface oil by containment and recovery or shoreline protection and deflection prior to contact so are considered very conservative. The full list of RPAs predicted to be contacted by oil above response thresholds are detailed in **Table 3-1**.

These figures have been combined into a single response planning need scenario that provides a worst-case scenario for planning purposes as outlined below. Given all other shoreline contact scenarios identified from modelling are longer time frames and lesser volumes, demonstration of capability against this need will enable Woodside to meet requirements for any other outcome.

The potential scale and remoteness of a response coupled with the uncertainty of which locations will be affected precludes the stockpiling or prepositioning of equipment specific to shorelines. The most significant constraint is accommodation and transport of personnel in Dampier to undertake clean-up operations and to manage wastes generated during the response effort. From previous assessment of facilities in Dampier, Woodside estimates that current accommodation can cater for a range of 500-700 personnel per day.

Woodside has identified several options which could be mobilised to achieve defined response objectives. Evaluation considers the benefit in terms of the time to respond and the scale of response made possible by each option. The evaluation of possible control measures is summarised in Section 6.5.3.

Table 6-6: Response Planning – Shoreline Clean-up

	Shoreline Clean-up (Phase 2)	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Week 2	Week 3	Week 4	Month 2	Month 3	Month 4
	Oil on shoreline (from deterministic modelling) m^3													
	Shoreline accumulation (above 100 g/m^2) - m^3	15	12	0	0	0	0	0	0	0	0	0	0	0
	Oil remaining following response operations - m^3	15	4	5	2	1	0	0	0	0	0	0	0	0
A	**Capability Required (number of operations)**													
A1	SCU operations required (lower)	2	0	0	0	0	0	0	0	0	0	0	0	0
A2	SCU operations required (upper)	2	1	1	0	0	0	0	0	0	0	0	0	0
B	**Capability Available (number of operations)**													
B1	SCU operations available - Stage 2 - Manual (lower)	0	1	3	5	8	12	15	105	105	105	560	560	560
B2	SCU operations available - Stage 2 - Manual (upper)	0	2	5	8	10	15	20	140	140	140	560	560	560
C	**Capability Gap**													
C1	SHC operations gap (lower)	2	-1	-3	-5	-8	-12	-15	-105	-105	-105	-560	-560	-560
C2	SHC operations gap (upper)	2	-1	-4	-8	-10	-15	-20	-140	-140	-140	-560	-560	-560

A1 and A2 – the number of Shoreline Clean-up operations required based on the hydrocarbon volumes ashore above 100 g/m^2
B1 and B2 – the upper and lower number of shoreline clean-up operations available (based on response planning assumptions in Section 5.5),
C1 and C2 – the gap between the upper and lower number of shoreline clean-up operations required in A1 and A2 compared to the operations available in B1 and B2

6.5.3 Shoreline Clean-up – Control measure options analysis

6.5.3.1 Alternative Control Measures

Alternative Control Measures considered *Alternative control measures, including potentially more effective and/or novel control measures are evaluated as replacements for an adopted control*					
Option considered	**Environmental consideration**	**Feasibility**	**Approximate Cost**	**Assessment conclusions**	**Implemented**
No reasonably practical alternative control measures identified					

6.5.3.2 Additional Control Measures

Additional Control Measures considered *Additional control measures are evaluated in terms of them reducing an environmental impact or an environmental risk when added to the existing suite of control measures*					
Option considered	**Environmental consideration**	**Feasibility**	**Approximate Cost**	**Assessment conclusions**	**Implemented**
Additional trained personnel available	The level of training and competency of the response personnel allows the shoreline clean-up operation to be delivered with minimum secondary impact to the environment. Training additional personnel does not provide an increased environmental benefit.	Additional personnel required to sustain an extended response can be sourced through the Woodside *People & Global Capability Surge Labour Requirement Plan*. Additional personnel sourced from contracted OSROs (OSRL/AMOSC) to manage other responders. Response personnel are trained and exercised regularly in shoreline response techniques and methods. All personnel involved in a response will receive a full operational/safety briefing prior to commencing operations.	Additional specialist personnel would cost A$2000 per person per day.	Larger numbers of additional personnel may also be detrimental to sensitive shoreline areas. Safety factors have also been considered, including the potential for personnel to be exposed to volatile hydrocarbons in the early stage of the response. Given the rapid natural weathering rate of Pluto Condensate, mobilising additional capability is not expected to provide a material net environmental benefit, therefore the current capability is considered to reduce the risk to ALARP.	**No**
Additional trained personnel deployed	Maintaining a span of control of 200 competent personnel is deemed manageable and appropriate for this activity. Additional personnel conducting clean-up activities may be able to complete the clean-up in a shorter timeframe, but modelling predicts ongoing stranding of hydrocarbons over a period of weeks. Managing a smaller, targeted response is expected to achieve an environmental benefit through ensuring the shoreline clean-up response is suitable and scalable for the shoreline substrate and sensitivity type. This will reduce the risk of increased impact from the shoreline clean-up through the presence of unnecessary personnel and equipment.	The figure of 200 personnel is broken down to include on 1-2 trained supervisors managing 8-10 personnel/labour hire responders. This allows for multiple operational teams to operate along the extended shoreline at different locations. Typically, an additional 30-50% of the tactical workforce is required to support ongoing operations including on-scene control, logistics, safety/medical/welfare and transport. Personnel on site will include members with the appropriate specialties to efficiently clean-up the shoreline. Additional personnel are available through existing contracts with oil spill response organisations, labour hire organisations and environmental panel contractors.	Additional specialist personnel would cost A$2000 per person per day.	Larger numbers of additional personnel may also be detrimental to sensitive shoreline areas. Safety factors have also been considered, including the potential for personnel to be exposed to volatile hydrocarbons in the early stage of the response. Given the rapid natural weathering rate of Pluto Condensate, mobilising additional capability is not expected to provide a material net environmental benefit, therefore the current capability is considered to reduce the risk to ALARP.	**No**

6.5.3.3 Improved Control Measures

Improved Control Measures considered *Improved control measures are evaluated for improvements they could bring to the effectiveness of adopted control measures in terms of functionality, availability, reliability, survivability, independence and compatibility*					
Option considered	**Environmental consideration**	**Feasibility**	**Approximate Cost**	**Assessment conclusions**	**Implemented**
Faster response/ mobilisation time	Modelling predicts floating or shoreline accumulation at threshold within 24 hours at Dampier Archipelago and Legendre Island (MEE-02b), thus faster response times are not practicable.	Response teams, trained personnel, contracted oil spill response service providers, government agencies and the associated mitigation equipment required to enact an initial protection and deflection	The cost of establishing a local stockpile of new shoreline clean-up equipment closer to the expected hydrocarbon stranding areas is not commensurate with the need.	This option is not adopted as additional shoreline clean-up capability is not considered practicable in the time frames prior to contact. Safety factors have also been considered, including the potential for personnel to be exposed to hydrocarbon gas vapours in the early stage of the response. Given the rapid natural weathering rate of Pluto Condensate, faster mobilisation is not expected to	**No**

		response will be available for mobilisation within 24-48 hrs of activation. Additional equipment from existing stockpiles and oil spill response service providers can be on scene within days.		provide a material net environmental benefit, therefore the current capability is considered to reduce the risk to ALARP.	

6.5.4 Selected Control Measures

Following review of alternative, additional and improved control measures as outlined above, the following controls were selected for implementation for the PAP.

- alternative
  - none selected
- additional
  - none selected
- improved
  - none selected.

6.6 Oiled Wildlife Response – ALARP Assessment

Alternative, additional and improved control measure options have been identified and assessed against the base capability described in Section 5. Those that have been selected for implementation are highlighted in green. Items highlighted in red have been considered and rejected on the basis that they are not feasible, the costs are disproportionate to the environmental benefit, and/or the option is not reasonably practical. Control measures where there is not a clear justification for their inclusion or exclusion may be subject to a detailed ALARP assessment.

6.6.1 Existing Capability – Oiled Wildlife Response

Woodside's existing level of capability is based on internal and third-party resources that are available 24 hours, 7 days per week. The capability presented below is displayed as ranges to incorporate operational factors such as weather, crew/vessel/aircraft/vehicle location and duties, survey or classification society inspection requirements, overflight/port/quarantine permits and inspections, crew/pilot duty and fatigue hours, refuelling/re-stocking provisions, and other similar logistic and operational limitation that are beyond Woodside's direct control.

6.6.2 Oiled Wildlife Response – Control Measure Options Analysis

6.6.2.1 Alternative Control Measures

Alternative Control Measures considered
Alternative control measures, including potentially more effective and/or novel control measures are evaluated as replacements for an adopted control

Option considered	Environmental consideration	Feasibility	Approximate Cost	Assessment conclusions	Implemented
Direct contracts with service providers	This option duplicates the capability accessed through AMOSC and OSRL and would compete for the same resources. Does not provide a significant increase in environmental benefit.	These delivery options provide increased effectiveness through more direct communication and control of specialists. However, no significant net benefit is anticipated.	Duplication of capability – already subscribed to through contracts with AMOSC and OSRL	This option is not adopted as the existing capability meets the need.	**No**

6.6.2.2 Additional Control Measures

Additional Control Measures considered
Additional control measures are evaluated in terms of them reducing an environmental impact or an environmental risk when added to the existing suite of control measures

Option considered	Environmental consideration	Feasibility	Approximate Cost	Assessment conclusions	Implemented
Additional wildlife treatment systems	The selected delivery options provide access to call-off contracts with selected specialist providers. The agreements allow these resources to be mobilised to meet the required response objectives, commensurate with the progressive nature of environmental impact and the time available to monitor hydrocarbon plume trajectories. Provides response equipment and personnel within 48 hours. The additional cost in having a dedicated oiled wildlife response (equipment and personnel) in place is disproportionate to environmental benefit. These selected delivery options provide capacity to carry out an oiled wildlife response if contact is predicted; and to scale up the response if required to treat widespread contamination. Current capability meets the needs required within 48 hours of the spill and there is no additional environmental benefit in adopting the improvements.	Although hydrocarbon contact above wildlife response threshold concentrations with offshore waters and shorelines is expected from day one(CS-01MEE-02b and CS-05), given the low likelihood of such an event occurring and that the current capability meets the need within 48 hours, thus the cost of implementing measures to reduce the mobilisation time is considered disproportionate to the benefit. Oiled wildlife response capacity would be addressed for open Commonwealth waters through the AMOSC arrangements, as informed by operational monitoring, and under the direction of DBCA in nearshore areas. The cost and organisational complexity of this approach is moderate, and the overall delivery effectiveness is high.	Additional wildlife response resources could total A$1700 per operational site per day.	This option is not adopted as the existing capability meets the need within 48 hours.	**No**
Additional trained wildlife responders	Numbers of oiled wildlife are expected to be low in the remote offshore setting of the oiled wildlife response, given the distance from known aggregation areas. The potential environmental benefit of training additional personnel is expected to be low.	Current numbers meet the needs required (from day 2) and additional personnel are available through existing contracts with oil spill response organisations and environmental panel contractors. Additional equipment and facilities would be required to support ongoing response, depending on the scale of the event and the impact to wildlife and may be sourced via existing contracts with OSROs. Materials for holding facilities, portable	Additional wildlife response personnel cost A$2000 per person per day	This option is not adopted as the existing capability meets the need from day 2.	**No**

		pools, enclosures and rehabilitation areas would be sourced as required.			

6.6.2.3 Improved Control Measures

Improved Control Measures considered *Improved control measures are evaluated for improvements they could bring to the effectiveness of adopted control measures in terms of functionality, availability, reliability, survivability, independence and compatibility*					
Option considered	**Environmental consideration**	**Feasibility**	**Approximate Cost**	**Assessment conclusions**	**Implemented**
Faster mobilisation time for wildlife response	This control measure provides increased effectiveness through faster mobilisation of specialists. Some net environmental benefit is expected if teams could be mobilised by day 1, however, the volatile nature of a spill of condensate or MGO may preclude access on day 1 for response personnel.	Pre-positioning vessels or equipment would reduce mobilisation time for oiled wildlife response activities. However, RPAs predicted to be contacted are based on modelling outputs and thus may differ under the prevailing conditions of a real event.	Wildlife response packages to preposition at vulnerable sites identified through the deterministic modelling cost A$700 per package per day. The cost of having dedicated equipment and personnel available to respond faster is considered disproportionate to the environmental benefit.	This option is not adopted as the existing capability meets the need from day 2.	**No**

6.6.3 Selected control measures

Following review of alternative, additional and improved control measures, the following controls were selected for implementation for the PAP.

- alternative
  - none selected
- additional
  - none selected
- improved
  - none selected.

6.7 Waste Management – ALARP Assessment

Alternative, additional and improved control measure options have been identified and assessed against the base capability described in Section 5. Those that have been selected for implementation are highlighted in green. Items highlighted in red have been considered and rejected on the basis that they are not feasible, the costs are disproportionate to the environmental benefit, and/or the option is not reasonably practical. Control measures where there is not a clear justification for their inclusion or exclusion may be subject to a detailed ALARP assessment.

6.7.1 Existing Capability – Waste Management

Woodside's existing level of capability is based on internal and third-party resources that are available 24 hours, 7 days per week. The capability presented below is displayed as ranges to incorporate operational factors such as weather, crew/vessel/aircraft/vehicle location and duties, survey or classification society inspection requirements, overflight/port/quarantine permits and inspections, crew/pilot duty and fatigue hours, refuelling/re-stocking provisions, and other similar logistic and operational limitation that are beyond Woodside's direct control.

6.7.2 Waste Management – Control Measure Options Analysis

6.7.2.1 Alternative Control Measures

Alternative Control Measures considered
Alternative control measures, including potentially more effective and/or novel control measures are evaluated as replacements for an adopted control

Option considered	Environmental consideration	Feasibility	Approximate Cost	Assessment conclusions	Implemented
No reasonably practical alternative control measures identified					

6.7.2.2 Additional Control Measures

Additional Control Measures considered
Additional control measures are evaluated in terms of them reducing an environmental impact or an environmental risk when added to the existing suite of control measures

Option considered	Environmental consideration	Feasibility	Approximate Cost	Assessment conclusions	Implemented
Increased waste storage capability	The procurement of waste storage equipment options on the day of the event will allow immediate response and storage of collected waste. The environmental benefit of immediate waste storage is to reduce ecological consequence by safely securing waste, allowing continuous response operations to occur.	Access to Woodside's waste service provider's storage options provides the resources required to store and transport sufficient waste to meet the need. Access to waste contractors existing facilities enables waste to be stockpiled and gradually processed within the regional waste handling facilities. Additional temporary storage equipment is available through existing contract and arrangements with AMOSC/ OSRL. Existing arrangements meet identified need for the PAP from day 4 onwards.	Cost for increased waste disposal capability would be approximately A$1300 per m^3. Cost for increased onshore temporary waste storage capability would be approximately A$40 per unit per day.	This option is not adopted as the existing capability meets the need.	**No**

6.7.2.3 Improved Control Measures

Improved Control Measures considered
Improved control measures are evaluated for improvements they could bring to the effectiveness of adopted control measures in terms of functionality, availability, reliability, survivability, independence and compatibility

Option considered	Environmental consideration	Feasibility	Approximate Cost	Assessment conclusions	Implemented
Faster response time	The access to Veolia waste storage options provides the resources to store and transport waste, permitting the wastes to be stockpiled and gradually processed within the regional waste handling facilities. Bulk transport to Veolia's licensed waste management facilities would be undertaken via controlled-waste-licensed vehicles and in accordance with Environmental Protection (Controlled Waste) Regulations 2004. The environmental benefit from successful waste storage will reduce pressure on the treatment and disposal facilities reducing ecological consequences by safely securing waste. In addition, waste storage	Woodside already maintains an equipment stockpile in Exmouth to enable shorter response times to incidents. This stockpile includes temporary waste storage equipment. Woodside has access to stockpiles of waste storage and equipment in Dampier and Exmouth through existing contracts and arrangements.	The incremental benefit of having a dedicated local Woodside owned stockpile of waste equipment and transport is considered minor and cost is considered disproportionate to the benefit gained given predicted shoreline contact times.	This option is not adopted.	**No**

	and transport will allow continuous response operations to occur. This delivery option would increase known available storage, eliminating the risk of additional resources not being available at the time of the event. However, the environmental benefit of Woodside procuring additional waste storage is considered minor as the risk of additional storage not being available at the time of the event is considered low and existing arrangements provide adequate storage to support the response.				

6.7.3 Selected control measures

Following review of alternative, additional and improved control measures as outlined above, the following controls were selected for implementation for the PAP.

- alternative
  - none selected
- additional
  - none selected
- improved
  - none selected.

6.8 Scientific Monitoring – ALARP Assessment

Alternative, additional and improved control measure options have been identified and assessed against the base capability described in Section 5. Those that have been selected for implementation are highlighted in green. Items highlighted in red have been considered and rejected on the basis that they are not feasible, the costs are disproportionate to the environmental benefit, and/or the option is not reasonably practical. Control measures where there is not a clear justification for their inclusion or exclusion may be subject to a detailed ALARP assessment.

6.8.1 Existing Capability – Scientific Monitoring

Woodside's existing level of capability is based on internal and third-party resources that are available 24 hours, 7 days per week. The capability presented below is displayed as ranges to incorporate operational factors such as weather, crew/ vessel/ aircraft/ vehicle location and duties, survey or classification society inspection requirements, overflight/ port/ quarantine permits and inspections, crew/ pilot duty and fatigue hours, refuelling/ re-stocking provisions, and other similar logistic and operational limitation that are beyond Woodside's direct control.

6.8.2 Scientific Monitoring – Control Measure Options Analysis

6.8.2.1 Alternative Control Measures

Alternative Control Measures considered
Alternative control measures, including potentially more effective and/or novel control measures are evaluated as replacements for an adopted control

Option considered	Environmental consideration	Feasibility	Approximate Cost	Assessment conclusions	Implemented
Analytical laboratory facilities closer to the likely spill affected area	The environmental consideration of having access to suitable laboratory facilities in Karratha to carry out the hydrocarbon analysis would provide faster turnaround in reporting of results only by a matter of days (as per the time to transport samples to laboratories).	SM01 water quality monitoring requires water samples to be transported to NATA-rated laboratories in Perth or over to the East coast. Consider the benefit of laboratory access and transportation times to deliver water samples and complete lab analysis. There is a time lag from collection of water samples to being in receipt of results and confirming hydrocarbon contact to sensitive receptors.	Laboratory facilities and staff available at locations closer to the spill affected area can reduce reporting times only to a moderate degree (days) with associated high costs of maintaining capability do not improve the environmental benefit.	This control measure is not adopted as the costs and complexity are considered disproportionate to any environmental benefit that might be realised.	**No**
Dedicated contracted SMP vessel (exclusive to Woodside)	Would provide faster mobilisation time of scientific monitoring resources, however, the environmental benefit associated with faster mobilisation time would be minor compared to selected options.	Chartering and equipping additional vessels on standby for scientific monitoring has been considered. The option is reasonably practicable, but the sacrifice (charter costs and organisational complexity) is significant, particularly when compared with the anticipated availability of vessels and resources within in the required timeframes. The selected delivery provides capability to meet the scientific monitoring objectives, including collection of pre-emptive data where baseline knowledge gaps are identified for receptor locations where spill predictions of time to contact are >10 days.	The cost and organisational complexity of employing a dedicated response vessel is considered disproportionate to the potential environmental benefit by adopting these delivery options.	This control measure is not adopted as the costs and complexity are considered disproportionate to any environmental benefit that might be realised.	**No**

6.8.2.2 Additional control measures

Additional Control Measures considered
Additional control measures are evaluated in terms of them reducing an environmental impact or an environmental risk when added to the existing suite of control measures

Option considered	Environmental consideration	Feasibility	Approximate Cost	Assessment conclusions	Implemented
Determine baseline data needs and provide implementation plan in the event of an unplanned hydrocarbon release	Address resourcing needs to collect post spill (pre-contact) baseline data as spill expands in the event of a loss of containment from a vessel collision from the PAP activities.	As part of Woodside's Scientific Monitoring Program, the following are considered and incorporated into the spill response approach and the SMP Standby Service contract: • Woodside relies on existing environmental baseline for receptors which have predicted hydrocarbon contact (above environment threshold) <10 days and acquiring pre-emptive data in the event of a loss of well control from the PAP activities based on receptors predicted to have hydrocarbon contact >10 days. • It provide appropriate baseline for key receptors for all geographic locations that are potentially impacted <10 days of spill event. • It addresses resourcing needs to collect pre-emptive baseline as spill expands in the event	No cost associated with baseline for SM01.	This control measure is adopted as the costs and complexity are not disproportionate to any environmental benefit that might be realised.	**Yes**

		of a condensate or MGO from the PAP activities. • For SM01 pre-emptive baseline is not required as marine water quality is assumed to be pristine.			

6.8.2.3 Improved Control Measures considered

Improved Control Measures considered *Improved control measures, including potentially more effective and/or novel control measures are evaluated as replacements for an adopted control*					
Option considered	**Environmental consideration**	**Feasibility**	**Approximate Cost**	**Assessment conclusions**	**Implemented**
No reasonably practical improved control measures identified					

6.8.3 Selected Control Measures

Following review of alternative, additional and improved control measures as outlined above, the following controls were selected for implementation for the PAP.

- alternative
  - none selected
- additional
  - determine baseline data needs and provide implementation plan in the event of an unplanned hydrocarbon release
- improved
  - none selected.

6.8.4 Operational Plan

Key actions from the Scientific Monitoring Program Operational Plan for implementing the response are outlined in **Table 6-7**.

Table 6-7: Scientific monitoring program operational plan actions

Responsibility	Action
Activation	
CIMT Planning (CIMT Planning – Environment Unit)	Mobilises SMP Lead/Manager and SMP Coordinator to the CIMT Planning Section.
CIMT Planning (CIMT Planning – Environment Unit) (SMP Lead/Manager and SMP Coordinator)	Constantly assesses all outputs from OM01, OM02 and OM03 (**Annex B**) to determine receptor locations and receptors at risk. Confirm sensitive receptors likely to be exposed to hydrocarbons, timeframes to specific receptor locations and which SMPs are triggered. Review baseline data for receptors at risk.
CIMT Planning (CIMT Planning – Environment Unit) (SMP Lead/Manager and SMP Coordinator)	SMP co-ordinator stands up SMP Standby contractor. Stands up subject matter experts, if required.
CIMT Planning (CIMT Planning – Environment Unit) (SMP Lead/Manager, SMP Coordinator, SMP Standby contractor)	Establish if, and where, pre-contact baseline data acquisition is required. Determines practicable baseline acquisition program based on predicted timescales to contact and anticipated SMP mobilisation times. Determines scope for preliminary post-contact surveys during the Response Phase. Determines which SMP activities are required at each location based on the identified receptor sensitivities.
CIMT Planning (CIMT Planning – Environment Unit) (SMP Lead/Manager, SMP Coordinator, SMP Standby contractor)	If response phase data acquisition is required, stand up the contractor SMP teams for data acquisition and instruct them to standby awaiting further details for mobilisation from the CIMT.
CIMT Planning (CIMT Planning – Environment Unit) (SMP Lead/Manager, SMP Coordinator, SMP Standby contractor)	SMP standby contractor, to prepare the Field Implementation Plan. Prepare and obtain sign-off of the Response Phase SMP work plan and Field Implementation Plan. Update the IAP.
CIMT Planning (CIMT Planning – Environment Unit) (SMP Lead/Manager, SMP Coordinator, SMP Standby contractor)	Liaise with CIMT Logistics, and determine the status and availability of aircraft, vessels and road transportation available to transport survey personnel and equipment to point of departure. Engage with SMP standby contractor, SMP Manager and CIMT Logistics Section to establish mobilisation plan, secure logistics resources and establish ongoing logistical support operations, including: • vessels, vehicles and other logistics resources • vessel fit-out specifications (as detailed in the Scientific Monitoring Program Operational Plan) • equipment storage and pick-up locations • personnel pick-up/airport departure locations • ports of departure

Responsibility	Action
	• land based operational centres and forward operations bases, accommodation and food requirements.
CIMT Planning (CIMT Planning – Environment Unit) (SMP Lead/Manager, SMP Coordinator, SMP Standby contractor)	Confirm communications procedures between Woodside SMP team, SMP standby contractor, SMP Team Leads and Operations Point Coordinator.
Mobilisation	
CIMT Logistics	Engage vessels and vehicles and arrange fitting out as specified by the mobilisation plan. Confirm vessel departure windows and communicate with the Service Provider's SMP Manager. Agree SMP mobilisation timeline and induction procedures with the Division and Sector Command Point(s).
CIMT Logistics	Coordinate with SMP standby contractor to mobilise teams and equipment according to the logistics plan and Sector Induction procedures.
SMP Survey Team Leads	SMP Survey Team Leader(s) coordinate on-ground/on-vessel mobilisations and support services with the Sector Command point(s).

6.8.5 ALARP and Acceptability Summary

ALARP and Acceptability Summary		
Scientific Monitoring		
ALARP Summary	X	All known reasonably practicable control measures have been adopted.
	X	No additional, alternative and improved control measures would provide further benefit.
		No reasonably practical additional, alternative, and/or improved control measure exists.
	The resulting scientific monitoring capability has been assessed against the credible spill scenarios. The range of techniques provide an ongoing approach to monitoring operations to assess and evaluate the scale and extent of impacts. All known reasonably practicable control measures have been adopted with the cost and organisational complexity of these options determined to be moderate and the overall delivery effectiveness considered medium. The SMP's main objectives can be met, with the addition of one alternative control measures to provide further benefit.	
Acceptability Summary	• The control measures selected for implementation manage the potential impacts and risks to ALARP. • In the event of a hydrocarbon spill for the PAP, the control measures selected, meet or exceed the requirements of Woodside Management System and industry best-practice. • Scientific Monitoring control and activities are compliant with relevant environmental legislation and regulations, including the EPBC Act. • Throughout the PAP, relevant Australian standards and codes of practice will be followed to evaluate the impacts from a loss of well control. • Consultation undertaken for the PAP did not receive feedback regarding concerns for Scientific Monitoring activities in response to a hydrocarbon spill. • The level of impact and risk to the environment has been considered with regards to the principles of ESD and risks and impacts from a range of identified scenarios were assessed in detail. The control measures described consider the conservation of biological and ecological diversity, through both the selection of control measures and the management of their performance. The control measures have been developed to account for credible case scenarios, and uncertainty has not been used as a reason for postponing control measures.	
On the basis from the impact assessment above and in Section 6.8 of the EP, Woodside considers the adopted controls discussed manage the impacts and risks associated with implementing scientific monitoring activities to a level that is ALARP and acceptable.		

7 ENVIRONMENTAL RISK ASSESSMENT OF SELECTED RESPONSE TECHNIQUES

The implementation of response techniques may modify the impacts and risks identified in the EP and response activities can introduce additional impacts and risks from response operations themselves. Therefore, it is necessary to complete an assessment so these impacts and risks have been considered and specific measures are put in place to continually review and manage further impacts and risks to ALARP and an acceptable level. A simplified assessment process has been used to complete this task which covers the identification, analysis, evaluation and treatment of impacts and risks introduced by responding to the event.

7.1 Identification of impacts and risks from implementing response techniques

Each of the control measures can modify the impacts and risks identified in the EP. These impacts and risks have been previously assessed within the scope of the EP. Please refer to the EP for details regarding how these risks are being managed as they are not discussed further in this document. These risks include:

- atmospheric emissions
- routine and non-routine discharges
- physical presence, proximity to other vessels (shipping and fisheries)
- routine acoustic emissions vessels
- lighting for night work/navigational safety
- invasive marine species
- collision with marine fauna
- disturbance to seabed.

Additional impacts and risks associated with the control measures not included within the scope of the EP include:

- drill cuttings and drilling fluids environmental impact assessment for relief well drilling
- vessel operations and anchoring
- presence of personnel on the shoreline
- Human presence (manual cleaning)
- vegetation cutting
- additional stress or injury caused to wildlife
- secondary contamination from the management of waste.

7.2 Analysis of impacts and risks from implementing response techniques

The table below compares the adopted control measures for this activity against the environmental values that can be affected when they are implemented.

Table 7-1: Analysis of risks and impacts

	Environmental Value						
	Soil and Groundwater	Marine Sediment Quality	Water Quality	Air Quality	Ecosystems/ Habitat	Species	Socio-Economic
Operational monitoring	✓		✓	✓		✓	
Source control		✓	✓	✓	✓		
Shoreline protection and deflection	✓	✓			✓	✓	✓
Shoreline clean-up	✓	✓			✓	✓	✓
Oiled wildlife				✓	✓	✓	
Scientific monitoring	✓	✓	✓	✓			
Waste management	✓	✓	✓				✓

7.3 Evaluation of impacts and risks from implementing response techniques

Drill cuttings and drilling fluids environmental impact assessment for relief well drilling

The identified potential impacts associated with the discharge of drill cuttings and fluids during a relief well drilling activity include a localised reduction in water and seabed sediment quality, and potential localised changes to benthic biota (habitats and communities).

Direct and indirect ecological impact pathways are identified for drill cuttings and drilling fluids as follows:

- temporary increase in total suspended solids (TSS) in the water column;
- attenuation of light penetration as an indirect consequence of the elevation of TSS and the rate of sedimentation;
- sediment deposition to the seabed leading to the alteration of the physio-chemical composition of sediments, and burial and potential smothering effects to sessile benthic biota; and
- potential contamination and toxicity effects to benthic and in-water biota from drilling fluids.

Potential impacts from the discharge of cuttings range from the complete burial of benthic biota in the immediate vicinity of the well site due to sediment deposition, smothering effects from raised sedimentation concentrations as a result of elevated TSS, changes to the physico-chemical properties of the seabed sediments (particle size distribution and potential for reduction in oxygen levels within the surface sediments due to organic matter degradation by aerobic bacteria) and subsequent changes to the composition of infauna communities to minor sediment loading above background and no associated ecological effects. Predicted impacts are generally confined to within a few hundred metres of the discharge point (International Association of Oil and Gas Producers 2016) (i.e. within the EMBA for a hydrocarbon spill event).

The discharge of drill cuttings and unrecoverable fluids from relief well drilling is expected to increase turbidity and TSS levels in the water column, leading to an increased sedimentation rate above ambient levels associated with the settlement of suspended sediment particles near to the seabed or below sea surface, depending on location of discharge. Cuttings with retained (unrecoverable) drilling fluids are discharged below the water line at the MODU location, resulting in drill cuttings and drilling fluids rapidly diluting, as they disperse and settle through the water column. The dispersion and fate of the cuttings is determined by particle size and density of the retained (unrecoverable) drilling fluids, therefore, the sediment particles will primarily settle in proximity to the well locations with potential for localised spread downstream (depending on the speed of currents throughout the water column and seabed) (IOGP

2016). The finer particles will remain in suspension and will be transported further before settling on the seabed.

These conclusions were supported by discharge modelling which was undertaken by Woodside in support of the Greater Enfield Development EP. Modelling results indicating that the TSS plume of suspended cuttings will typically disperse to the south-west while oscillating with the tide and diminish rapidly with increasing distance from the well locations. Maximum TSS concentrations predicted for 100 m; 250 m and 1 km distances from the wellsite were 7, 5 and 1 mg/L, respectively. Furthermore, water column concentrations below 10 mg/L remain within 235 m of the discharge location for each modelled well. For all well discharge locations (outside of direct discharge sites), TSS concentration did not exceed 10 mg/l. Nelson et al. (2016) identified <10 mg/L as a no effect or sub-lethal minimal effect concentration.

The low sensitivity of the deep-water benthic communities/habitats within and in the vicinity of relief well locations, combined with the relatively low toxicity of water based muds (WBM) and non-water based muds (NWBMs), there being no bulk discharges of NWBM and the highly localised nature and scale of predicted physical impacts to seabed biota indicate that any localised impact would likely be of a slight magnitude (especially when considering the broader consequence of the LOWC event that a relief well drilling activity would be responding too).

Vessel operations and anchoring

Typical booms used in shoreline protection and deflection operations are designed to float, meaning that fauna capable of diving, such as cetaceans, marine turtles and sea snakes can readily avoid contact with the boom. Impacts to species that inhabit the water column such as sharks, rays and fish are not expected. Additionally, some fauna, such as cetaceans, are likely to detect and avoid the spill area, and are not expected to be present in the proximity of containment and recovery operations.

During the implementation of response techniques, where water depths allow, it is possible that response vessels will be required to anchor (e.g. during shoreline protection and deflection, and shoreline surveys). The use of vessel anchoring will be minimal and likely to occur when the impacted shoreline is inaccessible via road. Anchoring in the nearshore environment of sensitive receptor locations will have the potential to impact coral reef, seagrass beds and other benthic communities in these areas. Recovery of benthic communities from anchor damage depends on the size of anchor and frequency of anchoring. Impacts would be highly localised (restricted to the footprint of the vessel anchor and chain) and temporary, with full recovery expected.

Presence of personnel on the shoreline

Presence of personnel on the shoreline during shoreline operations could potentially result in disturbance to wildlife and habitats. During the implementation of response techniques, it is possible that personnel may have minimal, localised impacts on habitats, wildlife and coastlines. The impacts associated with human presence on shorelines during shoreline surveys may include:

- damage to vegetation/habitat to gain access to areas of shoreline oiling;
- damage or disturbance to wildlife during shoreline surveys;
- removal of surface layers of intertidal sediments (potential habitat depletion)
- excessive removal of substrate causing erosion and instability of localised areas of the shoreline.

Human presence

Human presence for manual clean-up operations may lead to the compaction of sediments and damage to the existing environment especially in sensitive locations such as mangroves and turtle nesting beaches. However, any impacts are expected to be localised with full recovery expected.

Waste generation

Implementing the selected response techniques will result in the generation of the following waste streams that will require management and disposal:

- liquids (recovered oil/water mixture), collected during shoreline clean-up and oiled wildlife response operations
- semi-solids/solids (oily solids), collected during shoreline clean-up and oiled wildlife response operations
- debris (e.g. seaweed, sand, woods, plastics), collected during shoreline clean-up and oiled wildlife response operations.

If not managed and disposed of correctly, wastes generated during the response have the potential for secondary contamination of previously uncontaminated areas and/ or impacts to wildlife through contact with or ingestion of waste materials and contamination risks if not disposed of correctly onshore.

Cutting back vegetation could allow additional oil to penetrate the substrate and may also lead to localised habitat loss. However, any loss is expected to be localised in nature and lead to an overall net environmental benefit associated with the response by reducing exposure of wildlife to oiling.

Additional stress or injury caused to wildlife

Additional stress or injury to wildlife could be caused through the following phases of a response:

- capturing wildlife
- transporting wildlife
- stabilisation of wildlife
- cleaning and rinsing of oiled wildlife
- rehabilitation (e.g. diet, cage size, housing density)
- release of treated wildlife.

Inefficient capture techniques have the potential to cause undue stress, exhaustion or injury to wildlife, additionally pre-emptive capture could cause undue stress and impacts to wildlife when there are uncertainties in the forecast trajectory of the spill. During the transportation and stabilisation phases there is the potential for additional thermoregulation stress on captured wildlife. Additionally, during the cleaning process, it is important personnel undertaking the tasks are familiar with the relevant techniques to manage and mitigate further injury and the removal of water proofing feathers. Finally, during the release phase it is important that wildlife is not released back into a contaminated environment.

7.4 Treatment of impacts and risks from implementing response techniques

In respect of the impacts and risks assessed the following treatment measures have been adopted. It must be recognised that this environmental assessment is seeking to identify how to maintain the level of impact and risks at levels that are ALARP and of an acceptable level rather than exploring further impact and risk reduction. It is for this reason that the treatment measures identified in this assessment will be captured in Operational Plans, Tactical Response Plans, and/or First Strike Plans.

Vessel operations and access in the nearshore environment

- If vessels are required for access, anchoring locations will be selected to minimise disturbance to benthic primary producer habitats. Where existing fixed anchoring points are not available, locations will be selected to minimise impact to nearshore benthic environments with a preference for areas of sandy seabed where they can be identified (Performance Standard (PS) 14.1, PS 17.1).
- Shallow draft vessels will be used to access remote shorelines to minimise the impacts associated with seabed disturbance on approach to the shorelines (PS 14.2, PS 17.2).

Presence of personnel on the shoreline

- Oversight by trained personnel who are aware of the risks (PS 17.6).
- Trained unit leader’s brief personnel of the risks prior to operations (PS 17.7).

Human Presence

- Shoreline access route (foot, car, vessel and helicopter) with the least environmental impact identified will be selected by a specialist in SCAT operations (PS 7.3, PS 17.5).
- Vehicular access will be restricted on dunes, turtle nesting beaches and in mangroves (PS 17.3).

Waste generation

- All shoreline clean-up sites will be zoned and marked before clean-up operations commence to prevent secondary contamination and minimise the mixing of clean and oiled sediment and shoreline substrates (PS 15.4).
- Removal of vegetation will be limited to moderately or heavily oiled vegetation (PS 17.4).
- Teams will segregate liquid and solid wastes at the earliest opportunity (PS 23.1).

Additional stress or injury caused to wildlife

- Oiled wildlife operations (including hazing) would be implemented with advice and assistance from the Oiled Wildlife Advisor from the DBCA, and in accordance with the processes and methodologies described in the WA OWRP and the relevant regional plan (PS 21.1).

8 ALARP CONCLUSION

An analysis of alternative, additional and improved control measures has been undertaken to determine their reasonableness and practicability. The tables in Section 6 document the considerations made in this evaluation. Where the costs of an alternative, additional, or improved control measure have been determined to be disproportionate to the environmental benefit gained from its adoption, it has been rejected. Where this is not considered to be the case, the control measure has been adopted.

The risks from a hydrocarbon spill have been reduced to ALARP because:

- Woodside has a significant hydrocarbon spill response capability to respond to the WCCS through the control measures identified.
- New and modified impacts and risks associated with implementing response techniques have been considered and will not increase the risks associated with the activity.
- A consideration of alternative, additional, and improved control measures identified any other control measures that delivered proportionate environmental benefit compared to the cost of adoption for this activity ensuring that:
    - All known, reasonably practicable control measures have been adopted.
    - No additional, reasonably practicable alternative and/or improved control measures would provide further environmental benefit.
    - No reasonably practical additional, alternative, and/or improved control measure exists.
- A structured process for considering alternative, additional, and improved control measures was completed for each control measure.
- The evaluation was undertaken based on the outputs of the WCCS so that the capability in place is sufficient for all other scenario from this activity.
- The likelihood of the WCCS spill has been ignored in evaluating what was reasonably practicable.

9 ACCEPTABILITY CONCLUSION

Following the ALARP evaluation process, Woodside deems the hydrocarbon spill risks and impacts have been reduced to an acceptable level by meeting the following criteria:

- Techniques are consistent with Woodside's processes and relevant internal requirements including policies, culture, processes, standards, structures and systems.
- Levels of risk/impact are deemed acceptable by relevant persons/organisations and are aligned with the uniqueness of, and/or the level of protection assigned to the environment, its sensitivity to pressures introduced by the activity, and the proximity of activities to sensitive receptors, and have been aligned with Part 3 of the EPBC Act.
- Selected control measures meet requirements of legislation and conventions to which Australia is a signatory (e.g. MARPOL, the World Heritage Convention, the Ramsar Convention, and the Biodiversity Convention etc.). In addition to these, other non-legislative requirements met include:
    - Australian IUCN reserve management principles for Commonwealth marine protected areas and bioregional marine plans
    - National Water Quality Management Strategy and supporting guidelines for marine water quality)
    - conditions of approval set under other legislation
    - national and international requirements for managing pollution from ships
    - national biosecurity requirements.
- Industry standards, best practices and widely adopted standards and other published materials have been used and referenced when defining an acceptable level. Where these are inconsistent with mandatory/legislative regulations, explanation has been provided for the proposed deviation. Any deviation produces the same or a better level of environmental performance (or outcome).

10 GLOSSARY AND ABBREVIATIONS

10.1 Glossary

Term	Description / Definition
ALARP	Demonstration through reasoned and supported arguments that there are no other practicable options that could reasonably be adopted to reduce risks further.
Availability	The availability of a control measure is the percentage of time that it can perform its function (operating time plus standby time) divided by the total period (whether in service or not). In other words, it is the probability that the control has not failed or is undergoing a maintenance or repair function when it needs to be used.
Control	The means by which risk from events is eliminated or minimised.
Control effectiveness	A measure of how well the control measures perform its required function.
Control measure (risk control measure)	The features that eliminate, prevent, reduce or mitigate the risk to environment associated with PAP.
Credible spill scenario	A spill considered by Woodside as representative of maximum volume and characteristics of a spill that could occur as part of the PAP.
Dependency	The degree of reliance on other systems for the control measure to be able to perform its intended function.
Environment that may be affected	The summary of quantitative modelling where the marine environment could be exposed to hydrocarbons levels exceeding hydrocarbon threshold concentrations.
Incident	An event where a release of energy resulted in or had (with) the potential to cause injury, ill health, damage to the environment, damage to equipment or assets or company reputation.
Major Environment Event	The events with potential environment, reputation, social or cultural consequences of category C or higher (as per Woodside's operational risk matrix) which are evaluated against credible worst-case scenarios which may occur when all controls are absent or have failed.
Performance outcome	A statement of the overall goal or outcome to be achieved by a control measure
Performance standard	The parameters against which [risk] controls are assessed so they reduce risk to ALARP. A statement of the key requirements (indicators) that the control measure must achieve to perform as intended in relation to its functionality, availability, reliability, survivability and dependencies.
Preparedness	Measures taken before an incident to improve the effectiveness of a response
Reasonably practicable	... a computation ... made by the owner, in which the quantum of risk is placed on one scale and the sacrifice involved in the measures necessary for averting the risk (whether in money, time or trouble) [showing whether or not] that there is a gross disproportion between them ... made by the owner at a point of time anterior to the accident. (Judgement: Edwards v National Coal Board [1949])
Receptors at risk	Physical, biological and social resources identified as at risk from hydrocarbon contact using oil spill modelling predictions.
Receptor areas	Geographically referenced areas such as bays, islands, coastlines and/or protected area (WHA, Commonwealth or State marine reserve or park) containing one or more receptor type

Term	Description / Definition
Receptor Sensitivities	This is a classification scheme to categorise receptor sensitivity to an oil spill. The Environmental Sensitivity Index (ESI) is a numerical classification of the relative sensitivity of a particular environment (particularly different shoreline types) to an oil spill. Refer to the Woodside Oil Pollution Emergency Arrangements (Australia) for more details.
Regulator	NOPSEMA are the Environment Regulator under the Environment Regulations.
Reliability	The probability that at any point in time a control measure will operate correctly for a further specified length of time.
Response technique	The key priorities and objectives to be achieved by the response plan Measures taken in response to an event to reduce or prevent adverse consequences.
Survivability	Whether or not a control measure is able to survive a potentially damaging event is relevant for all control measures that are required to function after an incident has occurred.
Threshold	Hydrocarbon threshold concentrations applied to the risk assessment to evaluate hydrocarbon spills. These are defined as: surface hydrocarbon concentration – ≥10 g/m^2, dissolved – ≥50 ppb and entrained hydrocarbon concentrations – ≥100 ppb.
Zone of Application	The zone in which Woodside may elect to apply dispersant. The zone is determined based on a range of considerations, such as hydrocarbon characteristics, weathering and metocean conditions. The zone is a key consideration in the Net Environmental Benefit Analysis for dispersant use.

10.2 Abbreviations

Abbreviation	Meaning
ADIOS	Automated Data Inquiry for Oil Spills
AEP	Australian Energy Producers (formerly APPEA)
ALARP	As low as reasonably practicable
AMOSC	Australian Marine Oil Spill Centre
AMP	Australian Marine Park
AMSA	Australian Maritime Safety Authority
AUV	Autonomous Underwater Vehicle
BAOAC	Bonn Agreement Oil Appearance Code
BOP	Blowout Preventer
cSt	Centistokes
CIMT	Corporate Incident Management Team
DM	Duty Manager
DoT	Western Australia Department of Transport
DBCA	Western Australia Department of Biodiversity, Conservation and Attractions
DWER	Western Australia Department of Water and Environmental Regulation
EMBA	Environment that May Be Affected
EMSA	European Maritime Safety Agency
EP	Environment Plan
Environment Regulations	Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023
ESI	Environmental Sensitivity Index
ESD	Emergency Shut Down
ESP	Environmental Services Panel
FPSO	Floating Production Storage Offloading
FSP	First Strike Plan
FST	Functional Support Team
GIS	Geographic Information System
GPS	Global Positioning System
HSP	Hydrocarbon Spill Preparedness
IAP	Incident Action Plan
IC	Incident Commander
ICS	Incident Command System
IMS	Incident Management System
IMT	Incident Management Team
IPIECA	International Petroleum Industry Environment Conservation Association
ITOPF	International Tanker Owners Pollution Federation
IUCN	International Union for Conservation of Nature
KBSF	King Bay Supply Facility
KSAT	Kongsberg Satellite

Abbreviation	Meaning
LOWC	Loss of Well Containment
MODU	Mobile Offshore Drilling Unit
MoU	Memorandum of Understanding
NEBA	Net Environmental Benefit Analysis
NOAA	National Oceanic and Atmospheric Administration
NRT	National Response Team
OILMAP	Oil Spill Model and Response System
OMP	Operational Monitoring Program
OPEA	Oil Pollution Emergency Arrangements
OPEP	Oil Pollution Emergency Plan
OPGGSA	Offshore Petroleum and Greenhouse Gas Storage Act
OSRL	Oil Spill Response Limited
OSTM	Oil Spill Trajectory Modelling
OWR	Oiled Wildlife Response
OWRP	Oiled Wildlife Response Plan
PAP	Petroleum Activities Program
PEARL	People, Environment, Asset, Reputation, and Livelihood
PBA	Pre-emptive Baseline Areas
PPB	Parts per billion
PPM	Parts per million
ROV	Remotely Operated Vehicle(s)
RPA	Response Protection Area
SCAT	Shoreline Contamination Assessment Techniques
S&EM	Security and Emergency Management
SIMA	Spill Impact Mitigation Assessment
SIMAP	Integrated Oil Spill Impact Model System
SSDI	Subsea Dispersant Injection
SFRT	Subsea First Response Toolkit
SMP	Scientific monitoring program
SOP	Standard Operating Procedure
TRP	Tactical Response Plan
UAS	Unmanned Aerial Systems
UAV	Unmanned Aerial Vehicles
VOC	Volatile Organic Compound
WHA	World Heritage Area
Woodside	Woodside Energy Limited
WCC	Woodside Communication Centre
WWCI	Wild Well Control Inc
WCCS	Worst Case Credible Scenario
ZoA	Zone of Application

11 REFERENCES

Allen, A. and D. Dale. 1996. Computerized Mission Planners: Useful tools for the planning and implementation of oil spill response operations. Proceedings, “Prevention is the Key: A Symposium on Oil Spill Prevention and Readiness,” Valdez, AK, Oct. 8–11, 1996, 24 pp.

ANZECC / ARMCANZ 2018. Australian & New Zealand Guidelines for Fresh & Marine Water Quality Management Framework. https://www.waterquality.gov.au/anz-guidelines

Australian Maritime Safety Authority. The National Plan Oil Spill Control Agents List. Available from: https://www.amsa.gov.au/marine-environment/pollution-response/register-oil-spill-control-agents [Accessed 24 March 2024]

Australian Maritime Safety Authority (AMSA). 2015a. Automated Identification System Point Density Data. Australian Government, Canberra, Australian Capital Territory. Available at: https://www.operations.amsa.gov.au/Spatial/DataServices/MapProduct [accessed 24 March 2024]

Australasian Fire and Emergency Service Authorities Council, 2011, Fundamentals of Doctrine: A best practice guide, East Melbourne, VIC, AFAC Limited.

Brandvik, PJ, Johansen, Ø, Farooq, O, Angell, G. and Leirvik, F. (2014). Subsurface oil releases – Experimental study of droplet distributions and different dispersant injection techniques. A scaled experimental approach using the SINTEF Tower basin. SINTEF report no. A26122. Norway.

Brown M, 2012, Implementing an Operational Capability System within Fire & Rescue NSW, Australasian Fire and Emergency Service Authorities Council Conference Paper, September 2012.

BSEE, 2016. https://www.bsee.gov/site-page/worst-case-discharge-scenarios-for-oil-and-gas-offshore-facilities-and-oil-spill-response. [Accessed 24 March 2024]

BSEE, 2016. https://www.bsee.gov/what-we-do/oil-spill-preparedness/response-system-planning-calculators. [Accessed 24 March 2024]

Department of Biodiversity, Conservation and Attractions, Department of Transport and Australian Marine Oil Spill Centre, 2022a. Western Australia Oiled Wildlife Response Plan for Maritime Environmental Emergencies. Available at: https://www.dbca.wa.gov.au/media/1887/download. [Accessed 24 March 2024]

Department of Biodiversity, Conservation and Attractions, Department of Transport and Australian Marine Oil Spill Centre, 2022b. Western Australia Oiled Wildlife Response Manual. Available at: https://www.dbca.wa.gov.au/media/1886/download. [Accessed 24 March 2024]

Edwards v National Coal Board, 1949. 1 All ER 743 CA

European Maritime Safety Agency, 2012. Manual on the Applicability of Oil Spill Dispersants, Version 2, p.57.

Fingas, M. 2001. The Basics of Oil Spill Cleanup. Second Edition. Lewis Publishers, CRC Press LLC, Boca Raton, Florida. 233 p.

Fingas, M. 2011a. Physical Spill Countermeasures. *Oil Spill Science and Technology: Prevention, Response, and Cleanup*, edited by M. Fingas. Elsevier, Inc.

Fingas, M. 2011b. Weather Effects on Oil Spill Countermeasures. *Oil Spill Science and Technology: Prevention, Response, and Cleanup*, edited by M. Fingas. Elsevier, Inc.

French-McCay, D.P. 2003. Development and application of damage assessment modeling: Example assessment for the North Cape oil spill. Mar. Pollut. Bull. 47(9-12), 341-359.

French-McCay, D.P. 2004. Oil spill impact modeling: development and validation. Environ. Toxicol. Chem. 23(10), 2441-2456.

French, D., Reed, M., Jayko, K., Feng, S., Rines, H., Pavignano, S.1996. The CERCLA Type A Natural Resource Damage Assessment Model for Coastal and Marine Environments (NRDAM/CME), Technical Documentation, Vol. I – Model Description, Final Report. Office of Environmental Policy and Compliance, U.S. Department of the Interior. Washington, D.C.: Contract No. 14-0001-91-C-11

French, D.P., H. Rines and P. Masciangioli. 1997. Validation of an Orimulsion spill fates model using observations from field test spills. In: Proceedings of the 20th AMOP Technical Seminar, Environment and Climate Change Canada, Ottawa, ON, Canada, 20, 933-961.

French, D.P. and H. Rines. 1997. Validation and use of spill impact modeling for impact assessment. International Oil Spill Conference Proceedings, Vol. 1997, No. 1, pp. 829-834. https://doi.org/10.7901/2169-3358-1997-1-829. [Accessed 24 March 2024]

French-McCay, D.P. and J.J. Rowe. 2004. Evaluation of bird impacts in historical oil spill cases using the SIMAP oil spill model. In Proceedings of the 27th AMOP Technical Seminar, Environment and Climate Change Canada, Ottawa, ON, Canada, 27, 421-452.

French-McCay, D.P, C. Mueller, K. Jayko, B. Longval, M. Schroeder, J.R. Payne, E. Terrill, M. Carter, M. Otero, S. Y. Kim, W. Nordhausen, M. Lampinen, and C. Ohlmann, 2007. Evaluation of Field-Collected Data Measuring Fluorescein Dye Movements and Dispersion for Dispersed Oil Transport Modeling. In: Proceedings of the 30th Arctic and Marine Oil Spill Program (AMOP) Technical Seminar, Emergencies Science Division, Environment Canada, Ottawa, ON, Canada, pp.713-754.

French McCay, D.P, K. Jayko, Z. Li, M. Horn, Y. Kim, T. Isaji, D. Crowley, M. Spaulding, L. Decker, C. Turner, S. Zamorski, J. Fontenault, R. Shmookler, and J.J. Rowe. 2015. Technical Reports for Deepwater Horizon Water Column Injury Assessment – WC_TR14: Modeling Oil Fate and Exposure Concentrations in the Deepwater Plume and Cone of Rising Oil Resulting from the Deepwater Horizon Oil Spill. DWH NRDA Water Column Technical Working Group Report. Prepared for National Oceanic and Atmospheric Administration by RPS ASA, South Kingstown, RI, USA. September 29, 2015. Administrative Record no. DWH-AR0285776

French-McCay, D.P, Z. Li, M. Horn, D. Crowley, M. Spaulding, D. Mendelsohn, and C. Turner. 2016. Modeling oil fate and subsurface exposure concentrations from the Deepwater Horizon oil spill. In: Proceedings of the 39th AMOP Technical Seminar, Environment and Climate Change Canada, Ottawa, ON, Canada, 39, 115-150.

IPIECA, 2015, Dispersants: surface application, IOGP Report 532, p.43.

ITOPF, 2011. Fate of Marine Oil Spills, Technical Information Paper #2.

ITOPF, 2014, Use of Dispersants to Treat Oil Spills, Technical Information Paper #4, p. 7.

ITOPF, 2014, Aerial Observation of marine oil spills, Technical Information Paper #1, p. 5

ITOPF, 2014, Use of skimmers in oil pollution response, Technical Information Paper #5, p. 9

National Oceanic and Atmospheric Administration (NOAA) Characteristics of Response Strategies: A Guide for Spill Response Planning in Marine Environments, 2013, p.19 and p24.

National Offshore Petroleum Safety and Environmental Management Authority. 2012. Environment Plan Assessment Policy, N-04700-PL0930, Perth, WA.

National Offshore Petroleum Safety and Environmental Management Authority. 2012. Environment Plan Preparation Guidance Note, N-04700-GL0931, Perth, WA

National Offshore Petroleum Safety and Environmental Management Authority. 2012. Control Measures and Performance Standards, Guidance Note N04300-N0271, Perth, WA.

National Offshore Petroleum Safety and Environmental Management Authority. 2012. Oil Spill Contingency Planning, Guidance Note N-04700-GN0940, Perth, WA.

National Offshore Petroleum Safety and Environmental Management Authority. 2022. ALARP, Guidance Note N-04300-GN0166, Perth, WA.

National Offshore Petroleum Safety and Environmental Management Authority. 2021. Oil Pollution Risk Management, Guidance Note N-04750-GN1488, Perth, WA.

National Offshore Petroleum Safety and Environmental Management Authority. 2016. Vessels Subject to the Australian Offshore Petroleum Safety Legislation, Guidance Note N-09000-GN1661, Perth WA

Payne, J.R., E. Terrill, M. Carter, M. Otero, W. Middleton, A. Chen, D. French-McCay, C. Mueller, K. Jayko, W. Nordhausen, R. Lewis, M. Lampinen, T. Evans, C. Ohlmann, G.L. Via, H. Ruiz-Santana, M. Maly, B. Willoughby, C. Varela, P. Lynch and P. Sanchez, 2007a. Evaluation of Field-Collected Drifter and Subsurface Fluorescein Dye Concentration Data and Comparisons to High Frequency Radar

Surface Current Mapping Data for Dispersed Oil Transport Modeling. In: Proceedings of the Thirtieth Arctic and Marine Oil Spill Program (AMOP) Technical Seminar, Emergencies Science Division, Environment Canada, Ottawa, ON, pp. 681-711.

Payne, J.R., D. French-McCay, C. Mueller, K. Jayko, B. Longval, M. Schroeder, E. Terrill, M. Carter, M. Otero, S.Y. Kim, W. Middleton, A. Chen, W. Nordhausen, R. Lewis, M. Lampinen, T. Evans, and C. Ohlmann, 2007b. Evaluation of Field-Collected Drifter and In Situ Fluorescence Data Measuring Subsurface Dye Plume Advection/Dispersion and Comparisons to High Frequency Radar-Observation System Data for Dispersed Oil Transport Modeling, Draft Final Report 06-084, Coastal Response Research Center, NOAA/University of New Hampshire, Durham, NH, 98 p. plus 8 appendices https://cordc.ucsd.edu/projects/ospr/20070509/PECI_Rpt_20070509_final.pdf.[Accessed 24 March 2024]

Quigg, A., Farrington, J., Gilbert, S., Murawski, S., and John, V. (2021). A Decade of GoMRI Dispersant Science: Lessons Learned and Recommendations for the Future. *Oceanography*, Vol.34, No.1

Spaulding, M.S., D. Mendelsohn, D. Crowley, Z. Li, and A. Bird, 2015. Draft Technical Reports for Deepwater Horizon Water Column Injury Assessment: WC_TR.13: Application of OILMAP DEEP to the Deepwater Horizon Blowout. DWH NRDA Water Column Technical Working Group Report. Prepared for National Oceanic and Atmospheric Administration by RPS ASA, South Kingstown, RI 02879. Administrative Record no. DWH-AR0285366

Spence, A, McTaggart, A (2018) Defining response capability: effectiveness, limitations and determining ALARP. Interspill Conference, London 2018.

Wadsworth, T, 1995, Containment & Recovery of Oil Spills at Sea. Methods and limitations, ITOPF, London, United Kingdom.

ANNEX A: NET ENVIRONMENTAL BENEFIT ANALYSIS DETAILED OUTCOMES

A NEBA has been conducted to assess the net environmental benefit of different response techniques to selected receptors in the event of an oil spill from the PAP for a loss of containment of Pluto condensate from the export pipeline (MEE-02b). The complete list of potential receptor locations within the EMBA within the PAP is included in Section 6 of the EP.

The locations utilised for the NEBA were limited to the identified RPAs of the PAP identified from modelling (see Section 3 for outline of selection). These include receptors which have potential for the following:

- Surface contact (>50 g/m^2)
- Shoreline accumulation (>100 g/m^2) at any time
- Entrained contact (>100 ppb) within 14 days

The detailed NEBA assessment outcomes are shown below. The Pluto Facility Operations preoperational NEBAs contains the full assessments.

Table A-1: NEBA assessment technique recommendations for loss of containment of Pluto condensate from the export pipeline (MEE-02b)

Receptor	Operational Monitoring	Containment and recovery	Dispersant application: sub-sea	Dispersant application: > 20 m water depth and > 10 km from shore/reefs	Shoreline protection	Shoreline clean-up (manual)	Shoreline clean-up (mechanical)	Shoreline clean-up (chemical)	Oiled wildlife response	In situ burning	Mechanical dispersion	Well control and intervention
Cape Bruguieres	Yes	No	No	No	Yes	Yes	Potentially	Potentially	Yes	No	No	No
Dampier Archipelago	Yes	No	No	No	Yes	Yes	No	Potentially	Yes	No	No	No
Cohen Island	Yes	No	No	No	Yes	Yes	No	Potentially	Yes	No	No	No
Keast Island	Yes	No	No	No	Yes	Yes	No	Potentially	Yes	No	No	No
Legendre Island	Yes	No	No	No	Yes	Yes	No	Potentially	Yes	No	No	No
Rosemary Island	Yes	No	No	No	Yes	Yes	No	Potentially	Yes	No	No	No
Courtenay Shoal	Yes	No	No	No	No	No	No	No	Yes	No	No	No
Hammersley Shoal	Yes	No	No	No	No	No	No	No	Yes	No	No	No
Madeleine Shoal	Yes	No	No	No	No	No	No	No	Yes	No	No	No

Overall assessment

Sensitive receptor (sites identified in EP)	Operational Monitoring	Containment and recovery	Dispersant application: sub-sea	Dispersant application: > 20 m water depth and > 10 km from shore/reefs	Shoreline protection	Shoreline clean-up (manual)	Shoreline clean-up (mechanical)	Shoreline clean-up (chemical)	Oiled wildlife response	In situ burning	Mechanical dispersion	Well control and intervention
Is this response Practicable?	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes	No	No	No
NEBA identifies response potentially of net environmental benefit?	Yes	No	No	No	Yes	Yes	Potentially	Potentially	Yes	No	No	No

NEBA Impact Ranking Classification Guidance

To reduce variability between assessments, the following ranking descriptions have been devised to guide the workshop process:

			Degree of impact[7]	Potential duration of impact	Equivalent Woodside Corporate Risk Matrix Consequence Level
Positive	**3P**	**Major**	Likely to prevent: • behavioural impact to biological receptors • behavioural impact to socio-economic receptors e.g. changes to day-today business operations, public opinion/behaviours (e.g. avoidance of amenities such as beaches) or regulatory designations.	Decrease in duration of impact by > 5 years	N/A
	2P	**Moderate**	Likely to prevent: • significant impact to a single phase of reproductive cycle of biological receptors • detectable financial impact, either directly (e.g. loss of income) or indirectly (e.g. via public perception), for socio-economic receptors.	Decrease in duration of impact by 1–5 years	N/A

	1P	**Minor**	Likely to prevent impacts on:
			• significant proportion of population or breeding stages of biological receptors
			• socio-economic receptors such as:
			  ○ significant impact to the sensitivity of protective designation; or
			  ○ significant and long-term impact to business/industry.
				Decrease in duration of impact by several seasons (< 1 year)	N/A

	0	**Non-mitigated spill impact**	**No detectable difference to unmitigated spill scenario.**		
Negative	**1N**	**Minor**	Likely to result in: • behavioural impact to biological receptors • behavioural impact to socio-economic receptors e.g. changes to day-to-day business operations, public opinion/behaviours (e.g. avoidance of amenities such as beaches), or regulatory designations.	Increase in duration of impact by several seasons (< 1 year)	Increase in risk by one sub-category, without changing category (e.g. Minor (E) to Minor (D))
	2N	**Moderate**	Likely to result in: • significant impact to a single phase of reproductive cycle for biological receptors; or • detectable financial impact, either directly (e.g. loss of income) or indirectly (e.g. via public perception), for socio-economic receptors. This level of negative impact is recoverable and unlikely to result in closure of business/industry in the region.	Increase in duration of impact by 1–5 years	Increase in risk by one category (e.g. Minor (D) to Moderate (C or B))

	3N	**Major**	Likely to result in impacts on:
			• significant proportion of population or breeding stages of biological receptors
			• socio-economic receptors resulting in either:
			  ○ significant impact to the sensitivity of protective designation; or
			  ○ significant and long-term impact to business/industry.
				Increase in duration of impact by > 5 years or unrecoverable	Increase in risk by two categories (e.g. Minor (E) to Major (A))

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[7] NOTE: the maximum likely impact should be considered; for example, if a spill were to directly impact the behaviour that results in an impact to reproduction and/or the breeding population (such as fish failing to aggregate to spawn), then the score should be a 2 or 3 rather than a 1. Similarly, if a change in behaviour resulted in an increased risk of mortality of a population, then it should be scored as a 2 or 3

ANNEX B: OPERATIONAL MONITORING ACTIVATION AND TERMINATION CRITERIA

Table B-1: Operational monitoring objectives, triggers and termination criteria

Operational Monitoring Operational Plan	Objectives	Activation triggers	Termination criteria
Operational Monitoring Operational Plan – 01 (OM01) Predictive Modelling of Hydrocarbons to Assess Resources at Risk	OM01 focuses on the conditions that have prevailed since a spill commenced, as well as those that are forecasted in the short term (1–3 days ahead) and longer term. OM01 utilises computer-based forecasting methods to predict hydrocarbon spill movement and guide the management and execution of spill response operations to maximise the protection of environmental resources at risk. The objectives of OM01 are to: • Provide forecasting of the movement and weathering of spilled hydrocarbons • Identify resources that are potentially at risk of contamination • Provide simulations showing the outcome of alternative response options (booming patterns etc.) to inform on-going Net Environmental Benefit Analysis (NEBA) and continually assess the efficacy of available response options to reduce risks to ALARP	OM01 will be triggered immediately following a level 2/3 hydrocarbon spill.	The criteria for the termination of OM01 are: • The hydrocarbon discharge has ceased and no further surface oil is visible • Response activities have ceased • Hydrocarbon spill modelling (as verified by OM02 surveillance observations) predicts no additional natural resources will be impacted

Operational Monitoring Operational Plan	Objectives	Activation triggers	Termination criteria
Operational Monitoring Operational Plan – 02 (OM02) Surveillance and reconnaissance to detect hydrocarbons and resources at risk	OM02 aims to provide regular, on-going hydrocarbon spill surveillance throughout a broad region, in the event of a spill. The objectives of OM02 are: • Verify spill modelling results and recalibrate spill trajectory models (OM01). • Understand the behaviour, weathering and fate of surface hydrocarbons. • Identify environmental receptors and locations at risk or contaminated by hydrocarbons. • Inform ongoing Net Environmental Benefit Analysis (NEBA) and continually assess the efficacy of available response options to reduce risks to ALARP. • To aid in the subsequent assessment of the short- to long-term impacts and/or recovery of natural resources (assessed in SMPs) by ensuring that the visible cause and effect relationships between the hydrocarbon spill and its impacts to natural resources have been observed and recorded during the operational phase.	OM02 will be triggered immediately following a level 2/3 hydrocarbon spill.	The termination triggers for the OM02 are: • 72 hours has elapsed since the last confirmed observation of surface hydrocarbons. • Latest hydrocarbon spill modelling results (OM01) do not predict surface exposures at visible levels.
Operational Monitoring Operational Plan – 03 (OM03) Monitoring of hydrocarbon presence, properties, behaviour and weathering in water	OM03 will measure surface, entrained and dissolved hydrocarbons in the water column to inform decision-making for spill response activities. The specific objectives of OM03 are as follows: • Detect and monitor for the presence, quantity, properties, behaviour and weathering of surface, entrained and dissolved hydrocarbons. • Verify predictions made by OM01 and observations made by OM02 about the presence and extent of hydrocarbon contamination. Data collected in OM03 will also be used for the purpose of longer-term water quality monitoring during SM01.	OM03 will be triggered immediately following a level 2/3 hydrocarbon spill.	The criteria for the termination of OM03 are as follows: • The hydrocarbon release has ceased. • Response activities have ceased. • Concentrations of hydrocarbons in the water are below available ANZECC/ ARMCANZ (2018) trigger values for 99% species protection.

Operational Monitoring Operational Plan	Objectives	Activation triggers	Termination criteria
Operational Monitoring Operational Plan – 04 (OM04) Pre-emptive assessment of sensitive receptors at risk	OM04 aims to undertake a rapid assessment of the presence, extent and current status of shoreline sensitive receptors prior to contact from the hydrocarbon spill, by providing categorical or semi-quantitative information on the characteristics of resources at risk. The primary objective of OM04 is to confirm understanding of the status and characteristics of environmental resources predicted by OM01 and OM02 to be at risk, to further assist in making decisions on the selection of appropriate response actions and prioritisation of resources. Indirectly, qualitative/semi-quantitative pre-contact information collected by OM04 on the status of environmental resources may also aid in the verification of environmental baseline data and provide context for the assessment of environmental impacts, as determined through subsequent SMPs. OM04 would be undertaken in liaison with WA DoT as the control agency once the oil is in State Waters (if a Level 2/3 incident).	Triggers for commencing OM04 include: • Contact of a sensitive habitat or shoreline is predicted by OM01, OM02 and/or OM03. • The pre-emptive assessment methods can be implemented before contact from hydrocarbons (once a receptor has been contacted by hydrocarbons it will be assessed under OM05).	The criteria for the termination of OM04 at any given location are: • Locations predicted to be contacted by hydrocarbons have been contacted. • The location has not been contacted by hydrocarbons and is no longer predicted to be contacted by hydrocarbons (resources should be reallocated as appropriate).
Operational monitoring operational plan – 05 (OM05) Monitoring of contaminated resources	OM05 aims to implement surveys to assess the condition of wildlife and habitats contacted by hydrocarbons at sensitive habitat and shoreline locations. The primary objectives of OM05 are: • Record evidence of oiled wildlife (mortalities, sub-lethal impacts, number, extent, location) and habitats (mortalities, sub-lethal impacts, type, extent of cover, area, hydrocarbon character, thickness, mass and content) throughout the response and clean-up at locations contacted by hydrocarbons to inform and prioritise clean-up efforts and resources, while minimising the potential impacts of these activities. Indirectly, the information collected by OM05 may also support the assessment of environmental impacts, as determined through subsequent SMPs. OM05 would be undertaken in liaison with WA DoT as the control agency once the oil is in State Waters (if a Level 2/3 incident).	OM05 will be triggered when a sensitive habitat or shoreline is predicted to be contacted by hydrocarbons by OM01, OM02 and/or OM03.	The criteria for the termination of OM05 at any given location are: • No additional response or clean-up of wildlife or habitats is predicted. • Spill response and clean-up activities have ceased. OM05 survey sites established at sensitive habitat and shoreline locations will continue to be monitored during SM02. The formal transition from OM05 to SM02 will begin on cessation of spill response and clean-up activities.

ANNEX C: OIL SPILL SCIENTIFIC MONITORING PROGRAM

Oil spill environmental monitoring

The following provides some further detail on Woodside's oil spill scientific monitoring Program and includes the following:

- The organisation, roles and responsibilities of the Woodside oil spill scientific monitoring team and external resourcing.
- A summary table of the ten scientific monitoring programs as per the specific focus receptor, objectives, activation triggers and termination criteria.
- Details on the oil spill environmental monitoring activation and termination decision-making processes.
- Baseline knowledge and environmental studies knowledge access via geo-spatial metadata databases.
- An outline of the reporting requirements for oil spill scientific monitoring programs.

Oil Spill Scientific Monitoring – Delivery Team Roles and Responsibilities

Woodside Oil Spill Scientific Monitoring Delivery Team

The Woodside science team are responsible for the delivery of the oil spill scientific monitoring. The roles and responsibilities of the Woodside scientific monitoring delivery team are presented in Table C-1 and the organisational structure and Corporate Incident Management Team (CIMT) linkage provided in Figure C-1.

Woodside Oil Spill Scientific monitoring program – External Resourcing

In the event of a Level 2 or 3 hydrocarbon release, or any release event with the potential to contact sensitive environmental receptors, scientific monitoring personnel and scientific equipment to implement the appropriate SMPs will be provided by SMP Standby contractor who hold a standby contract for SMP via the Woodside Environmental Services Panel (ESP). If additional resources are required other consultancy capacity within the Woodside ESP will be utilised (as needed and may extend to specialist contractors such as research agencies engaged in long-term marine monitoring programs). In consultation with the SMP Standby Contractor and/or specialist contractors, the selection, field sampling and approach of the SMPs will be determined by the nature and scale of the spill.

Table C-1: Woodside and Environmental Service Provider – Oil Spill Scientific Monitoring Program Delivery Team Key Roles and Responsibilities

Role	Location	Responsibility
Woodside Roles		
SMP Lead/Manager	Onshore	• Approves the SMPs activated based on operational monitoring data provided by the Planning Section • Provides advice to the CIMT in relation to scientific monitoring • Provides technical advice regarding the implementation of scientific monitoring • Approves detailed sampling plans prepared for SMPs • Directs liaison between statutory authorities, advisors and government agencies in relation to SMPs.
SMP Co-Ordinator	Onshore	• Activates the SMPs based on operational monitoring data provided by the Planning Section • Sits in the Planning Section of the CIMT. • Liaises with other CIMT Sections to deliver required logistics, resources and operational support from Woodside to support the Environmental Service Provider in delivering on the SMPs. Acts as the conduit for advice from the SMP Lead/Manager to the Environmental Service Provider • Manages the Environmental Service Provider's implementation of the SMPs • Liaises with the Environmental Service Provider on delivery of the SMPs • Arranges all contractual matters, on behalf of Woodside, associated with the Environmental Service Provider's delivery of the SMPs.
Environmental Service Provider Roles		
SMP Standby Contractor – SMP Duty Manager/Project Manager (SMP Liaison Officer)	Onshore	• Coordinates the delivery of the SMPs • Provides costings, schedule and progress updates for delivery of SMPs • Determines the structure of the Environmental Service Provider's team to necessitate delivery of the SMPs • Verifies that HSE Plans, detailed sampling plans and other relevant deliverables are developed and implemented for delivery of the SMPs • Directs field teams to deliver SMPs • Arranges all contractual matters, on behalf of Environmental Service Provider, associated with the delivery of the SMPs to Woodside • Manages sub-consultant delivery to Woodside • Provides required personnel and equipment to deliver the SMPs.
SMP Field Teams	Offshore – Monitoring Locations	• Delivers the SMPs in the field consistent with the detailed sampling plans and HSE requirements, within time and budget. • Early communication of time, budget, HSE risks associated with delivery of the SMPs to the Environmental Service Provider – Project Manager • Provides start up, progress and termination updates to the Environmental Service Provider – Project Manager (will be led in-field by a party chief).

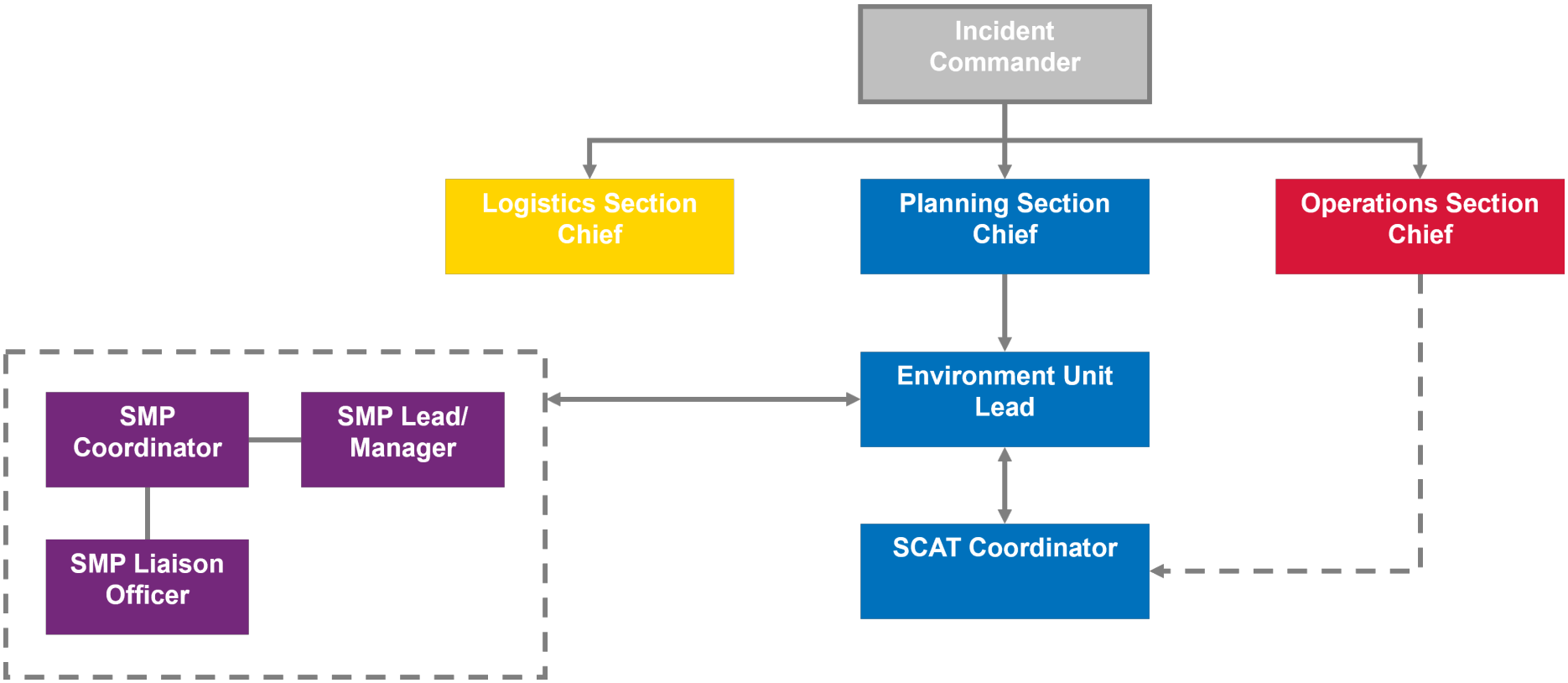

Figure C-1: Woodside Oil Spill Scientific Monitoring Program Delivery Team and Linkage to Corporate Incident Management Team (CIMT) organisational structure

Table C-2: Oil Spill Environmental Monitoring: Scientific Monitoring Program – Objectives, Activation Triggers and Termination Criteria

Scientific monitoring Program (SMP)	Objectives	Activation Triggers	Termination Criteria
Scientific monitoring program 1 (SM01) **Assessment of Hydrocarbons in Marine Waters**	SM01 will detect and monitor the presence, extent, persistence and properties of hydrocarbons in marine waters following the spill and the response. The specific objectives of SM01 are as follows: • Assess and document the extent, severity and persistence of hydrocarbon contamination with reference to observations made during surveillance activities and / or in-water measurements made during operational monitoring; and • Provide information that may be used to interpret potential cause and effect drivers for environmental impacts recorded for sensitive receptors monitored under other SMPs.	SM01 will be initiated in the event of a Level 2 or 3 hydrocarbon release, or any release event with the potential to contact sensitive environmental receptors	SM01 will be terminated when: • Operational monitoring data relating to observations and / or measurements of hydrocarbons on and in water have been compiled, analysed and reported; and • The report provides details of the extent, severity and persistence of hydrocarbons which can be used for analysis of impacts recorded for sensitive receptors monitored under other SMPs. SMP monitoring of sensitive receptor sites: • Concentrations of hydrocarbons in water samples are below NOPSEMA guidance note (20198) concentrations of 1 g/m2 for floating, 10 ppb for entrained and dissolved; and • Details of the extent, severity and persistence of hydrocarbons from concentrations recorded in water have been documented at sensitive receptor sites monitored under other SMPs.
Scientific monitoring program 2 (SM02) **Assessment of the Presence, Quantity and Character of Hydrocarbons in Marine Sediments**	SM02 will detect and monitor the presence, extent, persistence and properties of hydrocarbons in marine sediments following the spill and the response. The specific objectives of SM02 are as follows: • Determine the extent, severity and persistence of hydrocarbons in marine sediments across selected sites where hydrocarbons were observed or recorded during operational monitoring; and • Provide information that may be used to interpret potential cause and effect drivers for environmental impacts recorded for sensitive receptors monitored under other SMPs.	SM02 will be initiated in the event of a Level 2 or 3 hydrocarbon release, or any release event with the potential to contact sensitive environmental receptors and implemented as follows: • Response activities have ceased; and • Operational monitoring results made during the response phase indicate that shoreline, intertidal or sub-tidal sediments have been exposed to surface, entrained or dissolved hydrocarbons (at or above 0.5 g/m² surface, 5 ppb for entrained/dissolved hydrocarbons and ≥1 g/m² for shoreline accumulation).	SM02 will be terminated once pre-spill condition is reached and agreed upon as per the SMP termination criteria process and include consideration of: • Concentrations of hydrocarbons in sediment samples are below ANZECC/ ARMCANZ (20139) sediment quality guideline values (SQGVs) for biological disturbance; and • Details of the extent, severity and persistence of hydrocarbons from concentrations recorded in sediments have been documented.
Scientific monitoring program 3 (SM03) **Assessment of Impacts and Recovery of Subtidal and Intertidal Benthos**	The objectives of SM03 are: • Characterize the status of intertidal and subtidal benthic habitats and quantify any impacts to functional groups, abundance and density that may be a result of the spill; and • Determine the impact of the hydrocarbon spill and subsequent recovery (including impacts associated with the implementation of response options). Categories of intertidal and subtidal habitats that may be monitored include: • Coral reefs • Seagrass • Macro-algae • Filter-feeders SM03 will be supported by sediment contamination records (SM02) and characteristics of the spill derived from OMPs.	SM03 will be activated in the event of a Level 2 or 3 hydrocarbon release, or any release event with the potential to contact sensitive environmental receptors and implemented as follows: • As part of a pre-emptive assessment of PBAs of receptor locations identified by time to hydrocarbon contact >10 days, to target receptors and sites where it is possible to acquire pre-hydrocarbon contact baseline; and • Operational monitoring identified shoreline potential contact of hydrocarbons (at or above 0.5 g/m² surface, 5 ppb for entrained/dissolved hydrocarbons and ≥1 g/m² for shoreline accumulation) for subtidal and intertidal benthic habitat.	SM03 will be terminated once pre-spill condition is reached and agreed upon as per the SMP termination criteria process and include consideration of: • Overall impacts to benthic habitats from hydrocarbon exposure have been quantified. • Recovery of impacted benthic habitats has been evaluated. • Agreement with relevant persons/ organisations and regulators based on the nature and scale of the hydrocarbon spill impacts and/or that observed impacts can no longer be attributed to the spill.
Scientific monitoring program 4 (SM04) **Assessment of Impacts and Recovery of Mangroves / Saltmarsh**	The objectives of SM04 are: • Characterize the status of mangroves (and associated salt marsh habitat) at shorelines exposed/contacted by spilled hydrocarbons; • Quantify any impacts to species (abundance and density) and mangrove/saltmarsh community structure; and	SM04 will be activated in the event of a Level 2 or 3 hydrocarbon release, or any release event with the potential to contact sensitive environmental receptors and implemented as follows: • As part of a pre-emptive assessment of receptor locations identified by time to hydrocarbon contact >10 days; and	SM04 will be terminated once pre-spill condition is reached and agreed upon as per the SMP termination criteria process and include consideration of: • Impacts to mangrove and saltmarsh habitat from hydrocarbon exposure have been quantified. • Recovery of impacted mangrove/saltmarsh habitat has been evaluated.

[8] NOPSEMA (2019) Bulletin #1 – Oil spill modelling – April 2019, https://www.nopsema.gov.au/assets/Bulletins/A652993.pdf
[9] Simpson SL, Batley GB and Chariton AA (2013). Revision of the ANZECC/ARMCANZ Sediment Quality Guidelines. CSIRO and Water Science Report 08/07. Land and Water, pp. 132.

Scientific monitoring Program (SMP)	Objectives	Activation Triggers	Termination Criteria
	• Determine and monitor the impact of the hydrocarbon spill and potential subsequent recovery (including impacts associated with the implementation of response options). SM03 will be supported by sediment sampling undertaken in SM02 and characteristics of the spill derived from OMPs.	• Operational monitoring identified shoreline potential contact of hydrocarbons (at or above 0.5 g/m² surface, 5 ppb for entrained/dissolved hydrocarbons and ≥1 g/m² for shoreline accumulation) for mangrove/saltmarsh habitat.	• Agreement with relevant persons/ organisations and regulators based on the nature and scale of the hydrocarbon spill impacts and/or that observed impacts can no longer be attributed to the spill.
Scientific monitoring program 5 (SM05) **Assessment of Impacts and Recovery of Seabird and Shorebird Populations**	The Objectives of SM05 are to: • Collate and quantify impacts to avian wildlife from results recorded during OM02 and OM05 (such as mortalities, oiling, rescue and release counts) and undertake a desk-based assessment to infer potential impacts at species population level; and • Undertake monitoring to quantify and assess impacts of hydrocarbon exposure to seabirds and shorebird populations at targeted breeding colonies / staging sites / important coastal wetlands where hydrocarbon contact was recorded.	SM05 will be initiated in the event of a Level 2 or 3 hydrocarbon release, or any release event with the potential to contact sensitive environmental receptors and implemented as follows: • As part of a pre-emptive assessment of receptor locations identified by time to hydrocarbon contact >10 days; • Operational monitoring predicts shoreline contact of hydrocarbons (at or above 0.5 g/m² surface, 5 ppb for entrained/dissolved hydrocarbons and ≥1 g/m² for shoreline accumulation) at important bird colonies / staging sites / important coastal wetland locations; or • Records of dead, oiled or injured bird species made during the hydrocarbon spill or response.	SM05 will be terminated once it is agreed that the receptor has returned to pre-spill condition. The SMP termination criteria process will be followed and include consideration of: • Impacts to seabird and shorebird populations from hydrocarbon exposure have been quantified. • Recovery of impacted seabird and shorebird populations has been evaluated. • Agreement with relevant persons/ organisations and regulators based on the nature and scale of the hydrocarbon spill impacts and/or that observed impacts can no longer be attributed to the spill.
Scientific monitoring program 6 (SM06) **Assessment of Impacts and Recovery of Nesting Marine Turtle Populations**	The objectives of SM06 are to: • To quantify impacts of hydrocarbon exposure or contact on marine turtle nesting populations (including impacts associated with the implementation of response options); • Collate and quantify impacts to adult and hatchling marine turtles from results recorded during OM02 and OM05 (such as mortalities, oiling, rescue and release counts) and undertake a desk-based assessment to infer potential impacts at species population levels (including impacts associated with the implementation of response options); .and • Undertake monitoring to quantify and assess impacts of hydrocarbon exposure to nesting marine turtle populations at known rookeries (including impacts associated with the implementation of response options).	SM06 will be initiated in the event of a Level 2 or 3 hydrocarbon release, or any release event with the potential to contact sensitive environmental receptors and implemented if operational monitoring has: • As part of a pre-emptive assessment of receptor locations identified by time to hydrocarbon contact >10 days; • Predicted shoreline contact of hydrocarbons (at or above 0.5 g/m² surface, 5 ppb for entrained/dissolved hydrocarbons and ≥1 g/m² for shoreline accumulation) at known marine turtle rookery locations; or • Records of dead, oiled or injured marine turtle species made during the hydrocarbon spill or response.	SM06 will be terminated once it is agreed that the receptor has returned to pre-spill condition. The SMP termination criteria process will be followed and include consideration of: • Impacts to nesting marine turtle populations from hydrocarbon exposure have been quantified. • Recovery of impacted nesting marine turtle populations has been evaluated. • Agreement with relevant persons/ organisations and regulators based on the nature and scale of the hydrocarbon spill impacts and/or that observed impacts can no longer be attributed to the spill.
Scientific monitoring program 7 (SM07) **Assessment of Impacts to Pinniped Colonies including Haul-out Site Populations**	The objectives of SM07 are to: • Quantify impacts on pinniped colonies and haul-out sites as a result of hydrocarbon exposure/contact. • Collate and quantify impacts to pinniped populations from results recorded during OM02 and OM05 (such as mortalities, oiling, rescue and release counts) and undertake a desk-based assessment to infer potential impacts at species population levels.	SM07 will be initiated in the event of a Level 2 or 3 hydrocarbon release, or any release event with the potential to contact sensitive environmental receptors and implemented if operational monitoring has: • As part of a pre-emptive assessment of receptor locations identified by time to hydrocarbon contact >10 days; • Identified shoreline contact of hydrocarbons ((at or above 0.5 g/m² surface, ≥5 ppb for entrained/dissolved hydrocarbons and ≥1 g/m² for shoreline accumulation) at known pinniped colony or haul-out site(s) (i.e. most northern site is the Houtman Abrolhos Islands); or • Records of dead, oiled or injured pinniped species made during the hydrocarbon spill or response.	SM07 will be terminated once it is agreed that the receptor has returned to pre-spill condition. The SMP termination criteria process will be followed and include consideration of: • Impacts to pinniped populations from hydrocarbon exposure have been quantified. • Recovery of pinniped populations has been evaluated. • Agreement with relevant persons/ organisations and regulators based on the nature and scale of the hydrocarbon spill impacts and/or that observed impacts can no longer be attributed to the spill.
Scientific monitoring program 8 (SM08) **Desk-Based Assessment of Impacts to Other Non-Avian Marine Megafauna**	The objective of SM08 is to provide a desk-based assessment which collates the results of OM02 and OM05 where observations relate to the mortality, stranding or oiling of mobile marine megafauna species not addressed in SM06 or SM07, including: • Cetaceans; • Dugongs;	SM08 will be initiated in the event of a Level 2 or 3 hydrocarbon release, or any release event with the potential to contact sensitive environmental receptors and implemented if operational monitoring reports records of dead, oiled or injured non-avian marine megafauna during the spill/ response phase.	SM08 will be terminated when the results of the post-spill monitoring have quantified impacts to non-avian megafauna.

Scientific monitoring Program (SMP)	Objectives	Activation Triggers	Termination Criteria
	• Whale sharks and other shark and ray populations; • Sea snakes; and • Crocodiles. The desk-based assessment will include population analysis to infer potential impacts to marine megafauna species populations.		• Agreement with relevant persons/ organisations and regulators based on the nature and scale of the hydrocarbon spill impacts and/or that observed impacts can no longer be attributed to the spill.
Scientific monitoring program 9 (SM09) **Assessment of Impacts and Recovery of Marine Fish associated with SM03 habitats**	The objectives of SM09 are: • Characterise the status of resident fish populations associated with habitats monitored in SM03 exposed/contacted by spilled hydrocarbons; • Quantify any impacts to species (abundance, richness and density) and resident fish population structure (representative functional trophic groups); and • Determine and monitor the impact of the hydrocarbon spill and potential subsequent recovery (including impacts associated with the implementation of response options).	SM09 will be initiated in the event of a Level 2 or 3 hydrocarbon release, or any release event with the potential to contact sensitive environmental receptors and implemented with SM03.	SM09 will be undertaken and terminated concurrent with monitoring undertaken for SM03, as per the SMP termination criteria process • Agreement with relevant persons/ organisations and regulators based on the nature and scale of the hydrocarbon spill impacts and/or that observed impacts can no longer be attributed to the spill.
Scientific monitoring program 10 (SM10) **SM10 - Assessment of physiological impacts important fish and shellfish species (fish health and seafood quality/safety) and recovery**	SM10 aims to assess any physiological impacts to important commercial fish and shellfish species (assessment of fish health) and if applicable, seafood quality/safety. Monitoring will be designed to sample key commercial fish and shellfish species and analyse tissues to identify fish health indicators and biomarkers, for example: • Liver Detoxification Enzymes (ethoxyresorufin-O-deethylase (EROD) activity) • PAH Biliary Metabolites • Oxidative DNA Damage • Serum SDH • Other physiological parameters, such as condition factor (CF), liver somatic index (LSI), gonado-somatic index (GSI) and gonad histology, total weight, length, condition, parasites, egg development, testes development, abnormalities. • Seafood tainting may be included (where appropriate) using applicable sensory tests to objectively assess targeted finfish and shellfish species for hydrocarbon contamination. Results will be used to make inferences on the health of commercial fisheries and the potential magnitude of impacts to fishing industries.	SM10 will be initiated in the event of a Level 2 or 3 hydrocarbon release, or any release event with the potential to contact sensitive environmental receptors and implemented if operational monitoring (OM01, OM02 and OM05) indicates the following: • The hydrocarbon spill will or has intersected with active commercial fisheries or aquaculture activities. • Commercially targeted finfish and/or shellfish mortality has been observed/recorded. • Commercial fishing or aquaculture areas have been exposed to hydrocarbons (≥0.5 g/m² surface and ≥5 ppb for entrained/dissolved hydrocarbons); and • Taste, odour or appearance of seafood presenting a potential human health risk is observed.	SM10 will be terminated once it is agreed that the receptor has returned to pre-spill condition. The SMP termination criteria process will be followed and include consideration of: • Physiological impacts to important commercial fish and shellfish species from hydrocarbon exposure have been quantified. • Recovery of important commercial fish and shellfish species from hydrocarbon exposure has been evaluated. • Impacts to seafood quality/safety (if applicable) have been assessed and information provided to the relevant persons/ organisations and regulators for the management of any impacted fisheries. • Agreement with relevant persons/ organisations and regulators based on the nature and scale of the hydrocarbon spill impacts and/or that observed impacts can no longer be attributed to the spill.

Activation Triggers and Termination Criteria

Scientific monitoring program – Activation

The Woodside oil spill scientific monitoring team will be stood up immediately with the occurrence of a hydrocarbon spill (actual or suspected) Level 2 or 3 hydrocarbon release, or any release event with the potential to contact sensitive environmental receptors via the first strike plan for the petroleum activity programme. The presence of any level of hydrocarbons in the marine environment triggers the activation of the oil spill scientific monitoring program (SMP). This is to consider the full range of eventualities relating to the environmental, socio-economic and health consequences of the spill in the planning and execution of the SMP. The activation process also takes into consideration the management objectives, species recovery plans, conservation advices and conservations plans for any World Heritage Area (WHA), CMRs, State Marine Parks, other protected area designations (e.g., State nature reserves) and Matters of National Environmental Significance (including listed species under part 3 of the EPBC Act) potentially exposed to hydrocarbons. With the first 24-48 hours of a spill event, such information will be sourced and evaluated as part of the SMP planning process guided by Appendix D (identified receptors vulnerable to hydrocarbon contact), the information presented in the Existing Environment section of the EP as well as other information sources such as the Woodside Baseline Environmental Studies Database.

The starting point for decision-making on what SMPs are activated and spatial extent of monitoring activities will be based on the predictive modelling results (OM01) in the first 24-48 hours until more information is made available from other operational monitoring activities such as aerial surveillance and shoreline surveys. Pre-emptive Baseline Areas (WHA, CMRs and State Marine Parks encompassing key ecological and socio-economic values) are a key focus of the SMP activation decision-making process, particularly, in the early spill event/response phase. As the operational monitoring progresses and further situational awareness information becomes available, it will be possible to understand the nature and scale of the spill. The SMP activation and implementation decision-making will be revisited daily to account for the updates on spill information. One of the priority focus areas in the early phase of the incident will be to identify and execute pre-emptive SMP assessments at key receptor locations, as required. The SMP activation and implementation decision tree is presented in Figure C-2.

Scientific monitoring Program – Termination

The basis of the termination process for the active SMPs (SMPs 1-10) will include quantification of impacts, evaluation of recovery for the receptor at risk and consultation with relevant authorities, persons and organisations. Termination of each SMP will not be considered until the results (as presented in annual SMP reports for the duration of each program) indicate that the target receptor has returned to pre-spill condition.

Once the SMP results indicate impacted receptor(s) have returned to pre-spill condition (as identified by Woodside) a termination decision-making process will be triggered and steps will be undertaken as follows:

- Woodside will engage expert opinion on whether the receptor has returned to pre-spill condition (based on monitoring data). Subject Matter Expert (SMEs) will be engaged (via the Woodside SME scientific monitoring terms of reference to review program outcomes, provide expert advice and recommendations for the duration of each SMP.
- Where expert opinion agrees that the receptor has returned to pre-spill condition, findings will then be presented to the relevant authorities, persons and organisations (as defined by the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulation 25). Identification of relevant persons/ organisations, planning and engagement will be managed by Woodside's Public Information Functional Support Team (FST) .. These guidelines outline the FST roles and responsibilities, competencies, communications and planning processes. An assessment of the merits of any objection to termination will be documented in the SMP final report.
- Woodside will decide on termination of SMP based on expert opinion and merits of any relevant persons/ organisation objections. The final report following termination will include: monitoring results, expert opinion and consultation, including merits of any objections.
- Termination of SMPs will also consider applicable management objectives, species recovery plans, conservation advices and conservations plans for any World Heritage Area (WHA), CMRs, State Marine Parks, other protected area designations (e.g., State nature reserves) and Matters of National Environmental Significance (including listed species under part 3 of the EPBC Act).

The SMP termination decision-making process will be applied to each active SMP and an iterative process of decision steps continued until each SMP has been terminated (refer to decision-tree diagram for SMP termination criteria, Figure C-3).

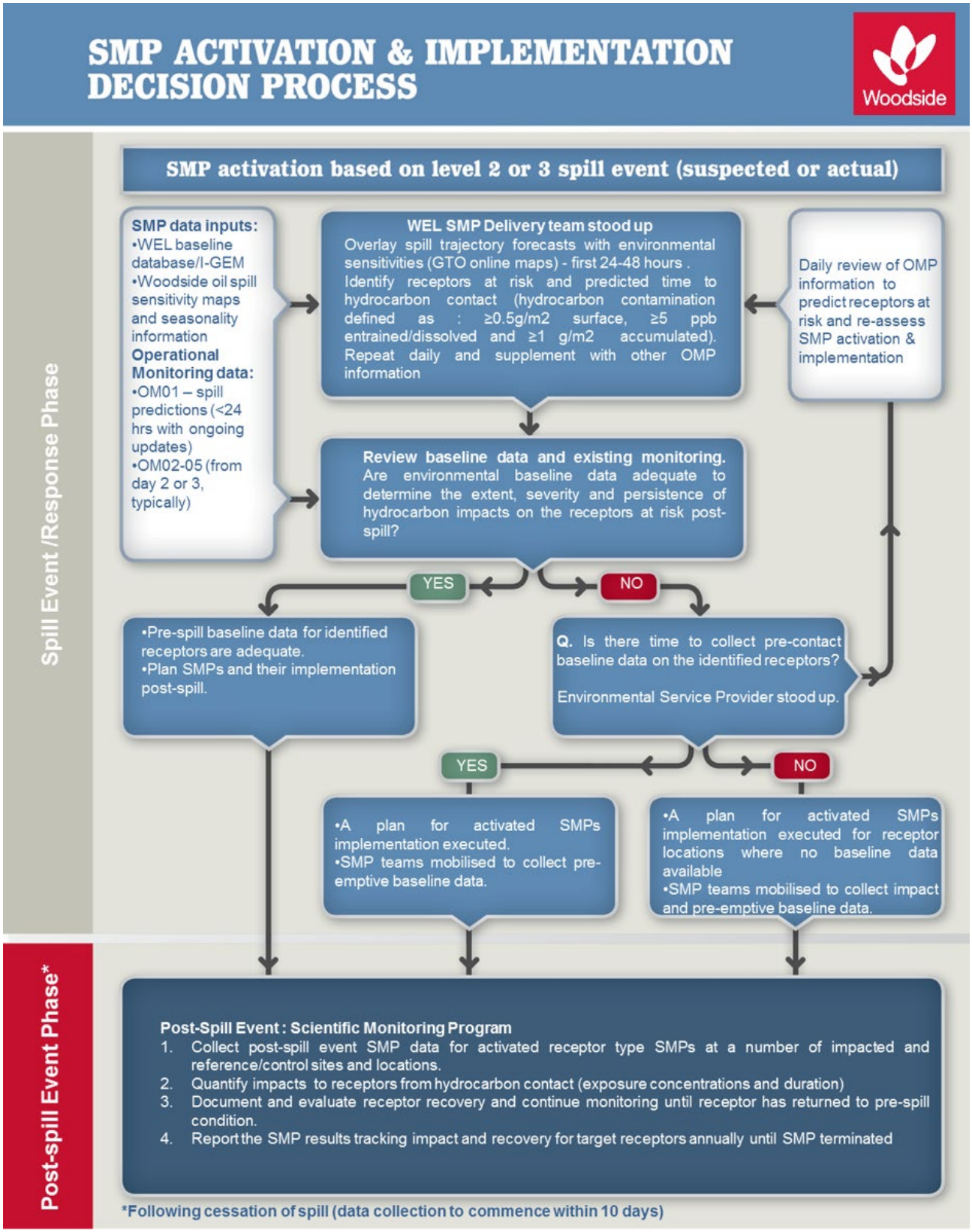

Figure C-2: Activation and implementation decision-tree for oil spill environmental monitoring

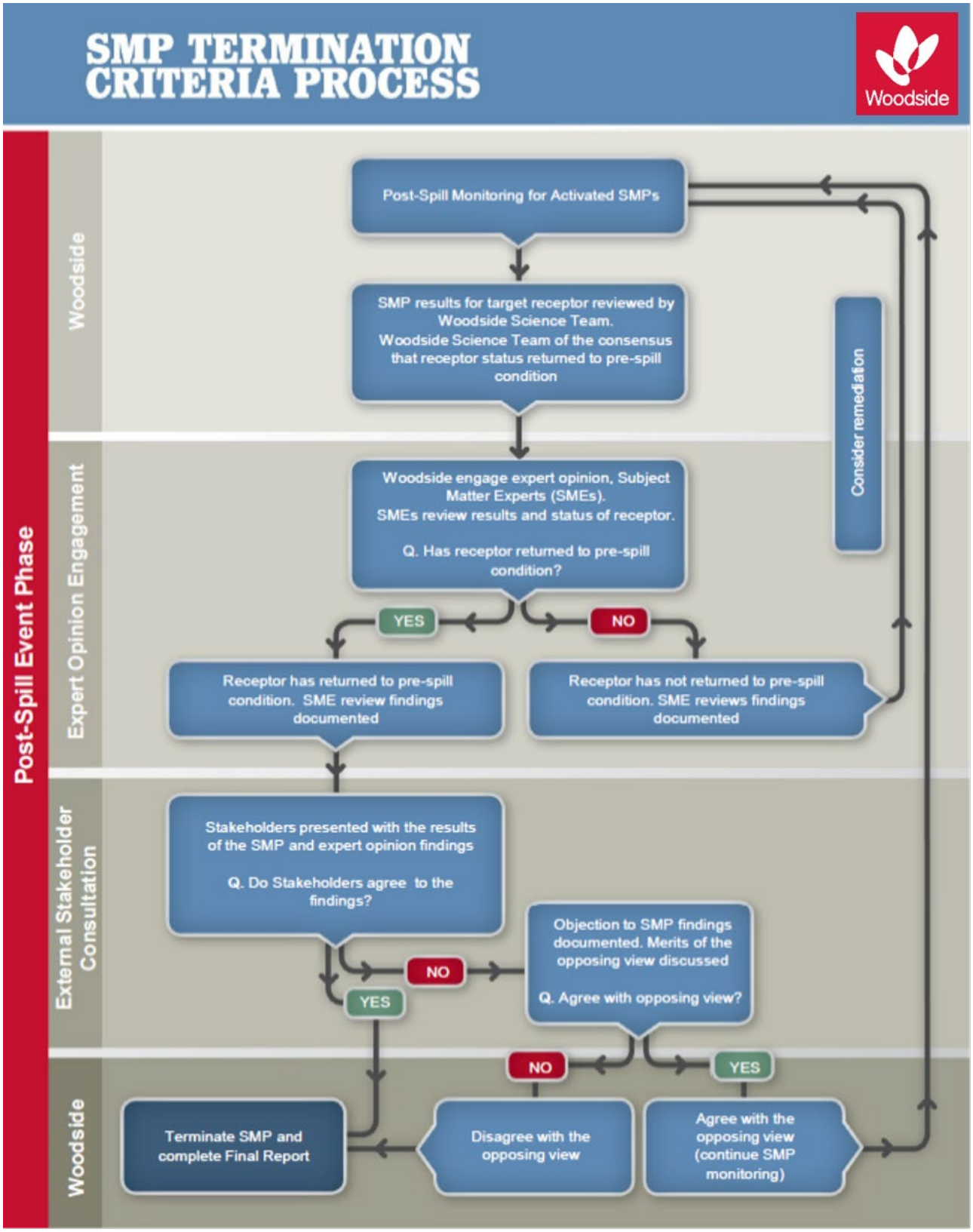

Figure C-3: Termination criteria decision-tree for oil spill environmental monitoring

Receptors at Risk and Baseline Knowledge

To assess the baseline studies available and suitability for oil spill scientific monitoring, Woodside maintains knowledge of environmental baseline studies through the upkeep and use of its Environmental Knowledge Management System.

Woodside's Environmental Knowledge Management System is a centralised platform for scientific information on the existing environment, marine biodiversity, Woodside environmental studies, key environmental impact topics, key literature and web-based resources. The system comprises several data directories and an environmental baseline database, as well as folders within the 'Corporate Environment' server space. The environmental baseline database was set up to support Woodside's SMP preparedness and as a SMP resource in the event of an unplanned hydrocarbon spill. The environmental baseline database is subject to updates including annual reviews completed as part of SMP standby contract. This database is accessed pre-PAP to identify PBAs where hydrocarbon contact is predicted to occur <10 days.

In addition to Woodside's Environmental Knowledge Management System, many relevant baseline datasets are held by other organisations (e.g. other oil and gas operators, government agencies, state and federal research institutions and non-governmental organisations). To understand the present status of environmental baseline studies a spatial environmental metadata database for Western Australia (Industry-Government Environmental Metadata, IGEM) was established. IGEM is a collaboration comprising oil and gas operators (including Woodside), government and research agencies and other organisations. IGEM held data were integrated into the DWER IMSA[10] in 2020. IMSA is an online portal for information about marine-based environmental surveys in Western Australia. IMSA is a project of DWER for the systematic capture and sharing of marine data created as part of an environmental impact assessment (EIA).

In the event of an unplanned hydrocarbon release, Woodside intends to interrogate the information on baseline studies status as held by the various databases (e.g. Woodside Environmental Knowledge Management System, IMSA and other sources of existing baseline data) to identify Pre-emptive Baseline Areas (PBAs), i.e., receptors at risk where hydrocarbon contact is predicted to be >10 days, and baseline data can be collected before hydrocarbon contact.

Reporting

For the scientific monitoring program relevant regulators will be provided with:

- Annual reports summarising the SMPs deployed and active, data collection activities and available findings; and
- Final reports for each SMP summarising the quantitative assessment of environmental impacts and recovery of the receptor once returned to pre-spill condition and termination of the monitoring program.

The reporting requirements of the scientific monitoring program will be specific to the individual SMPs deployed and terms of responsibilities, report templates, schedule, quality assurance/ quality control (QA/QC) and peer-review will be agreed with the contractors engaged to conduct the SMPs. Compliance and auditing mechanisms will be incorporated into the reporting terms.

[10] https://biocollect.ala.org.au/imsa#max%3D20%26sort%3DdateCreatedSort

ANNEX D: MONITORING PROGRAM AND BASELINE STUDIES FOR THE PETROLEUM ACTIVITIES PROGRAM

Table D-1: Oil spill environmental monitoring – scientific monitoring program scope for the PAP based on Spill EMBAs

Receptors to be Monitored	Receptor Areas - Potential Impact and Reference Scientific Monitoring Sites (marked X)																																							
	Applicable SMP	Kimberley AMP	Agro-Rowley Terrace AMP	Montebello AMP	Dampier AMP	Carnarvon Canyon AMP	Ningaloo AMP	Gascoyne AMP	Shark Bay Open Ocean (including AMP)	Abrolhos AMP	Jurien AMP	Two Rocks AMP	Perth Canyon AMP	Geographe AMP	South-west Corner AMP	Ashmore Reef and AMP	Seringapatam Reef	Scott Reef (North and South)	Mermaid Reef and AMP	Clerke Reef and State Marine Park	Imperieuse Reef and State Marine Park	Rankin Bank	Glomar Shoals	Rowley Shoals (including Sate Maine Park)	Fantome Shoal	Adele Island	Lacepede Islands	Montebello Islands (including State Marine Park)	Lowendal Islands (including State Nature Reserves)	Barrow Island (including State Nature Reserves, State Marine Park, and Marine Management Area)	Muiron Islands (WHA, Marine Management Area)	Pilbara Islands – Middle and Southern Island Group (Serrurier, Thevenard and Bessieres Islands - State	Pilbara Islands - Northern Island Group (Sandy Island Passage Islands - State nature reserves)	Abrolhos Islands	Kimberley Coast	Dampier Archipelago	Northern Pilbara Shoreline	Ningaloo Coast (North/Northwest Cape, Middle and South) (WHA, and State Marine Park)	Shark Bay - Open Ocean Coast	Shark Bay (WHA, State Marine Park)	Ngari Capes State Marine Park
Habitat																																								
Water Quality	SM01	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Marine Sediment Quality	SM02	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Coral Reef	SM03	X		X												X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X	X	X	X	X	X	
Seagrass / Macro-Algae	SM03	X									X					X	X	X								X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Deeper Water Filter Feeders	SM03	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X						X					X		X		
Mangroves and Saltmarsh	SM04																											X					X	X	X	X		X		
Species																																								
Sea Birds and Migratory Shorebirds (significant colonies/ staging sites/ coastal wetlands)	SM05	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Marine Turtles (significant nesting beaches)	SM06	X	X	X	X		X	X	X							X	X	X	X	X	X						X	X	X	X	X	X	X	X	X	X	X	X	X	
Pinnipeds (significant colonies/ haul-out sites)	SM07									X	X	X			X																										X
Cetaceans – Migratory Whales	SM08	X	X	X	X		X	X	X	X	X	X	X	X	X			X									X	X	X	X	X			X	X	X		X		X	X
Oceanic and Coastal Cetaceans	SM08	X	X	X	X		X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Dugongs	SM08	X							X							X												X	X	X	X	X	X		X	X	X	X	X	X	
Sea Snakes	SM08	X		X	X			X	X	X						X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	
Whale Sharks	SM08			X			X	X										X										X	X	X	X							X			
Other Shark and Ray Populations	SM08, SM09	X	X	X	X		X	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fish Assemblages	SM09	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Socio-economic																																								
Fisheries – Commercial	SM10		X	X	X	X	X	X	X	X	X	X										X	X	X	X			X	X	X		X	X	X	X	X	X	X	X	X
Fisheries – Traditional	SM10															X	X	X									X									X			X		
Tourism (incl. recreational fishing)	SM10	X		X			X	X	X		X			X	X	X	X	X	X	X	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X	X

	Receptor areas identified as Pre-emptive Baseline Areas (based on criteria of surface contact and/or entrained hydrocarbon contact ≤10 days (Offshore Australian Marine Parks contacted by hydrocarbons in this timeframe also noted)
	Receptor areas identified as Pre-Emptive Baseline Areas in the response phase >10 days (based on criteria of surface contact and/or entrained hydrocarbon contact >10 days)
	Receptor areas that may be identified as impact or reference sites in the event of major hydrocarbon release and would be identified as part of the SMP planning process

Table D-2: Baseline studies for the SMPs applicable to identified Pre-emptive Baseline Areas for the PAP

Major Baseline	Proposed Scientific monitoring operational plan and Methodology	Rankin Bank & Glomar Shoal	Barrow, Lowendal Montebello and Islands	Montebello AMP	Dampier Archipelago
Benthic Habitat (Coral Reef)	**SM03** Quantitative assessment using image capture using either diver held camera or towed video. Post analysis into broad groups based on taxonomy and morphology.	**Studies:**			
		1. Glomar Shoal and Rankin Bank Environmental Survey Report, 2013, quantitatively surveyed benthic habitats and communities. AIMS report to Woodside. Scientific Publication - Biodiversity and spatial patterns of benthic habitat and associated demersal fish communities at two tropical submerged reef ecosystems, 2018. 2. Rankin Bank Environmental Survey Extension, 2014, Habitat assessment of an area southeast of Rankin Bank. 3. Glomar Shoal and Rankin Bank surveys, 2017. GWF-2 Monitoring Programme. Quantitatively surveyed benthic habitats and communities. 4. Temporal Studies survey of Rankin Bank and Glomar Shoal, 2018.	Barrow Island: East and West Coast baseline and monitoring for soft sediment, limestone pavement and coral assemblages (Chevron) Barrow, Montebello and Lowendal Islands: 1. Benthic community monitoring as part of DBCA Western Australian Marine Monitoring Program (2015-ongoing). 2. Pilbara Marine Conservation Partnership Seabed biodiversity survey (2013).	Coral Reefs & Filter Feeders 1. Montebello Marine Park, 2019, Identification and qualitative descriptions of benthic habitat. 2. Montebello Australian Marine Parks – 2019 – Baseline survey on benthic habitats. 3. Pluto Trunkline within Montebello Marine Park – Monitoring marine communities.	1. Coral Monitoring, Mermaid Sound. URS on behalf of Chevron, 2004. 2. Scarborough Trunkline Marine Habitat Survey 2018. 5. Benthic community monitoring as part of DBCA's Dampier Archipelago Marine Monitoring Program (2007-ongoing). 6. WA Museum study on the Scleractinian corals collected in 1998. (Griffith 2004). 7. Regional Biodiversity — Pilbara Seabed Biodiversity Mapping & Characterisation (2016). 9. Distribution, patterns and key processes of major marine communities and large marine fauna – DBCA Pluto Offset Program D. 11. Study of the spatial and temporal distribution of coral assemblages at Dampier Archipelago (Cape Preston to Delambre Island), using 871 datasets dating back to the early 1970s. Sites surveyed in May 2017.
		Methods:			
		1. Towed video transects, photo quadrats using towed video system. 2. Towed video transects, photo quadrats using towed video system. 3. Towed video transects, photo quadrats using towed video system. 4. Towed video transects, photo quadrats using towed video system.	Barrow Island: Coral habitat – mapping, rapid visual assessment, size-class frequency, photoquadrats – live coral cover and survival, tagged corals – growth and survival and coral recruitment Benthic macro-invertebrate surveys – video belt transects Barrow, Montebello and Lowendal Islands: 1. Fixed long-term monitoring sites. Diver video transect. 2. Towed video, benthic trawl and sled.	1.ROV Transects 2. Benthic habitat mapping, multibeam acoustic swathing. 3. ROV video.	1. Towed Video. 2. Towed video, 5. Diver swum – belt transects, photo quadrats. 6. Coral collection for taxonomic records. 7. Towed video, benthic trawl and sled. 9. Collection of fish, coral, mangrove and seagrass samples from reefs along the WA coast, including reefs within the proposed Dampier Archipelago Marine Park. Samples subject to genetic testing. 11. Photo quadrants and recruitment tiles
		References/ data:			
		1. AIMS 2014a and Abdul Wahab et al., 2018. DATAHOLDER: AIMS. 2. AIMS 2014b. DATAHOLDER: AIMS. 3.Currey-Randall et. al., 2019. DATAHOLDER: AIMS 4. Currey-Randall et. al., 2019. DATAHOLDER: AIMS	Barrow Island: Chevron Australia (2015a and b) DATAHOLDER: Chevron Australia Barrow, Montebello and Lowendal Islands: 1. WA Department of Biodiversity, Conservation and Attractions (DBCA) DATAHOLDER: DBCA 2. Pitcher et al. 2016 DATAHOLDER: CSIRO	1. Advisian 2019 2. Keesing 2019 3. McLean et al. 2019	1. URS Australia Pty Ltd. 2004. DATAHOLDER: Woodside. 2. MSCIENCE, 2019. DATAHOLDER: MSCIENCE. 5. DBCA. 6. Griffith (2004) Western Australian Museum. 7. Pitcher et al. (2016). DATAHOLDER: CSIRO 9. DBCA (2023) 11. Moustaka, et al. 2019 Dataholder: DBCA
Benthic Habitat (Seagrass and Macro-algae)	**SM03** Quantitative assessment using image capture using either diver held camera or towed video. Post analysis into broad groups based on taxonomy and morphology.	**Studies:**			
			Barrow Island: East Barrow Island – Chevron baseline and monitoring	N/A – see Table D-1	1. West Australian Museum marine biodiversity collection. 2. Benthic community monitoring as part of DBCA's Dampier Archipelago Marine Monitoring Program (2007-ongoing). 3. Distribution, patterns and key processes of major marine communities and large marine fauna (Pluto Offset Program DBCA) 4. Establishment of long-term monitoring reference sites for the Pluto Offset Program – DBCA (in the proposed Dampier Archipelago Marine Park and Cape Preston Marine Management Area).
		Methods:			

Major Baseline	Proposed Scientific monitoring operational plan and Methodology	Rankin Bank & Glomar Shoal	Barrow, Lowendal Montebello and Islands	Montebello AMP	Dampier Archipelago
			East Barrow- seagrass photoquadrats (30 m transects) during spring/summer and winter periods Macroalgae photoquadrats, visual census and biomass and specimen sampling		1. Diving collection to establish diversity, distribution and abundance of biota. 2. Towed video, photoquadrats 3. Collection of fish, coral, mangrove and seagrass samples from reefs along the WA coast, including reefs within the proposed Dampier Archipelago Marine Park. Samples subject to genetic testing. 4. The major datasets collected in 2016/17 were for mangroves, seagrass, macroalgae, coral and fish communities. Several techniques were trialled for both seagrass and macroalgae monitoring; including benthic imagery, quadrat counts, line intercept measures, and laboratory analysed collections.
		References/ data:			
			Barrow Island: Chevron Australia (2015a and b) DATAHOLDER: Chevron Australia		1. West Australian Museum 2002. DATAHOLDER: WAM, Woodside. 2.DBCA. 3. DBCA (2017 and 2023) 4. DBCA (2017 and 2023)
Benthic Habitat (Deeper Water Filter Feeders)	**SM03** Quantitative assessment using image capture using towed video. Post analysis into broad groups based on taxonomy and morphology.	**Studies:**			
		As above (SM03 Coral Reefs)		As above (SM03 Coral Reefs)	1. Baseline Marine Habitat Survey for the Pluto LNG Project. A total of 315 km^2 of Mermaid Sound was mapped in high resolution to distinguish habitat location and extent and further verified with 389 km of towed video.
		Methods:			
					1. Drop camera surveys of Deepwater sites (approximately 10 – 35 m depth).
		References/ data:			
					1. SKM 2008. DATAHOLDER: Woodside.
Mangroves and Saltmarsh	**SM04** Aerial photography and satellite imagery will be used in conjunction with field surveys to map the range and distribution of mangrove communities.	**Studies:**			
		N/A – See Table D-1	Barrow Island: East and West Coast baseline and monitoring – mapping (HR aerial imagery) and vegetation surveys	N/A – see Table D-1	1. Lymburner et al. (2019) applies quantitative analysis to assess the extent and canopy density of mangroves for each year between 1987 and 2018 2. Mangrove baseline data 2017 - Woodside has acquired satellite imagery of coastal areas of mainland and offshore islands from Geraldton and the Abrolhos Islands (in the south) to Dampier Archipelago (out to the Montebello Islands in the north), land classification completed and mangrove habitats identified and mapped
		Methods:			
			Barrow – Chevron (2015a and b) – HR mapping (aerial images) and vegetation surveys using belt transects – species composition, estimated total canopy cover, total number of trees, pneumatophore density and canopy density.		1. PCC% for mangroves using optical and radar data (Landsat sensor spectral composite data (all spectral wavebands) and Advanced Land Observing Satellite (ALOS) Phased Arrayed L-band Synthetic Aperture Radar (SAR) data). for the entire Australian coastline. 2. Land cover classification was performed based on atmospherically corrected Sentinel-2 data
		References/ data:			
			Barrow Island: Chevron Australia (2015a and b) DATAHOLDER: Chevron Australia		1. Lymburner et al. 2019. DATAHOULDER: Geoscience Australia, Author ([1]) 2. SOURCE: EOMAP 2017 report to Woodside
Seabirds	**SM05**	**Studies:**			

Major Baseline	Proposed Scientific monitoring operational plan and Methodology	Rankin Bank & Glomar Shoal	Barrow, Lowendal Montebello and Islands	Montebello AMP	Dampier Archipelago
	Visual counts of breeding seabirds, nest counts, intertidal bird counts at high tide.	N/A – See Table D-1	Barrow Island: Barrow Island Seabird Monitoring Program (Chevron) Barrow, Montebello and Lowendal Islands: 1. Johnston et al (2013) general inventory and distribution for the Pilbara region (WA Museum) 2. Santos – Integrated Shearwater Monitoring Program (1994-2016) 3. Santos – monitoring of seabird breeding colonies throughout the Lowendal Group of Islands.	N/A – see Table D-1	1. Baseline information in the Pilbara oiled wildlife response plan 2014. 2. Advisian (2021) NMWR Seabird and Shorebird baseline Desktop review (Woodside report)
		Methods:			
			Barrow Island – 2008-ongoing annual surveys: abundance, nest density, presence/absence of egg or chick/fledgling Barrow, Montebello and Lowendal Islands: 1. Desktop review (WA Museum) 2. Nest burrow density, presence/absence of eggs or chicks in burrows 3. The distribution and abundance of other nesting seabirds within the Lowendal Island group, including up to 45 islands and islets		1. Species, total numbers, Distribution, presence/absence of eggs or chicks in burrows. 2. Desktop literature review
		References/ data:			
			Barrow – Chevron (2015c) DATAHOLDER: Chevron Australia Barrow, Montebello and Lowendal Islands: 1. Johnstone et al (2013) DATAHOLDER: (WA Museum 2. Santos DATAHOLDER: Santos 3. Surman and Nicholson (2012) DATAHOLDER: Santos		1. AMOSC/DBCA 2014. DATAHOLDER: AMOSC/DBCA. 2. Report to Woodside commissioned study – Advisian (2021)
Turtles	**SM06** Beach surveys (recording species, nests, and false crawls).	**Studies:**			
		N/A – See Table D-1	Barrow Island: Chevron Australia: long term monitoring programs for flatback turtles Barrow, Montebello and Lowendal Islands: 1. Marine turtle monitoring as part of DBCA long-term turtle monitoring program (ongoing). 2. LTM Study of Green, Flatback, Hawksbill turtles on beaches within the Barrow, Lowendal and Montebello Island Complex. 3. Santos 2013 turtle nesting survey on the Lowendal islands. 4. Varanus Island Turtle monitoring program (2005 – present). North West Shelf Flatback Conservation Program – conserve North West Shelf stock – scope covers all summer nesting flatback turtles - https://flatbacks.dbca.wa.gov.au/about	N/A – see Table D-1	1. DBCA Photogrammetry survey of marine turtle nesting beaches in Dampier Archipelago 2019-2020 2.Holden Beach sea turtle habitat. Pendoley Environmental (2006) on behalf of Woodside for the Pluto Development. 3. Marine turtle monitoring as part of DPAWs long-term turtle monitoring program within the Dampier Archipelago (ongoing) 4. Nesting ecology of flatback sea turtles *Natator depressus* from Delambre Island collected over 2–3 weeks each nesting season across six nesting seasons (2010-2016).
		Methods:			

Major Baseline	Proposed Scientific monitoring operational plan and Methodology	Rankin Bank & Glomar Shoal	Barrow, Lowendal Montebello and Islands	Montebello AMP	Dampier Archipelago
			Barrow Island – Chevron Australia: 2005 -ongoing annual surveys, flatback turtles – nesting success, track counts and satellite tracking, hatchling survival and dispersal. Barrow, Montebello and Lowendal Islands: 1. Nesting demographics 2. Nesting demographics 3. Tagging and nest counts 4. Tagging and nest counts at Varanus, Beacon, Bridled, Abutilon and Parakeelya islands. North West Shelf Flatback Conservation Program - https://flatbacks.dbca.wa.gov.au/program-activities		1. High Resolution aerial surveys 2. Adult tracks, body pits, nests, emerged nests. 3. Adult tracks, body pits, nests, emerged nests. 4. Flipper tag resightings and track counts
		References/ data:			
			Barrow Island – Chevron (2015c) DATAHOLDER: Chevron Australia Barrow, Montebello and Lowendal Islands: 1. DBCA 2. Pendoley 2005. AMOSC/DBCA (DPaW) 2014. 3. Santos (2014) DATAHOLDER: Santos 4. Santos (2005-prsesent) DATAHOLDER: Santos North West Shelf Flatback Conservation Program https://flatbacks.dbca.wa.gov.au/program-activities		1. DBCA Karratha office 2. Pendoley Environmental 2006. DATAHOLDER: Woodside. 3. DBCA 4. Thums et al 2019 DATAHOLDER: AIMS
Fish	**SM09** Baited Remote Underwater Video Stations (BRUVS), Visual Underwater Counts (VUC), Diver Operated Video (DOV).	**Studies:**			
		1. Glomar Shoal and Rankin Bank Environmental Survey Report, 2013, quantitatively surveyed benthic habitats and communities. AIMS report to Woodside. Scientific Publication - Biodiversity and spatial patterns of benthic habitat and associated demersal fish communities at two tropical submerged reef ecosystems, 2018. 2. Rankin Bank Environmental Survey Extension, 2014, Habitat assessment of an area southeast of Rankin Bank. 3. Glomar Shoal and Rankin Bank surveys, 2017. GWF-2 Monitoring Programme. Quantitatively surveyed benthic habitats and communities. 4. Temporal Studies survey of Rankin Bank and Glomar Shoal, 2018.	Barrow Island: Chevron: East and West Coast intertidal and subtidal baseline and monitoring Barrow, Montebello and Lowendal Islands: 1. Pilbara Marine Conservation Partnership Stereo BRUVS drops in shallow water (~10m) from Exmouth to Barrow Islands in 2015. 2. Finfish monitoring as part of DBCAs Western Australian Marine Monitoring Program (2015-ongoing).	1. CSIRO – Fish Diversity. 2. Fish species richness and abundance.	1. Fish assemblages quantitatively described Mermaid Sound using BRUVs. Recorded main habitat types (sand, reef, coral and macroalgae) and at a total of 412 sites. 2. West Australian Museum of Fish of Dampier archipelago. 3. Pilbara Marine Conservation Partnership Stereo BRUVS drops in shallow water (~10m) in 2015 around the Dampier Archipelago. 4. Finfish community monitoring as part of DBCA Dampier Archipelago Marine Monitoring Program (2007-ongoing).
		Methods:			
		1. BRUVs. 2. BRUVs. 3. BRUVs. 4. BRUVs.	Barrow Island – Chevron (2015a and b) – demersal fish: stereo BRUVS (subtidal habitats) and netting combination for mangrove habitat Barrow, Montebello and Lowendal Islands: 1. Stereo BRUVS. 2. Diver underwater visual surveys (UVS)	1. Semi V Wing trawl net or an epibenthic sled. 2. ROV Video.	1. BRUVs, Stereo Baited Remote Underwater Video Systems. 2. Fish collected and species lists. 3. Stereo BRUVS. 4. Diver UVS.
		References/ data:			
		1. AIMS 2014a and Abdul Wahab et al., 2018. DATAHOLDER: AIMS. 2. AIMS 2014b. DATAHOLDER: AIMS. 3. Currey-Randall et. al., 2019. DATAHOLDER: AIMS 4. Currey-Randall et. al., 2019. DATAHOLDER: AIMS	Barrow Island – Chevron Australia (2015a and b) DATAHOLDER: Chevron Barrow, Montebello and Lowendal Islands: 1. Unpublished report CSIRO DATAHOLDER: CSIRO, CSIRO Data centre ([2]) 2. DBCA	1. Keesing 2019. 2. McLean et al. 2019.	1. SKM 2008. DATAHOLDER: Woodside. 2. Hutchins 2004. DATAHOLDER: Woodside and WAM. 3. CSIRO. DATAHOLDER: CSIRO ([2]). 4. DBCA.

References

Abdul Wahab, M, A., Radford, B., Cappo, C., Colquhoun, J., Stowar, M., Depczynski, M., Miller, K and Heyward, A. (2018). Biodiversity and spatial patterns of benthic habitat and associated demersal fish communities at two tropical submerged reef ecosystems. *Coral Reefs*. Vol. 37, Issue 2, pp. 327-343. https://doi.org/10.1007/s00338-017-1655-9

Advisian (2019) Montebello Marine Park Benthic Habitat Survey ROV Analysis of the Scarborough Pipeline Route. Report Prepared for Woodside Energy Ltd. 183 pp.

Advisian (2021) Northwest Marine Region Seabird and Shorebird Baseline and Threats Review. Desktop Literature Review, Report to Woodside.

AIMS (2014a). AIMS 2013 Biodiversity Survey of Glomar Shoal and Rankin Bank. Report prepared by the Australian Institute of Marine Science for Woodside Energy Ltd. Australian Institute of Marine Science, Townsville. October 2014 Rev 1,153pp.

AIMS (2014b). AIMS 2014 Extended Benthic Models and Habitat Maps of Rankin Bank. Report prepared by the Australian Institute of Marine Science for Woodside Energy Ltd. Australian Institute of Marine Science, Townsville. December 2014 Rev 0 (43pp.).

AMOSC/DPAW (2014). Inter-Company Oil Spill Wildlife Response Plan – Pilbara region. pp. 272 http://www.dpaw.wa.gov.au/images/documents/conservation-management/marine/wildlife/PROWRP_20141103.pdf

Babcock R, Donovan A, Collin S and Ochieng-Erftemeijer C (2017). Pilbara Marine Conservation Partnership – Final Report – Volume 2 (Part III: Coral Reef Health). CSIRO Oceans & Atmosphere, Published Brisbane. https://research.csiro.au/pmcp/pmcp-publications/

Bancroft, K.P. (2009). Establishing long-term coral community monitoring sites in the Montebello/ Barrow Islands marine protected areas: data collected in December 2006. Marine Science Program Data Report Series MSPDR4. January 2009. Marine Science Program, Science Division, Department of Environment and Conservation, Perth, Western Australia. 68p.

Currey-Randall L, Wakeford M, Colquhoun J, Cappo M, Stowar M, Birt M, Cure K, Vaughan B, Case M, Fisher R and Miller KJ (2019) Temporal trends in benthic communities and demersal fishes at Rankin Bank and Glomar Shoal. Report prepared for Woodside Energy Ltd. Australian Institute of Marine Science, Perth. 59 pp.

DBCA (2017). Pluto LNG Environmental Offset D. Research and Monitoring in the Proposed Dampier Marine Reserves Program. Annual report 2016-2017. Report prepared for Woodside.

DBCA (2023). Pluto LNG Environmental Offset D. Research and Monitoring in the Proposed Dampier Marine Reserves Program. Annual report 2022-2023. Report prepared for Woodside.

Griffith, J.K. (2004). Scleractinian corals collected during 1998 from the Dampier Archipelago, Western Australia. *Records of the Western Australian Museum* Supplement No. 66: 101-120pp.

Hutchins, J.B. (2004). Fishes of the Dampier Archipelago, Western Australia. *Records of the Western Australian Museum* Supplement No. 66: 343-398.

Johnstone R.E, Burbidge A. H, Darnell J.C. (2013). Birds of the Pilbara Region, including seas and offshore islands, Western Australia: distribution, status and historical changes. Records of the Western Australian Museum, Supplement 78: 343-441. http://museum.wa.gov.au/sites/default/files/WAM_Supp78(B)_JOHNSTONEetal%20pp343-441_0.pdf

Keesing, J. K. (2019). Benthic habitats and biodiversity of the Dampier Archipelago and Montebello Australian Marine Parks. Report of the Director of Nationals Parks. CSIRO, Australia

Lymburner, L. et al. (2019). Remote Sensing of Environment. Mapping the multi-decadal mangrove dynamics of the Australian coastline. https://doi.org/10.1016/j.rse.2019.05.004

McLean, D., Taylor M., Vaughan B. (2019) Marine Communities of the Pluto Trunkline within the Montebello Marine Park. Report prepared for Woodside Energy Ltd. Australian Institute of Marine Science, Perth. 45 pp.

MScience, 2019. Scarborough Trunkline Marine Environmental Studies: Pre-dredging Coral Habitat Assessment. Unpublished report MSA275_2R01 to Advisian , Perth Western Australia, pp53.

Moustaka, M., Mohring. M.B., Holmes, T., Evans, R.D., Thomson, D., Nutt, C., Stoddart, J. and Wilson, S.K. (2019). Cross-shelf Heterogeneity of Coral Assemblages in Northwest Australia. Diversity 2019, 11, 15; doi:10.3390/d11020015

Pitcher, C., Miller, Margaret, Morello, Elisabetta & Fry, G. & Strzelecki, Joanna & McLeod, I. & Slawinski, Dirk & Ellis, N. & Thomson, Damian & Bearham, Douglas & Keesing, John & Donovan, A. & Mortimer, N. & Babcock, R. & Fromont, Jane & Gomez, Oliver & Hosie, Andrew & Hara, Ana & Moore, Glenn & Huisman, John. (2016). Environmental Pressures: Regional Biodiversity — Pilbara Seabed Biodiversity Mapping & Characterisation. https://www.researchgate.net/publication/310328261_Environmental_Pressures_Regional_Biodiversity_-_Pilbara_Seabed_Biodiversity_Mapping_Characterisation

ANNEX E: TACTICAL RESPONSE PLANS

TACTICAL RESPONSE PLANS
Exmouth
Mangrove Bay
Turquoise Bay
Yardie Creek
Muiron Islands
Jurabi to Lighthouse Beaches Exmouth
Ningaloo Reef – Refer to Mangrove/ Turquoise Bay and Yardie Creek
Exmouth Gulf
Shark Bay Area 1: Carnarvon to Wooramel
Shark Bay Area 2: Wooramel to Petite Point
Shark Bay Area 3: Petite Point to Dubaut Point
Shark Bay Area 4: Dubaut Point to Herald Bight
Shark Bay Area 5: Herald Bight to Eagle Bluff
Shark Bay Area 6: Eagle Bluff to Useless Loop
Shark Bay Area 7: Useless Loop to Cape Bellefin
Shark Bay Area 8: Cape Bellefin to Steep Point
Shark Bay Area 9: Western Shores of Edel Land
Shark Bay Area 10: Dirk Hartog Island
Shark Bay Area 11: Bernier and Dorre Islands
Abrohlos Islands: Pelseart Group
Abrohlos Islands: Wallabi Group
Abrohlos Islands: Easter Group
Dampier
Rankin Bank & Glomar Shoals
Barrow and Lowendal Islands
Pilbara Islands – Southern Island Group
Montebello Island – Stephenson Channel Nth TRP
Montebello Island – Champagne Bay and Chippendale channel TRP
Montebello Island – Claret Bay TRP
Montebello Island – Hermite/Delta Island Channel TRP
Montebello Island – Hock Bay TRP
Montebello Island – North and Kelvin Channel TRP
Montebello Island – Sherry Lagoon Entrance TRP
Withnell Bay
Holden Bay
King Bay
No Name Bay / No Name Beach
Enderby Island – Dampier
Rosemary Island – Dampier
Legendre Island – Dampier
Karratha Gas Plant

KGP to Withnell Creek
KGP to Northern Shore
KGP Fire Pond & Estuary
KGP to No Name Creek
Broome
Sahul Shelf Submerged Banks and Shoals
Clerke Reef (Rowley Shoals)
Imperieuse Island (Rowley Shoals)
Mermaid Reef (Rowley Shoals)
Scott Reef
Oiled Wildlife Response
Exmouth
Dampier region
Shark Bay

APPENDIX I: PLUTO OFFSHORE OPERATIONS FIRST STRIKE PLAN

Pluto Facility Operations – Oil Pollution First Strike Plan

Corporate HSE

Hydrocarbon Spill Preparedness

July 2024
Revision 9b

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CONTROL AGENCIES AND INCIDENT CONTROLLERS

Source	Location	Level	Control Agency	Incident Controller
Spill from facility including subsea infrastructure *Note: pipe laying and accommodation vessels are considered a "facility" under Australian regulations*	Commonwealth waters	1	Woodside	Person In Charge (PIC) with support from Onshore Team Leader (OTL)
		2/3	Woodside	Corporate Incident Management Team (CIMT) Duty Manager
	State waters	1	Woodside	CIMT Duty Manager
		2/3	Department of Transport (DoT)	DoT Incident Controller
	Within port limits	1	Woodside	CIMT Duty Manager
		2/3	DoT	DoT Incident Controller
Spill from vessel Note: SOPEP should be implemented in conjunction with this document	Commonwealth waters	1	Australian Marine Safety Authority (AMSA)	Vessel Master
		2/3	AMSA	AMSA (with response assistance from Woodside)
	State waters	1	DoT	DoT Incident Controller
		2/3	DoT	DoT Incident Controller
	Within port limits	1	Port Authority	Port Harbour Master
		2/3	Port Authority/ DoT	Port Harbour Master/ DoT Incident Controller

SPILLS IN STATE WATERS

In the event of a hydrocarbon spill (hereafter 'spill') where Woodside Burrup Pty Ltd ('Woodside') is the responsible party and the spill may impact State waters and shorelines, Woodside (or the Vessel Master) will commence the initial response actions and notify the Western Australian Department of Transport (DoT). In the event that Woodside is the responsible party for a spill that occurs within port limits, Woodside will notify the Port Authority and DoT for all spill levels.

Initially Woodside will be required to make available an appropriate number of suitably qualified persons to work in the DoT IMT (APPENDIX F – Woodside Liaison Officer resources to DoT). DoT/ Port Authority's role as the Controlling Agency in State waters does not negate the requirement for Woodside to have appropriate plans and resources in place to adequately respond to a marine hydrocarbon spill incident in State Waters/ within port limits, or to commence the initial response actions to a spill prior to DoT establishing incident control in line with DoT *Offshore Petroleum Industry Guidance Note – Marine Oil Pollution: Response and Consultation Arrangements* (July 2020). Cost recovery arrangements for offshore marine pollution incidents (MOP) are in accordance with Section 9 of the Guidance Note:

https://www.transport.wa.gov.au/mediaFiles/marine/MAC_P_Westplan_MOP_OffshorePetroleumIndGuidance.pdf

Woodside's Incident Management Structure for a hydrocarbon spill, including Woodside Liaison Officer's command structure within DoT can be seen at APPENDIX E – Woodside Incident Management structure.

The coordination structure for a concurrent hydrocarbon spill in both Commonwealth and State waters/ shorelines is shown in APPENDIX D – Coordination structure for a concurrent hydrocarbon spill in both Commonwealth and State waters/ shorelines.

RESPONSE PROCESS OVERVIEW

	For guidance on credible scenarios and hydrocarbon characteristics, refer to APPENDIX A	
ALL INCIDENTS	Notify the Woodside Communication Centre (WCC) on: [3]	
	Incident Controller or delegate to make relevant notifications in **Table 1-1** of this Oil Pollution First Strike Plan.	
LEVEL 1	**FACILITY INCIDENT**	**VESSEL INCIDENT**
	Coordinate pre-identified tactics in **Table 2-1** of this Oil Pollution First Strike Plan. Remember to download each Operational Plan.	Notify AMSA or Port Authority (if within port limits) and coordinate pre-identified tactics in **Table 2-1** of this Oil Pollution First Strike Plan Remember to download each Operational Plan.
	If the spill escalates such that the site cannot manage the incident, inform the WCC on: [3] and escalate to a level 2/3 incident.	
LEVEL 2/3	**FACILITY INCIDENT**	**VESSEL INCIDENT**
	Handover control to CIMT and notify DoT or Port Authority (if within port limits).	Handover control to AMSA or Port Authority (if within port limits) and stand up CIMT to assist.
	Commence quick revalidation of the recommended strategies in **Table 2-1** taking into consideration seasonal sensitivities and current situational awareness. Commence validated strategies.	If requested by AMSA/ Port Authority: Commence quick revalidation of the recommended strategies in **Table 2-1** taking into consideration seasonal sensitivities and current situational awareness. Commence validated strategies.
	Create an Incident Action Plan (IAP) for all ongoing operational periods. The content of the IAP should reflect the selected response strategies based on current situational awareness. For the full detailed pre-operational Net Environmental Benefit Analysis (NEBA) see the OSPRMA Appendix A.	If requested by AMSA/ Port Authority: Create an IAP for all ongoing operational periods. The content of the IAP should reflect the selected response strategies based on current situational awareness. For the full detailed pre-operational NEBA see the OSPRMA Appendix A.

1. NOTIFICATIONS

The Incident Controller or delegate must ensure the below notifications (Table 1-1) are completed within the designated timeframes.

For spills from a vessel, relevant notifications must be undertaken by a WEL representative.

Table 1-1: Notifications

In the event of an incident between campaign vessels, also activate relevant vessel Emergency Response Plans and/or Bridging Documents

Timing	By	To	Name	Contact	Instruction	Form	Complete? (ü)
NOTIFICATIONS FOR ALL LEVELS OF SPILL							
Immediately	Offshore Installation Manager (OIM) or Vessel Master	Woodside Communication Centre (WCC)	Duty Manager	[3]	Verbally notify WCC of event and estimated volume and hydrocarbon type.	Verbal	
Within 2 hours	Woodside Site Rep (WSR), Corporate Incident Management Team Duty Manager (CIMT DM) or Delegate	National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA[1])	Incident notification office	[4]	Verbally notify NOPSEMA for spills >80L. Record notification using Initial Verbal Notification Form or equivalent and send to NOPSEMA as soon as practicable (cc to NOPTA and DEMIRS).	Link	
Within 3 days	WSR, CIMT DM or Delegate				Provide a written NOPSEMA Incident Report Form as soon as practicable (no later than 3 days after notification) (cc to NOPTA and DEMIRS) NOPSEMA [4] NOPTA [5] DEMIRS [6]	[4]	
As soon as practicable	CIMT DM or Delegate	Woodside	Environment Duty Manager	As per roster	Verbally notify Duty Environment of event and seek advice on relevant performance standards from EP	Verbal	
Within 2 hours of becoming aware of a marine pollution incident (MOP) that occurs in or may impact state waters	CIMT DM or Delegate	WA Department of Transport	DoT Maritime Environmental Emergency Response Unit (MEER) Duty Officer	[7]	Verbally notify DoT MEER Duty Officer that a spill has occurred and, if required, request use of equipment stored in Karratha. Follow up with a written POLREP as soon as practicable following verbal notification. Additionally, DoT to be notified if spill is likely to extend into WA State waters. Request DoT to provide liaison to Woodside IMT.	[7]	
As soon as practicable if spill arises in or is likely to extend into port limits.	CIMT IC or Delegate	Pilbara Ports Authority (PPA)	PPA Dampier Vessel Traffic Services (VTS)	[16]	Any spill within or close to the Dampier Port boundary should be reported immediately to the PPA Dampier VTS.	Verbal/ [16]	
As soon as practicable	CIMT DM or Delegate	Department of Climate Change, Energy, the Environment and Water (DCCEEW) Director of National Parks	Marine Park Compliance Duty Officer	[8]	The Marine Park Compliance Duty Officer is notified in the event of oil pollution within a marine park, or where an oil spill response action must be taken within a marine park, so far as reasonably practicable, prior to response action being taken. This notification should include: • titleholder details • time and location of the incident • proposed response arrangements and locations as per the OPEP • contact details for the response coordinator • confirmation of access to relevant monitoring and evaluation reports when available.	Verbal	
As soon as practicable if there is potential for oiled wildlife or the spill is expected to contact land or waters managed by WA Department of Biodiversity, Conservation and Attractions	CIMT DM or Delegate	WA Department of Biodiversity, Conservation and Attractions (DBCA)	Duty Officer	[9]	Phone call notification	Verbal	

[1] Notification to NOPSEMA must be from a Woodside Representative.

As soon as practicable	Public Information	Relevant persons/ organisations	To be determined	To be determined	Should it be identified that additional persons such as, but not limited to, commercial fishers or tourism operators may be affected, Woodside would, at the relevant time, engage with these parties as appropriate and in alignment with the Oil Spill Preparedness and Response Mitigation Assessment (OSPRMA) for Pluto Facility Operations. Relevant persons/ organisations will be re-assessed throughout the response period.	Verbal initially	
As soon as practicable	Public Information	Relevant cultural authorities	To be determined	To be determined	Should it be identified that relevant cultural authorities may be affected, Woodside would, at the relevant time, engage with these parties as appropriate and in alignment with the Oil Spill Preparedness and Response Mitigation Assessment (OSPRMA) for Pluto Facility Operations. Relevant cultural authorities will be re-assessed throughout the response period.	Verbal initially	
ADDITIONAL NOTIFICATIONS TO BE MADE ONLY IF SPILL IS FROM A VESSEL							
"Without delay" as per *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Cth) s 11(1)	Vessel Master	Australian Maritime Safety Authority (AMSA)	Response Coordination Centre (RCC)	[10]	Verbally notify AMSA RCC of the hydrocarbon spill. Follow up with written Harmful Substances Report (POLREP – AMSA) as soon as practicable.	[10]	
ADDITIONAL LEVEL 2/3 NOTIFICATIONS							
As soon as practicable	CIMT DM or Delegate	AMOSC	AMOSC Duty Manager	[11]	Notify AMOSC that a spill has occurred and follow-up with an email from the CIMT IC/ Deputy CIMT IC/CMT Leader to formally activate AMOSC. Determine what resources are required consistent with the AMOS Plan and detail in a Service Contract that will be sent to Woodside from AMOSC upon activation.	[11]	
As soon as practicable	CIMT DM or Delegate	Oil Spill Response Limited (OSRL)	OSRL Duty Manager	[12]	Contact OSRL Duty Manager and request assistance from technical advisor in Perth. Send the completed notification form to OSRL as soon as practicable.	[12]	
					For mobilisation of resources, send the mobilisation form to OSRL as soon as practicable. The mobilisation form must be signed by a nominated callout authority from Woodside. OSRL can advise the names on the call out authority list, if required.	[12]	
As soon as practicable if extra personnel are required for incident support	CIMT DM or Delegate	Marine Spill Response Corporation (MSRC)	MSRC Response Manager	[13]	Activate the contract with MSRC (in full) for the provision of up to 30 personnel depending on what skills are required. Please note that provision of these personnel from MSRC are on a best endeavours basis and are not guaranteed.	Verbal	

2. RESPONSE TECHNIQUES

Table 2-1: Response techniques

Technique	Spill type			Level	Pre- Identified Tactics	Responsible	ALARP Commitment Summary	Link to Operational Plans for notification numbers and actions
	MGO (CS-05)	Condensate (trunkline) (MEE-02b)	Condensate (LOWC) (MEE-01)					
Operational monitoring – tracking buoy (OM02)	Yes	Yes	Yes	ALL	If a vessel is on location, consider the need to deploy the oil spill tracking buoy. If no vessel is on location, consider the need to mobilise oil spill tracking buoys from the King Bay Supply Base (KBSB) Stockpile. If a surface sheen is visible from the facility, deploy the satellite tracking buoy within two hours.	Operations	**WITHIN 24 HOURS:** Tracking buoy deployed within 2 hours.	Surveillance and Reconnaissance to Detect Hydrocarbons and Resources at Risk (OM02) of The Operational Monitoring Operational Plan. Deploy tracking buoy in accordance with Link.
Operational monitoring – predictive modelling (OM01)	Yes	Yes	Yes	ALL	Undertake initial modelling using the Rapid Assessment Oil Spill Tool and weathering fate analysis using Automated Data Inquiry for Oil Spills (ADIOS) or refer to the hydrocarbon information in **Appendix A.**	Situation or Environment	**WITHIN 24 HOURS:** Initial modelling within 6 hours using the Rapid Assessment Tool.	Predictive Modelling of Hydrocarbons to Assess Resources at Risk (OM01 of The Operational Monitoring Operational Plan). *Planning Section to download and follow steps*
	Yes	Yes	Yes	ALL	Send Oil Spill Trajectory Modelling (OSTM) form (Appendix B, Form 7) to RPS Response ([14]).	Situation	**WITHIN 24 HOURS:** Detailed modelling within 4 hours of RPS Response receiving information from Woodside.	
Operational monitoring – aerial surveillance (OM02)	Yes	Yes	Yes	ALL	Instruct Aviation Unit Leader to commence aerial observations in daylight hours. Aerial surveillance observer to complete log in Appendix B Form 8.	Logistics – Aviation	**WITHIN 24 HOURS:** 2 trained aerial observers. 1 aircraft available. Report made available to the IMT within 2 hours of landing after each sortie.	Surveillance and Reconnaissance to Detect Hydrocarbons and Resources at Risk (OM02 of The Operational Monitoring Operational Plan). *Planning Section to download and follow steps*
Operational monitoring – satellite tracking (OM02)	Yes	Yes	Yes	ALL	The Situation Unit Leader to action satellite imagery services. This may be obtained via: • AMOSC Duty Manager: [11] • OSRL Duty Manager: [12] • KSAT:[15] • Others identified by CIMT.	Situation	**WITHIN 24 HOURS:** Service provider will confirm availability of an initial acquisition within 2 hours. Data received to be uploaded into Woodside Common Operating Picture.	
Operational monitoring – monitoring hydrocarbons in water (OM03)	Yes	Yes	Yes	ALL	Consider the need to mobilise resources to undertake water quality monitoring (OM03).	Planning or Environment	**WITHIN 72 HOURS:** Water quality assessment access and capability. Daily fluorometry reports will be provided to IMT.	Detecting and Monitoring for the Presence and Properties of Hydrocarbons in the Marine Environment (OM03 of The Operational Monitoring Operational Plan).
Operational monitoring – pre-emptive assessment of receptors at risk (OM04)	Potentially	Yes	Potentially	ALL	**MEE-02b:** Consider the need to mobilise resources to undertake pre-emptive assessment of sensitive receptors at risk (OM04).	Planning or Environment	**WITHIN 24 HOURS:** In agreement with WA DoT, deployment of 1 specialist for each of the Response Protection Areas (RPA) with predicted impacts.	Pre-emptive Assessment of Sensitive Receptors (OM04 of The Operational Monitoring Operational Plan).
Operational monitoring – shoreline assessment (OM05)	Potentially	Yes	Potentially	ALL	**MEE-02b:** Consider the need to mobilise resources to undertake shoreline assessment surveys (OM05).	Planning or Environment	**WITHIN 24 HOURS:** In agreement with WA DoT, deployment of 1 specialist trained in Shoreline Clean-up Assessment Technique (SCAT) for each of the RPAs with predicted impacts.	Shoreline Assessment (OM05 of The Operational Monitoring Operational Plan).
Surface dispersant	No	No	No	ALL	This response strategy is not recommended for spills of volatile hydrocarbons such as MGO and Pluto Condensate.			
Containment and recovery	No	No	No	ALL	This response strategy is not recommended for spills of volatile hydrocarbons such as MGO and Pluto Condensate.			
Mechanical dispersion	No	No	No	ALL	This response strategy is not recommended for spills of volatile hydrocarbons such as MGO and Pluto Condensate.			
In-situ burning	No	No	No	ALL	This response strategy is not recommended for spills of volatile hydrocarbons such as MGO and Pluto Condensate.			

Technique	Spill type			Level	Pre- Identified Tactics	Responsible	ALARP Commitment Summary	Link to Operational Plans for notification numbers and actions
	MGO (CS-05)	Condensate (trunkline) (MEE-02b)	Condensate (LOWC) (MEE-01)					
Shoreline protection and deflection	**No**	**Yes**	**No**	**ALL**	**MEE-02b:** Equipment from Woodside, PPA (if within port limits), AMOSC and AMSA Western Australian Stockpiles mobilised. Consideration of mobilisation of interstate/international shoreline protection equipment (i.e. OSRL).	Operations and Planning	**WITHIN 24 HOURS:** In agreement with WA DoT, activate relevant Tactical Response Plans (TRPs) within 12 hours. In agreement with WA DoT, mobilise teams to RPAs within 24 hours of operational monitoring predicting impacts. In agreement with WA DoT, equipment mobilised from closest stockpile within 24 hours. **WITHIN 48 HOURS:** Supplementary equipment mobilised from AMOSC, AMSA and State stockpiles within 48 hours. Supplementary equipment mobilised from OSRL within 48 hours.	Protection and Deflection Operational Plan *Logistics Section to download and follow steps*
Shoreline clean-up	**No**	**Yes**	**No**	**ALL**	**MEE-02b:** Equipment from Woodside, PPA (if within port limits), AMOSC and AMSA Western Australian Stockpiles and relevant personnel mobilised. Consideration of mobilisation of interstate/international shoreline clean-up equipment and relevant personnel (i.e. OSRL).	Logistics and Planning	**WITHIN 24 HOURS:** Relevant Tactical Response Plans (TRPs) will be identified in the First Strike Plan for activation within 24 hours of a release. In liaison with WA DoT (for Level 2/3 incidents), mobilise and deploy 1-2 shoreline clean-up operations within 24 hours. In agreement with WA DoT, equipment mobilised from closest stockpile within 24 hours. Access to ~124 m^3 of solid and liquid waste storage available within 24 hours upon activation of 3rd party contract. Access to 675 m^3 of solid and liquid waste storage available by end of day 4. **WITHIN 48 HOURS:** Supplementary equipment mobilised from AMOSC, AMSA and State stockpiles within 48 hours. Supplementary equipment mobilised from OSRL within 48 hours.	Shoreline Clean-up Operational Plan *Logistics Section to download and follow steps*
Oiled wildlife response	**Yes**	**Yes**	**Yes**	**ALL**	If oiled wildlife is a potential impact, request AMOSC to mobilise containerised oiled wildlife first strike kits and relevant personnel. Refer to relevant Tactical Response Plan for potential wildlife at risk. Mobilise AMOSC Oiled Wildlife Containers. Consider whether additional equipment is required from local suppliers.	Logistics and Planning	**WITHIN 24 HOURS:** Initiate a wildlife first strike response within 24 hours of confirmed or imminent wildlife contact as directed by relevant Operational Monitoring techniques (OM01-05) and in liaison with DBCA.	Oiled Wildlife Response Operational Plan
Scientific monitoring (type II)	**Yes**	**Yes**	**Yes**	**ALL**	Notify Woodside science team of spill event.	Environment		Oil Spill Scientific Monitoring Programme – Operational Plan
SOURCE CONTROL TECNIQUES								
Subsea First Response Toolkit	**N/A**	**N/A**	**Yes**	**L2/3**	Equipment from Oceaneering support staff all year round, via contract, to assist with the mobilisation, deployment, and operation of the SFRT equipment.	Operations – Source Control Unit	SFRT equipment mobilised to site for deployment within 11 days.	Source Control Emergency Response Planning Guideline
Subsea Dispersant	**N/A**	**N/A**	**No**	**L2/3**	This response strategy is not recommended.			
Capping Stack	**N/A**	**N/A**	**Yes**	**L2/3**	Wild Well Control Inc (WWCI) staff available all year round to assist with the mobilisation, deployment, and operation of the capping stack and well intervention equipment.	Operations – Source Control Unit	**WITHIN 24 HOURS:** Identify source control vessel availability within 24 hours.	

Technique	Spill type			Level	Pre- Identified Tactics	Responsible	ALARP Commitment Summary	Link to Operational Plans for notification numbers and actions
	MGO (CS-05)	Condensate (trunkline) (MEE-02b)	Condensate (LOWC) (MEE-01)					
							Capping stack on suitable vessel mobilised to site within 16 days. Deployment and well intervention attempt will be made once plume size is acceptable and safety and metocean conditions are suitable.	
Relief Well	**N/A**	**N/A**	**Yes**	**L2/3**	Relief MODU supply arrangements through the AEP MoU. Wild Well Control Inc (WWCI) staff available all year round to assist with the mobilisation, deployment, and operation well intervention equipment.	Operations – Source Control Unit	**WITHIN 24 HOURS** Identify source control vessel availability within 24 hours. MODU mobilised to site for relief well drilling within 21 days, with drilling to be completed within 77 days (LOWC during Pluto Facility Operations activities) or 64 days (LOWC for Xena-03 activities).	

3. RESPONSE PROTECTION AREAS

Action: Provide relevant Control Agency with applicable Tactical Response Plans for any Response Protection Areas (RPAs) identified during operational monitoring.

Based on hydrocarbon spill modelling results, the sensitive receptors outlined in **Table 3-1** are identified as priority protection areas, as they have the potential to be contacted by hydrocarbon at or above impact threshold levels within 48 hours of a spill. These arise from MEE-02b only (see **Table A-1**) and thus receptor distances are measured from the closest point of the trunkline Operational Area.

Table 3-1: Receptors for priority protection with potential impact within 48 Hours

Receptor	Distance and direction from trunkline Operational Area (km)	Minimum time to shoreline contact (above 100 g/m^2) in hours	Maximum shoreline accumulation (above 100 g/m^2) in m^3	Tactical Response Plans
Cape Bruguieres	12.7 km south-southeast	32 hours (4 m^3)	4 m^3 (32 hours)	Mermaid Sound - Dampier Archipelago Inshore Waters
Dampier Archipelago	Adjacent	21 hours (9 m^3)	9 m^3 (21 hours)	
Cohen Island	9.9 km southeast	30 hours (<1 m^3)	5 m^3 (31 hours)	
Keast Island	12.7 km southeast	32 hours (3 m^3)	3 m^3 (32 hours)	
Legendre Island	11.9 km east-southeast	22 hours (6 m^3)	6 m^3 (22 hours)	Legendre Island – Dampier

Hydrocarbon spill modelling results indicate no additional sensitive receptors have the potential to be contacted by hydrocarbons at response thresholds (>100 g/m^2) beyond 48 hours of a spill. In a real event, oil spill trajectory modelling specific to the spill will be required to determine the regional sensitive receptors to be contacted beyond 48 hours of a spill.

Tactical Response plans for these and other locations can be accessed via this link and include the details of potential forward operating bases and staging areas.

Figure 3-1 illustrates the location of regional sensitive receptors in relation to the Pluto Facility Operational Area and identifies priority protection areas.

Consideration should be given to other stakeholders (including mariners) in the vicinity of the spill location. **Table 3-2** indicates the assets within the vicinity of the PLA02 Operations Area.

Table 3-2: Assets in the vicinity of the Pluto Facility Operations Area Operational Area

Asset	Distance and Direction from PLA02 well	Operator
Wheatstone platform	26.1 km east-southeast	Chevron
Angel platform	159.2 km northeast	Woodside
John Brookes	61.8 km	Santos
Goodwyn Alpha platform	87.2 km northeast	Woodside
North Rankin Complex	110.2 km northeast	Woodside
Reindeer wellhead platform	123.8 km east-southeast	Santos
Stag A	126.7 km southeast	Jadestone

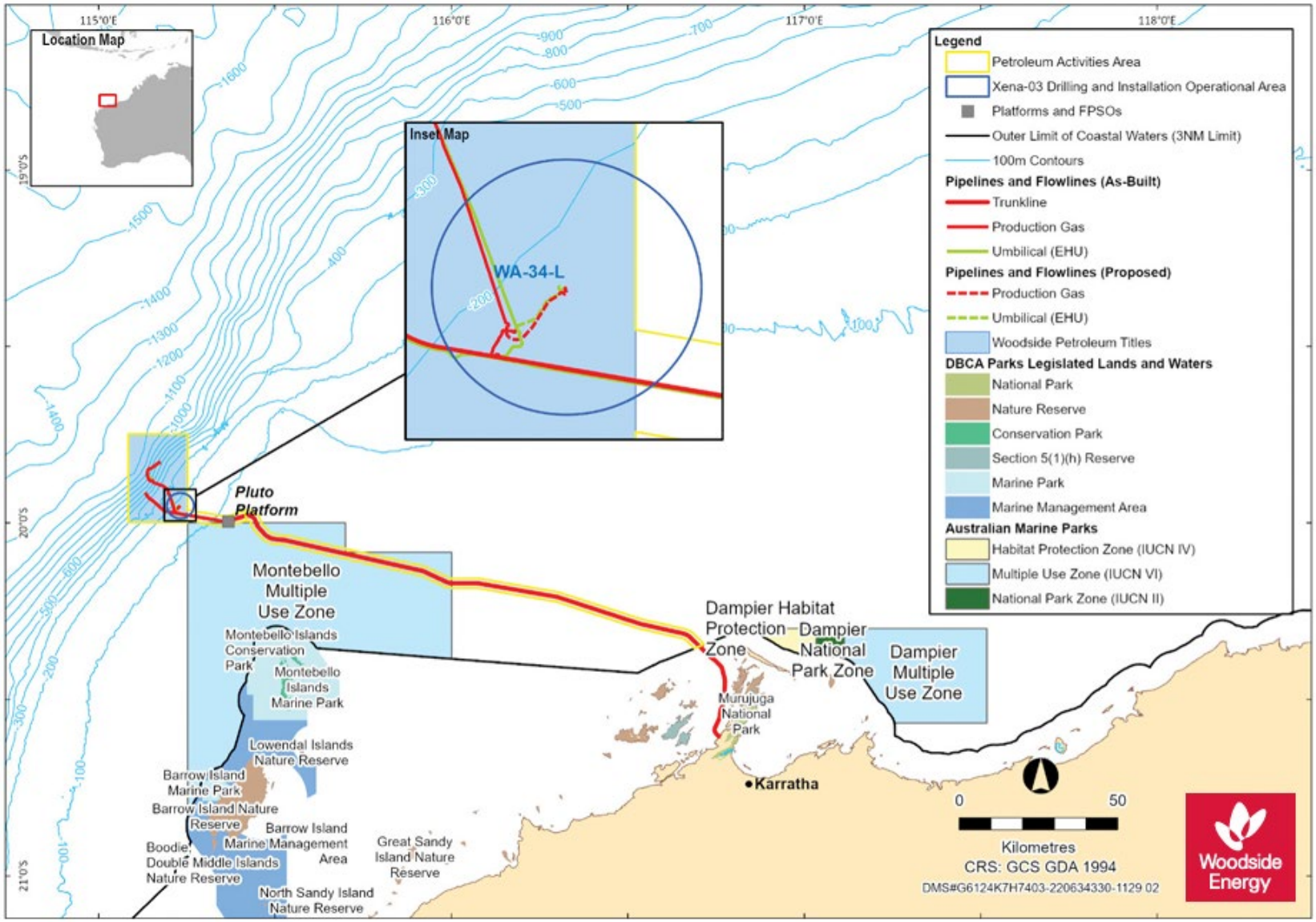


Figure 3-1: Operational area

4. DISPERSANT APPLICATION

Dispersant is not considered an appropriate response strategy for this activity as described in the Pluto Facility Operations Environment Plan Appendix D (Woodside's Oil Spill Preparedness and Response Mitigation Assessment).

APPENDIX A – CREDIBLE SPILL SCENARIOS AND HYDROCARBON INFORMATION

Table A - 1: Credible spill scenarios and hydrocarbon information

Scenario	Product	Volume	Residue	Weathering rate		Suggested ADIOS2 Analogue[2]
CS-01: *A long-term (64-day) release of Eris-1 loss of well containment during drilling at the Xena-03 well*	*Eris-1 Condensate*	Total: 46,631 m^3 1880 m^3 (surface) 44,751 m^3 (subsea)	Surface: 10.01% (188.2 m^3) Seabed: 3.39% (1517.1 m^3)	12 hours (BP < 180 °C)	Surface: 14.97% Seabed: 65.99%	*Martin Linge Condensate API 42.2*
				24 hours (180 °C < BP < 265 °C)	Surface 48.43% Seabed: 21.6%	
				Several days (265 °C < BP < 380 °C)	Surface: 26.6% Seabed: 9.02%	
MEE-01 (WCCS): L*ong-term (77-day) subsurface release of Pluto Condensate caused by a loss of well containment from PLA02 well*	*Pluto Condensate*	59,459 m^3	2.53% (1504 m^3)	12 hours (BP < 180 °C)	67.97%	*NWS Condensate API 62.6*
				24 hours (180 °C < BP < 265 °C)	18.48%	
				Several days (265 °C < BP < 380 °C)	10.05%	
MEE-02a: *Loss of containment of the export pipeline at 29 km from Pluto A*	*Pluto Condensate*	479 tons (632 standard m^3)	0.5% (3.16 m^3)	12 hours (BP < 180 °C)	76%	*NWS Condensate API 62.6*
				24 hours (180 °C < BP < 265 °C)	14%	
				Several days (265 °C < BP < 380 °C)	9.5%	
MEE-02b (WCCS): *Loss of containment of the export pipeline at a location near-shore*	*Pluto Condensate*	607 tons (662 standard m^3)	0.5% (3.31 m^3)	12 hours (BP < 180 °C)	76%	*NWS Condensate API 62.6*
				24 hours (180 °C < BP < 265 °C)	14%	
				Several days (265 °C < BP < 380 °C)	9.5%	
CS-05: L*oss of vessel containment at the PLA platform*	*Marine Gas Oil*	1000 m^3	5.0% (50 m^3)	12 hours (BP < 180 °C)	6%	*Diesel Fuel Oil (Southern USA 1). API of 37.2*
				24 hours (180 °C < BP < 265 °C)	34.6%	
				Several days (265 °C < BP < 380 °C)	54.4%	

[2] Initial screening of possible ADIOS2 analogues considered hydrocarbons with similar APIs. Suggested selection is based on the closest distillation cut to the Woodside hydrocarbon. Only hydrocarbons with >380°C distillation cuts were included in selection process.

APPENDIX B – NOTIFICATION FORMS

Table B - 1: Notification forms

No.	Form Name	Link
1	Record of initial verbal notification to NOPSEMA template	Link
2	NOPSEMA Incident Report Form	[4]
3	Harmful Substances Report (POLREP – AMSA)	[10]
4	Marine Pollution Report (POLREP – DoT)	[7]
5	PPA Incident Reporting Form	[16]
6	AMOSC Service Contract	[11]
7a	OSRL Initial Notification Form	[12]
7b	OSRL Mobilisation Activation Form	[12]
8	RPS Response Oil Spill Trajectory Modelling Request	[14]
9	Aerial Surveillance Observer Log	Link
10	Tracking buoy deployment instructions	Link

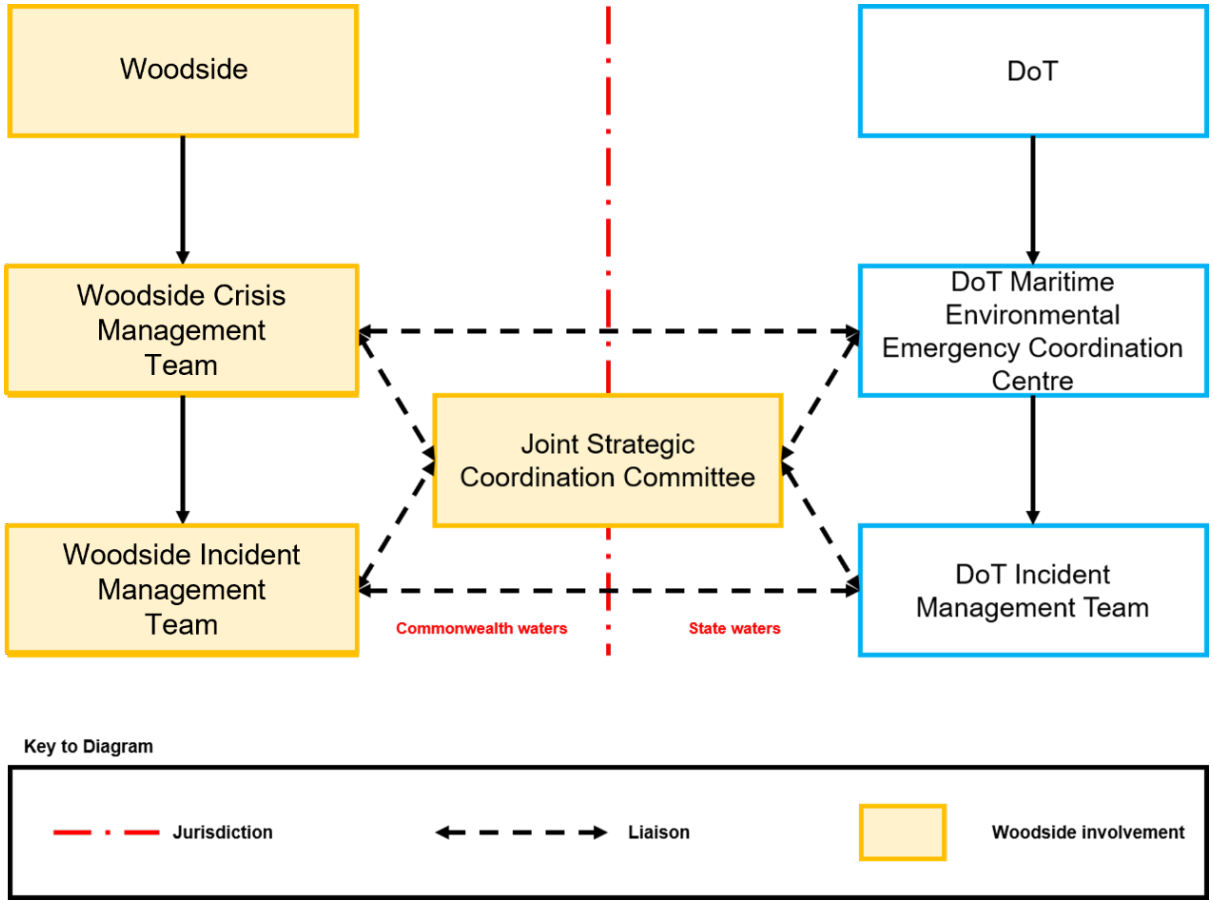
FORM 1 – RECORD OF INITIAL VERBAL NOTIFICATION TO NOPSEMA

NOPSEMA phone: [4]		
Date of call		
Time of call		
Call made by		
Call made to		
Information to be provided to NOPSEMA:		
Date and time of incident/ time caller became aware of incident		
Details of incident	**1. Location**	
	2. Title	
	3. Source	□ **Platform**
		□ **Pipeline**
		□ **FPSO**
		□ **Exploration drilling**
		□ **Well**
		□ **Other (please specify)**
	4. Hydrocarbon type	
	5. Estimated volume	
	6. Has the discharge ceased?	
	7. Fire, explosion or collision?	
	8. Environment Plan(s)	
	9. Other Details	
Actions taken to avoid or mitigate environmental impacts		
Corrective actions taken or proposed to stop, control or remedy the incident		
After the initial call is made to NOPSEMA, please send this record as soon as practicable to:		
NOPSEMA	**[4]**	
NOPTA	**[5]**	
DEMIRS	**[6]**	

APPENDIX C – SPILL ASSESSMENT QUESTIONS

What has happened?		
Date/time		
Spill source		
Spill cause		
Safety situation		
What is it?		
Oil type and name		
Oil properties	Specific gravity	
	Viscosity	
	Pour point	
	Asphaltenes	
	Wax content	
	Boiling point	
Where is it?		
Latitude and longitude		
Distance and bearing		
Affected area	☐ Offshore	
	☐ Subsea	
	☐ Shoreline	
	☐ Estuary	
	☐ Port	
	☐ Harbour	
	☐ Inland	
	☐ River	
	☐ Other (please detail):	
Water depth		
How big is it?		
Area		
Release type	☐ Instantaneous	Estimated volume:
	☐ Continuous release	Estimated release rate:
Where it is going?		
Metocean conditions		
Currents and tides		
What is in the way?		
Resources at risk		
Time until resource contact		
What's happening to it?		
Weathering processes		
Response actions underway		

APPENDIX D – COORDINATION STRUCTURE FOR A CONCURRENT HYDROCARBON SPILL IN BOTH COMMONWEALTH AND STATE WATERS/ SHORELINES[3]



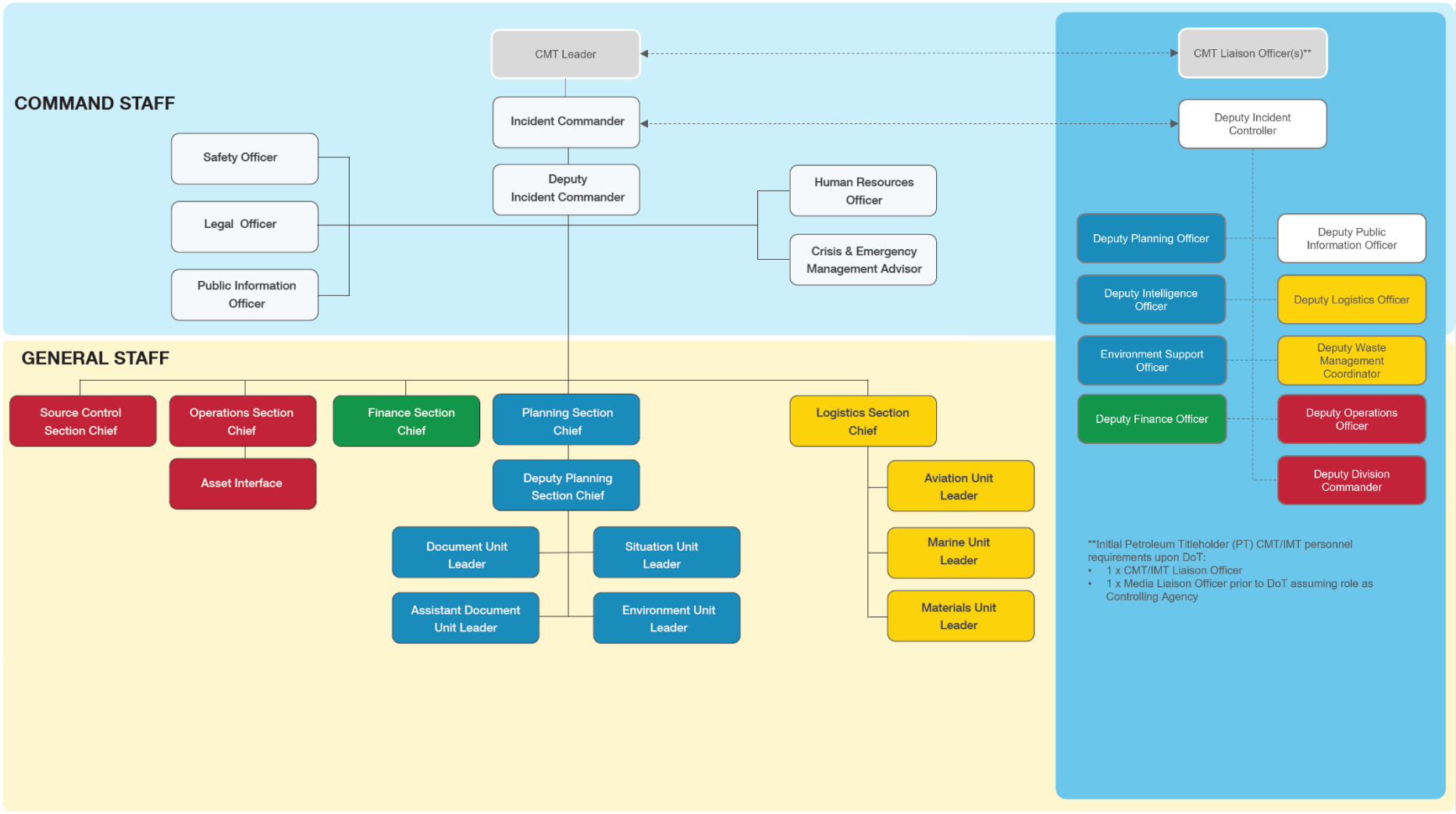
The Control Agency for a hydrocarbon spill in Commonwealth waters resulting from an offshore petroleum activity is Woodside (the Petroleum Titleholder).

The Control Agency/Hazard Management Agency (HMA) for a hydrocarbon spill in State waters/shorelines resulting from an offshore petroleum activity is DoT. DoT will appoint an Incident Controller and form a separate IMT to only manage the spill within State waters/shorelines.

[3] Adapted from DoT Offshore Petroleum Industry Guidance Note, Marine Oil Pollution: Response and Consultation Arrangements July 2020. Note: For full structure up to Commonwealth Cabinet/Minister refer to Marine Oil Pollution: Response and Consultation Arrangements Section 6.5, Figure 4.

APPENDIX E – WOODSIDE INCIDENT MANAGEMENT STRUCTURE

Woodside incident management structure for hydrocarbon spill (including Woodside Liaison Officers command structure within DoT IMT if required).



APPENDIX F – WOODSIDE LIAISON OFFICER RESOURCES TO DOT

In the event that DoT is required to establish an IMT, Woodside will make available an appropriate number of appropriately qualified persons to work within the DoT IMT. In the event the PPA is the Control Agency within the Dampier Port Limits, Woodside will make available similar roles as requested.

It is an expectation that Woodside's nominated CMT Liaison Officer and the Deputy Incident Controller attend the DoT Fremantle Incident Control Centre (ICC) as soon as possible after the formal request has been made by the State Marine Pollution Coordinator (SMPC), and that the remaining initial cohort will attend no later than 8 am on the day following the request being formally made to Woodside by the SMPC. For Woodside personnel designated to serve in DoT's Forward Operating Base (FOB), it is expected that they arrive at the FOB no later than 24 hours from the formal request being made by the SMPC.

Area	Role	Woodside Liaison Role[4]	Key Duties	#
DoT Maritime Environmental Emergency Coordination Centre (MEECC)	CMT Liaison Officer	CIMT Liaison	• Provide a direct liaison between the CMT and the MEECC. • Facilitate effective communications and coordination between the CIMT Leader and SMPC. • Offer advice to SMPC on matters pertaining to PT crisis management policies and procedures.	1
DoT IMT Incident Control	Deputy Incident Controller	Deputy Incident Commander (Deputy IC)	• Provide a direct liaison between the PT IMT and DoT IMT. • Facilitate effective communications and coordination between the PT IC and the DoT IC. • Offer advice to the DoT IC on matters pertaining to PT incident response policies and procedures. • Offer advice to the Safety Coordinator on matters pertaining to PT safety policies and procedures, particularly as they relate to PT employees or contractors operating under the control of the DoT IMT.	1
DoT IMT Intelligence	Deputy Intelligence Officer	Situation Unit Leader (Intelligence)	• As part of the Intelligence Team, assist the Intelligence Officer in the performance of their duties in relation to situation and awareness. • Facilitate the provision of relevant modelling and predications from the PT IMT. • Assist in the interpretation of modelling and predictions originating from the PT IMT. • Facilitate the provision of relevant situation and awareness information originating from the DoT IMT to the PT IMT. • Facilitate the provision of relevant mapping from the PT IMT. • Assist in the interpretation of mapping originating from the PT IMT. • Facilitate the provision of relevant mapping originating from the DoT IMT to the PT IMT.	1

[4] *These positions would be mobilised, in consultation with DoT, to align to the actual spill scenario. The selected roles and/or individual personnel would be subject to continued evaluation to ensure continued 'best fit'. For CIMT roster arrangements, contact the WCC. During a prolonged response, additional personnel may be sourced through internal resourcing and mutual Aid agreements such as the AMOSC Core Group via [11].*

Area	Role	Woodside Liaison Role[4]	Key Duties	#
DoT IMT Intelligence – Environment	Environment Support Officer	Deputy Environment Unit Leader	• As part of the Intelligence Team, assist the Environment Coordinator in the performance of their duties in relation to the provision of environmental support into the planning process. • Assist in the interpretation of the PT OPEP and relevant TRP plans. • Facilitate in requesting, obtaining and interpreting environmental monitoring data originating from the PT IMT. • Facilitate the provision of relevant environmental information and advice originating from the DoT IMT to the PT IMT.	1
DoT IMT Planning-Plans/ Resources	Deputy Planning Officer	Deputy Planning Section Chief	• As part of the Planning Team, assist the Planning Officer in the performance of their duties in relation to the interpretation of existing response plans and the development of incident action plans and related sub plans. • Facilitate the provision of relevant IAP and sub plans from the PT IMT. • Assist in the interpretation of the PT OPEP from the PT. • Assist in the interpretation of the PT IAP and sub plans from the PT IMT. • Facilitate the provision of relevant IAP and sub plans originating from the DoT IMT to the PT IMT. • Assist in the interpretation of the PT existing resource plans. • Facilitate the provision of relevant components of the resource sub plan originating from the DoT IMT to the PT IMT. **(Note this individual must have intimate knowledge of the relevant PT OPEP and planning processes)**	1
DoT IMT Public Information-Media/ Community Engagement	Deputy Public Information Officer	Deputy Public Information Officer	• As part of the Public Information Team, provide a direct liaison between the PT Media team and DoT IMT Media team. • Facilitate effective communications and coordination between the PT and DoT media teams. • Assist in the release of joint media statements and conduct of joint media briefings. • Assist in the release of joint information and warnings through the DoT Information and Warnings team. • Offer advice to the DoT Media Coordinator on matters pertaining to PT media policies and procedures. • Facilitate effective communications and coordination between the PT and DoT Community Liaison teams. • Assist in the conduct of joint community briefings and events. • Offer advice to the DoT Community Liaison Coordinator on matters pertaining to the PT community liaison policies and procedures. • Facilitate the effective transfer of relevant information obtained from through the Contact Centre to the PT IMT.	1

Area	Role	Woodside Liaison Role[4]	Key Duties	#
DoT IMT Logistics	Deputy Logistics Officer	Deputy Logistics Section Chief	• As part of the Logistics Team, assist the Logistics Officer in the performance of their duties in relation to the provision of supplies to sustain the response effort. • Facilitate the acquisition of appropriate supplies through the PTs existing OSRL, AMOSC and private contract arrangements. • Collects Request Forms from DoT to action via PT IMT. **(Note this individual must have intimate knowledge of the relevant PT logistics processes and contracts)**	1
DoT IMT Finance-Accounts/ Financial Monitoring	Deputy Finance Officer	Deputy Finance Section Chief	• As part of the Finance Team, assist the Finance Officer in the performance of their duties in relation to the setting up and payment of accounts for those services acquired through the PTs existing OSRL, AMOSC and private contract arrangements. • Facilitate the communication of financial monitoring information to the PT to allow them to track the overall cost of the response. • Assist the Finance Officer in the tracking of financial commitments through the response, including the supply contracts commissioned directly by DoT and to be charged back to the PT.	1
DoT IMT Operations	Deputy Operations Officer	Deputy Operations Section Chief	• As part of the Operations Team, assist the Operations Officer in the performance of their duties in relation to the implementation and management of operational activities undertaken to resolve an incident. • Facilitate effective communications and coordination between the PT Operations Section and the DoT Operations Section. • Offer advice to the DoT Operations Officer on matters pertaining to PT incident response procedures and requirements. • Identify efficiencies and assist to resolve potential conflicts around resource allocation and simultaneous operations of PT and DoT response efforts.	1
DoT IMT Operations – Waste Management	Deputy Waste Management Coordinator	Deputy Waste Coordinator (Materials)	• As part of the Operations Team, assist the Waste Management Coordinator in the performance of their duties in relation to the provision of the management and disposal of waste collected in State waters. • Facilitate the disposal of waste through the PT's existing private contract arrangements related to waste management and in line with legislative and regulatory requirements. • Collects Request Forms from DoT to action via PT IMT.	1
DoT FOB Operations Command	Deputy Division Commander	FOB Deputy Incident Commander	• As part of the Field Operations Team, assist the Division Commander in the performance of their duties in relation to the oversight and coordination of field operational activities undertaken in line with the IMT Operations Section's direction. • Provide a direct liaison between the PT FOB and DoT FOB.	1

Area	Role	Woodside Liaison Role[4]	Key Duties	#
			• Facilitate effective communications and coordination between the PT Division Commander and the DoT Division Commander. • Offer advice to the DoT Division Commander on matters pertaining to PT incident response policies and procedures. • Assist the Safety Coordinator deployed in the FOB in the performance of their duties, particularly as they relate to PT employees or contractors. • Offer advice to the Safety Coordinator deployed in the FOB on matters pertaining to PT safety policies and procedures.	
			Total	11

APPENDIX G – DOT LIAISON OFFICER RESOURCES TO WOODSIDE

Once DoT activates a State waters/shorelines IMT, DoT will make available the following roles to Woodside.

Area	DoT Liaison Role	Personnel Sourced from:	Key Duties	#
Woodside CIMT	DoT Liaison Officer (prior to DoT assuming Controlling Agency)/ Deputy Incident Controller – State waters (after DoT assumes Controlling Agency)	DoT	• Facilitate effective communications between DoT's SMPC/ Incident Controller and the Petroleum Titleholder's appointed CMT Leader / Incident Controller. • Provide enhanced situational awareness to DoT of the incident and the potential impact on State waters. • Assist in the provision of support from DoT to the Petroleum Titleholder. • Facilitate the provision technical advice from DoT to the Petroleum Titleholder Incident Controller as required.	1
Woodside Public Information – Media	DoT Media Liaison Officer	DoT	• Provide a direct liaison between the PT Media team and DoT IMT Media team. • Facilitate effective communications and coordination between the PT and DoT media teams. • Assist in the release of joint media statements and conduct of joint media briefings. • Assist in the release of joint information and warnings through the DoT Information & Warnings team. • Offer advice to the PT Media Coordinator on matters pertaining to DoT and wider Government media policies and procedures.	1
			Total DoT Personnel Initial Requirement to Woodside	2

APPENDIX J: XENA-03 DRILLING AND TIE-BACK FIRST STRIKE PLAN

Xena-03 Tie-back – Oil Pollution First Strike Plan

Corporate HSE

Hydrocarbon Spill Preparedness

July 2024
Revision 0a

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CONTROL AGENCIES AND INCIDENT CONTROLLERS

Source	Location	Level	Control Agency	Incident Controller
Spill from facility including subsea infrastructure *Note: pipe laying and accommodation vessels are considered a "facility" under Australian regulations*	Commonwealth waters	1	Woodside	Person In Charge (PIC) with support from Onshore Team Leader (OTL)
		2/3	Woodside	Corporate Incident Management Team (CIMT) Duty Manager
	State waters	1	Woodside	CIMT Duty Manager
		2/3	Department of Transport (DoT)	DoT Incident Controller
	Within port limits	1	Woodside	CIMT Duty Manager
		2/3	DoT	DoT Incident Controller
Spill from vessel Note: SOPEP should be implemented in conjunction with this document	Commonwealth waters	1	Australian Marine Safety Authority (AMSA)	Vessel Master
		2/3	AMSA	AMSA (with response assistance from Woodside)
	State waters	1	DoT	DoT Incident Controller
		2/3	DoT	DoT Incident Controller
	Within port limits	1	Port Authority	Port Harbour Master
		2/3	Port Authority/ DoT	Port Harbour Master/ DoT Incident Controller

SPILLS IN STATE WATERS

In the event of a hydrocarbon spill (hereafter 'spill') where Woodside Burrup Pty Ltd ('Woodside') is the responsible party and the spill may impact State waters and shorelines, Woodside (or the Vessel Master) will commence the initial response actions and notify the Western Australian Department of Transport (DoT).

Initially Woodside will be required to make available an appropriate number of suitably qualified persons to work in the DoT IMT (APPENDIX F – Woodside Liaison Officer resources to DoT). DoT role as the Controlling Agency in State waters does not negate the requirement for Woodside to have appropriate plans and resources in place to adequately respond to a marine hydrocarbon spill incident in State Waters or to commence the initial response actions to a spill prior to DoT establishing incident control in line with DoT *Offshore Petroleum Industry Guidance Note – Marine Oil Pollution: Response and Consultation Arrangements* (July 2020). Cost recovery arrangements for offshore marine pollution incidents (MOP) are in accordance with Section 9 of the Guidance Note:

https://www.transport.wa.gov.au/mediaFiles/marine/MAC_P_Westplan_MOP_OffshorePetroleumIndGuidance.pdf

Woodside's Incident Management Structure for a hydrocarbon spill, including Woodside Liaison Officer's command structure within DoT can be seen at APPENDIX E – Woodside Incident Management structure.

The coordination structure for a concurrent hydrocarbon spill in both Commonwealth and State waters/ shorelines is shown in APPENDIX D – Coordination structure for a concurrent hydrocarbon spill in both Commonwealth and State waters/ shorelines.

RESPONSE PROCESS OVERVIEW

	For guidance on credible scenarios and hydrocarbon characteristics, refer to APPENDIX A	
ALL INCIDENTS	Notify the Woodside Communication Centre (WCC) on: [3]	
	Incident Controller or delegate to make relevant notifications in **Table 1-1** of this Oil Pollution First Strike Plan.	
LEVEL 1	**FACILITY INCIDENT**	**VESSEL INCIDENT**
	Coordinate pre-identified tactics in **Table 2-1** of this Oil Pollution First Strike Plan. Remember to download each Operational Plan.	Notify AMSA and coordinate pre-identified tactics in **Table 2-1** of this Oil Pollution First Strike Plan Remember to download each Operational Plan.
	If the spill escalates such that the site cannot manage the incident, inform the WCC on: [3] and escalate to a level 2/3 incident.	
LEVEL 2/3	**FACILITY INCIDENT**	**VESSEL INCIDENT**
	Handover control to CIMT and notify DoT	Handover control to AMSA and stand up CIMT to assist.
	Commence quick revalidation of the recommended strategies in **Table 2-1** taking into consideration seasonal sensitivities and current situational awareness. Commence validated strategies.	If requested by AMSA: Commence quick revalidation of the recommended strategies in **Table 2-1** taking into consideration seasonal sensitivities and current situational awareness. Commence validated strategies.
	Create an Incident Action Plan (IAP) for all ongoing operational periods. The content of the IAP should reflect the selected response strategies based on current situational awareness. For the pre-operational Net Environmental Benefit Analysis (NEBA) see the related Pluto Facility Operations OSPRMA Appendix A	If requested by AMSA: Create an IAP for all ongoing operational periods. The content of the IAP should reflect the selected response strategies based on current situational awareness. For the pre-operational NEBA see the related Pluto Facility Operations OSPRMA Appendix A

1. NOTIFICATIONS

The Incident Controller or delegate must ensure the below notifications (Table 1-1) are completed within the designated timeframes.

For spills from a vessel, relevant notifications must be undertaken by a WEL representative.

Table 1-1: Notifications

In the event of an incident between campaign vessels, also activate relevant vessel Emergency Response Plans and/or Bridging Documents

Timing	By	To	Name	Contact	Instruction	Form	Complete? (✓)
NOTIFICATIONS FOR ALL LEVELS OF SPILL							
Immediately	Offshore Installation Manager (OIM) or Vessel Master	Woodside Communication Centre (WCC)	Duty Manager	[3]	Verbally notify WCC of event and estimated volume and hydrocarbon type.	Verbal	
Within 2 hours	Woodside Site Rep (WSR), Corporate Incident Management Team Duty Manager (CIMT DM) or Delegate	National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA[1])	Incident notification office	[4]	Verbally notify NOPSEMA for spills >80L. Record notification using Initial Verbal Notification Form or equivalent and send to NOPSEMA as soon as practicable (cc to NOPTA and DEMIRS).	Link	
Within 3 days	WSR, CIMT DM or Delegate				Provide a written NOPSEMA Incident Report Form as soon as practicable (no later than 3 days after notification) (cc to NOPTA and DEMIRS) NOPSEMA [4] NOPTA [5] DEMIRS [6]	[4]	
As soon as practicable	CIMT DM or Delegate	Woodside	Environment Duty Manager	As per roster	Verbally notify Duty Environment of event and seek advice on relevant performance standards from EP	Verbal	
Within 2 hours of becoming aware of a marine pollution incident (MOP) that occurs in or may impact state waters	CIMT DM or Delegate	WA Department of Transport	DoT Maritime Environmental Emergency Response Unit (MEER) Duty Officer	[7]	Verbally notify DoT MEER Duty Officer that a spill has occurred and, if required, request use of equipment stored in Karratha. Follow up with a written POLREP as soon as practicable following verbal notification. Additionally, DoT to be notified if spill is likely to extend into WA State waters. Request DoT to provide liaison to Woodside IMT.	[7]	
As soon as practicable	CIMT DM or Delegate	Department of Climate Change, Energy, the Environment and Water (DCCEEW) Director of National Parks	Marine Park Compliance Duty Officer	[3]	The Marine Park Compliance Duty Officer is notified in the event of oil pollution within a marine park, or where an oil spill response action must be taken within a marine park, so far as reasonably practicable, prior to response action being taken. This notification should include: • titleholder details • time and location of the incident • proposed response arrangements and locations as per the OPEP • contact details for the response coordinator • confirmation of access to relevant monitoring and evaluation reports when available.	Verbal	
As soon as practicable if there is potential for oiled wildlife or the spill is expected to contact land or waters managed by WA Department of Biodiversity, Conservation and Attractions	CIMT DM or Delegate	WA Department of Biodiversity, Conservation and Attractions (DBCA)	Duty Officer	[4]	Phone call notification	Verbal	
As soon as practicable	Public Information	Relevant persons/ organisations	To be determined	To be determined	Should it be identified that additional persons such as, but not limited to, commercial fishers or tourism operators may be affected, Woodside would, at the relevant time, engage with these parties as appropriate and in alignment with the related Oil Spill Preparedness and Response Mitigation Assessment (OSPRMA) for Pluto Facility Operations.	Verbal initially	

[1] Notification to NOPSEMA must be from a Woodside Representative.

					Relevant persons/ organisations will be re-assessed throughout the response period.		
As soon as practicable	Public Information	Relevant cultural authorities	To be determined	To be determined	Should it be identified that relevant cultural authorities may be affected, Woodside would, at the relevant time, engage with these parties as appropriate and in alignment with the related OSPRMA for Pluto Facility Operations. Relevant cultural authorities will be re-assessed throughout the response period.	Verbal initially	
ADDITIONAL NOTIFICATIONS TO BE MADE ONLY IF SPILL IS FROM A VESSEL							
"Without delay" as per *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Cth) s 11(1)	Vessel Master	Australian Maritime Safety Authority (AMSA)	Response Coordination Centre (RCC)	[10]	Verbally notify AMSA RCC of the hydrocarbon spill. Follow up with written Harmful Substances Report (POLREP – AMSA) as soon as practicable.	[10]	
ADDITIONAL LEVEL 2/3 NOTIFICATIONS							
As soon as practicable	CIMT DM or Delegate	AMOSC	AMOSC Duty Manager	[11]	Notify AMOSC that a spill has occurred and follow-up with an email from the CIMT IC/ Deputy CIMT IC/CMT Leader to formally activate AMOSC. Determine what resources are required consistent with the AMOS Plan and detail in a Service Contract that will be sent to Woodside from AMOSC upon activation.	[11]	
As soon as practicable	CIMT DM or Delegate	Oil Spill Response Limited (OSRL)	OSRL Duty Manager	[12]	Contact OSRL Duty Manager and request assistance from technical advisor in Perth. Send the completed notification form to OSRL as soon as practicable.	[12]	
					For mobilisation of resources, send the Mobilisation Form to OSRL as soon as practicable. The mobilisation form must be signed by a nominated callout authority from Woodside. OSRL can advise the names on the call out authority list, if required.	[12]	
As soon as practicable if extra personnel are required for incident support	CIMT DM or Delegate	Marine Spill Response Corporation (MSRC)	MSRC Response Manager	[13]	Activate the contract with MSRC (in full) for the provision of up to 30 personnel depending on what skills are required. Please note that provision of these personnel from MSRC are on a best endeavours basis and are not guaranteed.	Verbal	

2. RESPONSE TECHNIQUES

Table 2-1: Response techniques

Technique	Spill type		Level	Pre- Identified Tactics	Responsible	ALARP Commitment Summary	Link to Operational Plans for notification numbers and actions
	MGO CS-05	Condensate CS-01					
Operational monitoring –tracking buoy (OM02)	Yes	Yes	ALL	If a vessel is on location, consider the need to deploy the oil spill tracking buoy. If no vessel is on location, consider the need to mobilise oil spill tracking buoys from the King Bay Supply Base (KBSB) Stockpile. If a surface sheen is visible from the facility, deploy the satellite tracking buoy within two hours.	Operations	**WITHIN 24 HOURS:** For manned facility/vessel, tracking buoy deployed within 2 hours. **WITHIN 48 HOURS:** For unmanned facility/vessel, deploy tracking buoy within 48 hours.	Surveillance and Reconnaissance to Detect Hydrocarbons and Resources at Risk (OM02) of The Operational Monitoring Operational Plan. Deploy tracking buoy in accordance with Link.
Operational monitoring – predictive modelling (OM01)	Yes	Yes	ALL	Undertake initial modelling using the Rapid Assessment Oil Spill Tool and weathering fate analysis using Automated Data Inquiry for Oil Spills (ADIOS) or refer to the hydrocarbon information in **Appendix A.**	Situation or Environment	**WITHIN 24 HOURS:** Initial modelling within 6 hours using the Rapid Assessment Tool.	Predictive Modelling of Hydrocarbons to Assess Resources at Risk (OM01 of The Operational Monitoring Operational Plan). *Planning Section to download and follow steps*
	Yes	Yes	ALL	Send Oil Spill Trajectory Modelling (OSTM) form (Appendix B, Form 7) to RPS Response ([14]).	Situation	**WITHIN 24 HOURS:** Detailed modelling within 4 hours of RPS Response receiving information from Woodside.	
Operational monitoring – aerial surveillance (OM02)	Yes	Yes	ALL	Instruct Aviation Unit Leader to commence aerial observations in daylight hours. Aerial surveillance observer to complete log in Appendix B Form 8.	Logistics – Aviation	**WITHIN 24 HOURS:** 2 trained aerial observers. 1 aircraft available. Report made available to the IMT within 2 hours of landing after each sortie.	Surveillance and Reconnaissance to Detect Hydrocarbons and Resources at Risk (OM02 of The Operational Monitoring Operational Plan). *Planning Section to download and follow steps*
Operational monitoring – satellite tracking (OM02)	Yes	Yes	ALL	The Situation Unit Leader to action satellite imagery services. This may be obtained via: • AMOSC Duty Manager: [11] • OSRL Duty Manager: [12] • KSAT:[15] • Others identified by CIMT.	Situation	**WITHIN 24 HOURS:** Service provider will confirm availability of an initial acquisition within 2 hours. Data received to be uploaded into Woodside Common Operating Picture.	
Operational monitoring – monitoring hydrocarbons in water (OM03)	Yes	Yes	ALL	Consider the need to mobilise resources to undertake water quality monitoring (OM03).	Planning or Environment	**DAY 3:** Water quality assessment access and capability Daily fluorometry reports will be provided to IMT.	Detecting and Monitoring for the Presence and Properties of Hydrocarbons in the Marine Environment (OM03 of The Operational Monitoring Operational Plan).
Operational monitoring – pre-emptive assessment of receptors at risk (OM04)	Potentially	Potentially	ALL	Modelling does not predict shoreline contact at response threshold (>100 g/m^2) any receptors. Consider the need to mobilise resources to undertake pre-emptive assessment of sensitive receptors at risk (OM04).	Planning or Environment	In agreement with WA DoT, deployment of 2 specialists for each of the Response Protection Areas (RPA) with predicted impacts.	Pre-emptive Assessment of Sensitive Receptors (OM04 of The Operational Monitoring Operational Plan).
Operational monitoring – shoreline assessment (OM05)	Potentially	Potentially	ALL	Modelling does not predict shoreline contact at response threshold (>100 g/m^2) any receptors. Consider the need to mobilise resources to undertake shoreline assessment surveys (OM05).	Planning or Environment	In agreement with WA DoT, deployment of 2 specialists trained in Shoreline Clean-up Assessment Technique (SCAT) for each of the RPAs with predicted impacts.	Shoreline Assessment (OM05 of The Operational Monitoring Operational Plan).
Surface dispersant	No	No	N/A	This response strategy is not recommended for Eris-1 condensate or marine gas oil (MGO) as there is no surface expression predicted above response threshold (>50 g/m^2). The addition of dispersant is not considered to have a net environmental benefit.			
Containment and recovery	No	No	N/A	This response strategy is not recommended for Eris-1 condensate or MGO as there is no surface expression predicted above response threshold (>50 g/m^2). Containment and recovery of condensate or MGO poses a significant safety risk due to low flash points. Corralling low			

Technique	Spill type		Level	Pre- Identified Tactics	Responsible	ALARP Commitment Summary	Link to Operational Plans for notification numbers and actions
	MGO CS-05	Condensate CS-01					
				flash point substances should be avoided, therefore, this response technique is not feasible.			
Mechanical dispersion	**No**	**No**	**N/A**	This response strategy is not recommended.			
In-situ burning	**No**	**No**	**N/A**	This response strategy is not recommended.			
Shoreline protection and deflection	**No**	**No**	**N/A**	This response strategy is not recommended for Eris-1 condensate or MGO as there is no shoreline accumulation predicted above response threshold (>100 g/m^2) at any RPA.			
Shoreline clean-up	**No**	**No**	**N/A**	This response strategy is not recommended for Eris-1 condensate or MGO as there is no shoreline accumulation predicted above response threshold (>100 g/m^2) at any RPA.			
Oiled wildlife response	**Yes**	**Yes**	**ALL**	If oiled wildlife is a potential impact, request AMOSC to mobilise containerised oiled wildlife first strike kits and relevant personnel. Refer to relevant Tactical Response Plan for potential wildlife at risk. Mobilise AMOSC Oiled Wildlife Containers. Consider whether additional equipment is required from local suppliers.	Logistics and Planning		Oiled Wildlife Response Operational Plan
Scientific monitoring (type II)	**Yes**	**Yes**	**ALL**	Notify Woodside science team of spill event.	Environment		Oil Spill Scientific Monitoring Programme – Operational Plan
SOURCE CONTROL TECNIQUES							
Subsea First Response Toolkit	**N/A**	Yes	**L2/3**	Debris clearance equipment to be mobilised prior to deployment of capping stack (if feasible).	Source Control	**WITHIN 48 HOURS:** Remotely Operated Vehicle (ROV) on Mobile Offshore Drilling Unit (MODU) ready for deployment within 48 hours. SFRT equipment mobilised to site for deployment within 11 days.	Source Control Emergency Response Planning Guideline Activity Source Control Emergency Response Plan
Subsea Dispersant	**N/A**	No	**N/A**	This response strategy is not recommended. Whilst the Eris-1 well is in water depths of 178 m, which greater than the 100 m minimum water depth recognised for feasible use of subsea dispersant, modelling predicts that the LOWC scenario will not result in any surface or shoreline oil at any RPA for the duration of the spill event. The use of subsea dispersant would increase dispersed/ entrained hydrocarbon levels and exposure of subsea biota to potentially higher toxicity substances and thus not provide a net environmental benefit.			
Capping Stack	**N/A**	Yes	**L2/3**	Conventional/vertical capping stack deployment with a heavy lift vessel will be attempted if plume radius is ~25 m and environmental conditions permit (wind speed, wave height, current and plume radius).	Source Control	**WITHIN 24 HOURS:** Identify source control vessel availability within 24 hours. Capping stack on suitable vessel mobilised to site within 16 days. Deployment and well intervention attempt will be made once plume size is acceptable and safety and metocean conditions are suitable.	
Relief Well	**N/A**	Yes	**L2/3**	Undertake tactics per Source Control Emergency Response Plan (SCERP).	Source Control	**WITHIN 24 HOURS** Identify source control vessel availability within 24 hours. MODU mobilised to location within 21 days, with drilling to be completed within 64 days.	

3. RESPONSE PROTECTION AREAS

Action: Provide relevant Control Agency with applicable Tactical Response Plans for any Response Protection Areas (RPAs) identified during operational monitoring.

Based on hydrocarbon spill modelling results, no sensitive receptors are predicted to be contacted at response threshold (>100 g/m^2) for the duration of the spill event.

Hydrocarbon spill modelling results indicate the following sensitive receptors may have the potential to be contacted by hydrocarbons below response threshold (>10 g/m^2):

- Montebello Islands including Marine Park, and Hermite Island – 10.4 days, 2 m^3
- Barrow Island including Boodie, Double and Middle Islands Nature Reserves – 77.9 days, <1 m^3
- Muiron Islands and MMA – 35.2 days, <1 m^3

In a real event, oil spill trajectory modelling specific to the spill will be required to determine the regional sensitive receptors to be contacted.

Tactical Response plans for these and other locations can be accessed via this link and include the details of potential forward operating bases and staging areas.

Figure 3-1 illustrates the location of regional sensitive receptors in relation to the Xena-03 Tie-back Operational Area and identifies priority protection areas.

Consideration should be given to other stakeholders (including mariners) in the vicinity of the spill location. **Table 3-1** indicates the assets within the vicinity of the Xena-03 Tie-back Operational Area.

Table 3-1: Assets in the vicinity of the Xena-03 Tie-back Operational Area

Asset	Distance and direction from Xena-03 well	Operator
Wheatstone platform	17.6 km east	Chevron
Angel platform	153 km north-northwest	Woodside
John Brookes	56.3 km south-southwest	Santos
Goodwyn Alpha platform	81.7 km northwest	Woodside
North Rankin Complex	104.8 km northwest	Woodside
Reindeer wellhead platform	114.8 km east-southeast	Santos
Stag A	116.8 km south-east	Jadestone

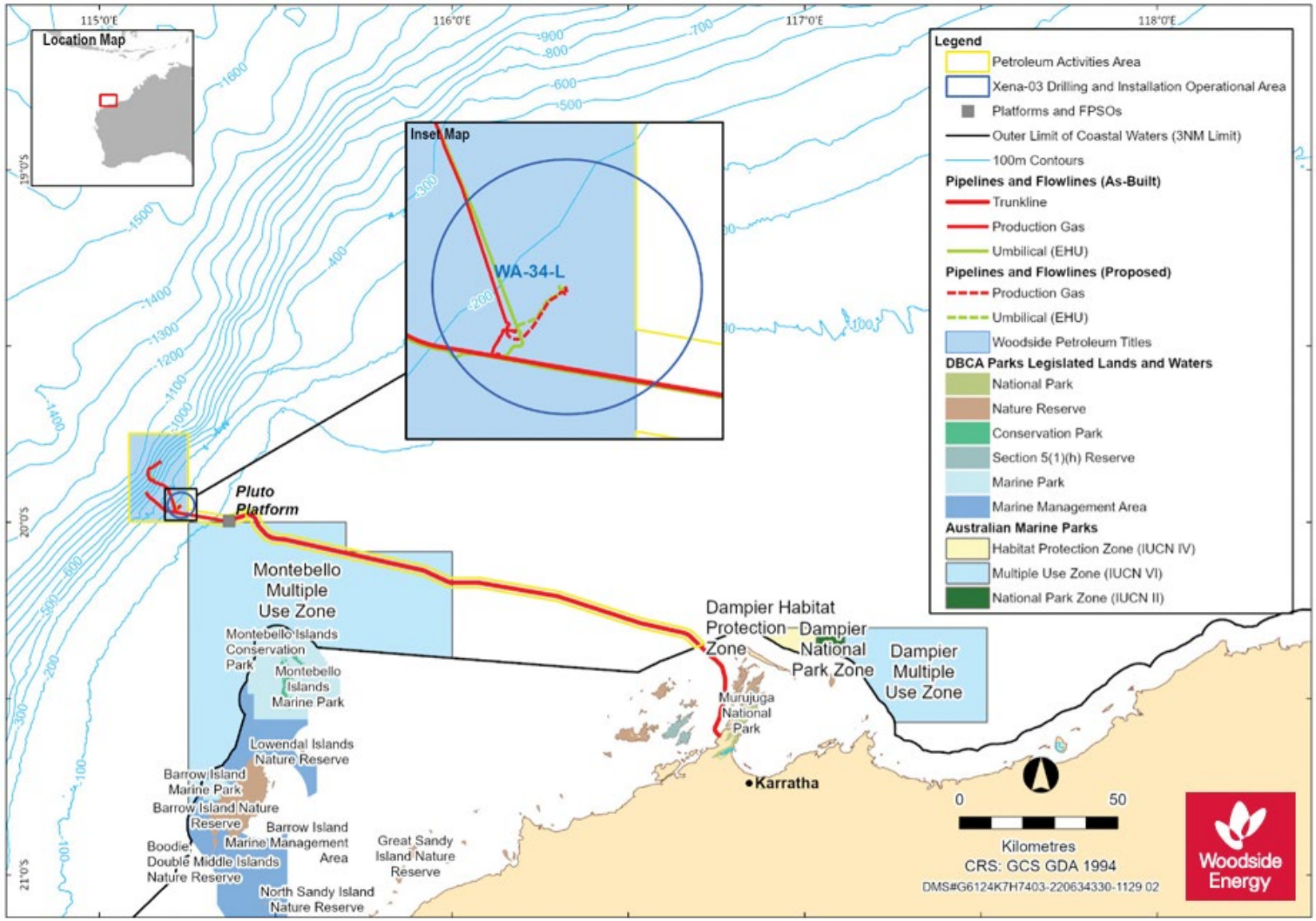


Figure 3-1: Operational area

4. DISPERSANT APPLICATION

Dispersant is not considered an appropriate response strategy for this activity as described in the related Pluto Facility Operations Environment Plan Appendix D (Woodside's Oil Spill Preparedness and Response Mitigation Assessment).

APPENDIX A – CREDIBLE SPILL SCENARIOS AND HYDROCARBON INFORMATION

Table A - 1: Credible spill scenarios and hydrocarbon information

Scenario	Product	Volume	Residue	Weathering rate		Suggested ADIOS2 Analogue[2]
CS-01 (WCCS): *A long-term (64-day) release of Eris-1 loss of well containment during drilling at the Xena-03 well*	*Eris-1 Condensate*	Total: 46,631 m^3 1880 m^3 (surface) 44,751 m^3 (subsea)	Surface: 10.01% (188.2 m^3) Seabed: 3.39% (1517.1 m^3)	12 hours (BP < 180 °C)	Surface: 14.97% Seabed: 65.99%	*Martin Linge Condensate API 42.2*
				24 hours (180 °C < BP < 265 °C)	Surface 48.43% Seabed: 21.6%	
				Several days (265 °C < BP < 380 °C)	Surface: 26.6% Seabed: 9.02%	
CS-05: Loss of vessel containment at the PLA platform	*Marine Gas Oil*	1000 m^3	5.0% (50 m^3)	12 hours (BP < 180 °C)	6%	*Diesel Fuel Oil (Southern USA 1). API of 37.2*
				24 hours (180 °C < BP < 265 °C)	34.6%	
				Several days (265 °C < BP < 380 °C)	54.4%	

[2] Initial screening of possible ADIOS2 analogues considered hydrocarbons with similar APIs. Suggested selection is based on the closest distillation cut to the Woodside hydrocarbon. Only hydrocarbons with >380°C distillation cuts were included in selection process.

APPENDIX B – NOTIFICATION FORMS

Table B - 1: Notification forms

No.	Form Name	Link
1	Record of initial verbal notification to NOPSEMA template	Link
2	NOPSEMA Incident Report Form	[4]
3	Harmful Substances Report (POLREP – AMSA)	[10]
4	Marine Pollution Report (POLREP – DoT)	[7]
5	AMOSC Service Contract	[11]
6a	OSRL Initial Notification Form	[12]
6b	OSRL Mobilisation Activation Form	[12]
7	RPS Response Oil Spill Trajectory Modelling Request	[14]
8	Aerial Surveillance Observer Log	Link
9	Tracking buoy deployment instructions	Link

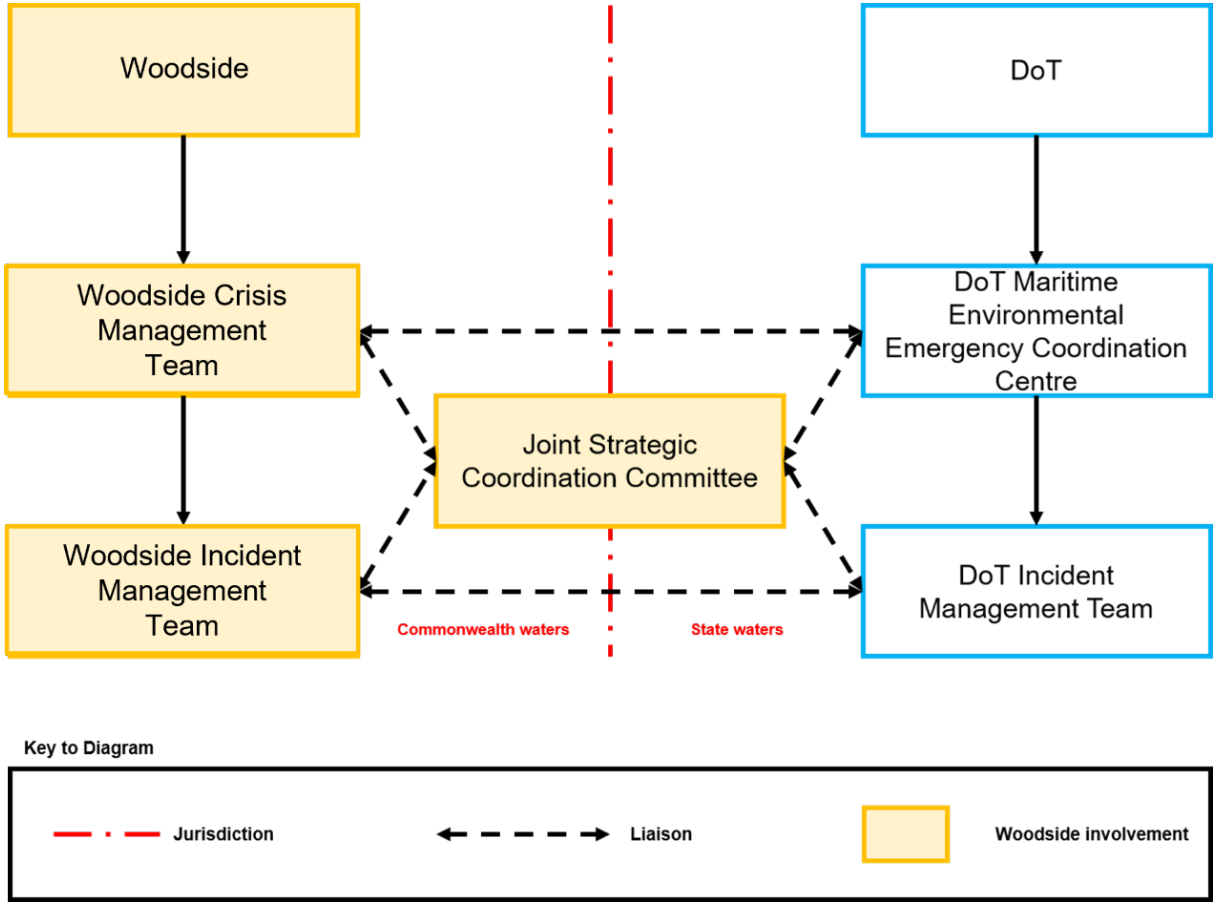
FORM 1 – RECORD OF INITIAL VERBAL NOTIFICATION TO NOPSEMA

NOPSEMA phone: [4]		
Date of call		
Time of call		
Call made by		
Call made to		
Information to be provided to NOPSEMA:		
Date and time of incident/ time caller became aware of incident		
Details of incident	**1. Location**	
	2. Title	
	3. Source	□ **Platform**
		□ **Pipeline**
		□ **FPSO**
		□ **Exploration drilling**
		□ **Well**
		□ **Other (please specify)**
	4. Hydrocarbon type	
	5. Estimated volume	
	6. Has the discharge ceased?	
	7. Fire, explosion or collision?	
	8. Environment Plan(s)	
	9. Other Details	
Actions taken to avoid or mitigate environmental impacts		
Corrective actions taken or proposed to stop, control or remedy the incident		
After the initial call is made to NOPSEMA, please send this record as soon as practicable to:		
NOPSEMA	**[4]**	
NOPTA	**[5]**	
DEMIRS	**[6]**	

APPENDIX C – SPILL ASSESSMENT QUESTIONS

What has happened?		
Date/time		
Spill source		
Spill cause		
Safety situation		
What is it?		
Oil type and name		
Oil properties	Specific gravity	
	Viscosity	
	Pour point	
	Asphaltenes	
	Wax content	
	Boiling point	
Where is it?		
Latitude and longitude		
Distance and bearing		
Affected area	☐ Offshore	
	☐ Subsea	
	☐ Shoreline	
	☐ Estuary	
	☐ Port	
	☐ Harbour	
	☐ Inland	
	☐ River	
	☐ Other (please detail):	
Water depth		
How big is it?		
Area		
Release type	☐ Instantaneous	Estimated volume:
	☐ Continuous release	Estimated release rate:
Where it is going?		
Metocean conditions		
Currents and tides		
What is in the way?		
Resources at risk		
Time until resource contact		
What's happening to it?		
Weathering processes		
Response actions underway		

APPENDIX D – COORDINATION STRUCTURE FOR A CONCURRENT HYDROCARBON SPILL IN BOTH COMMONWEALTH AND STATE WATERS/ SHORELINES[3]



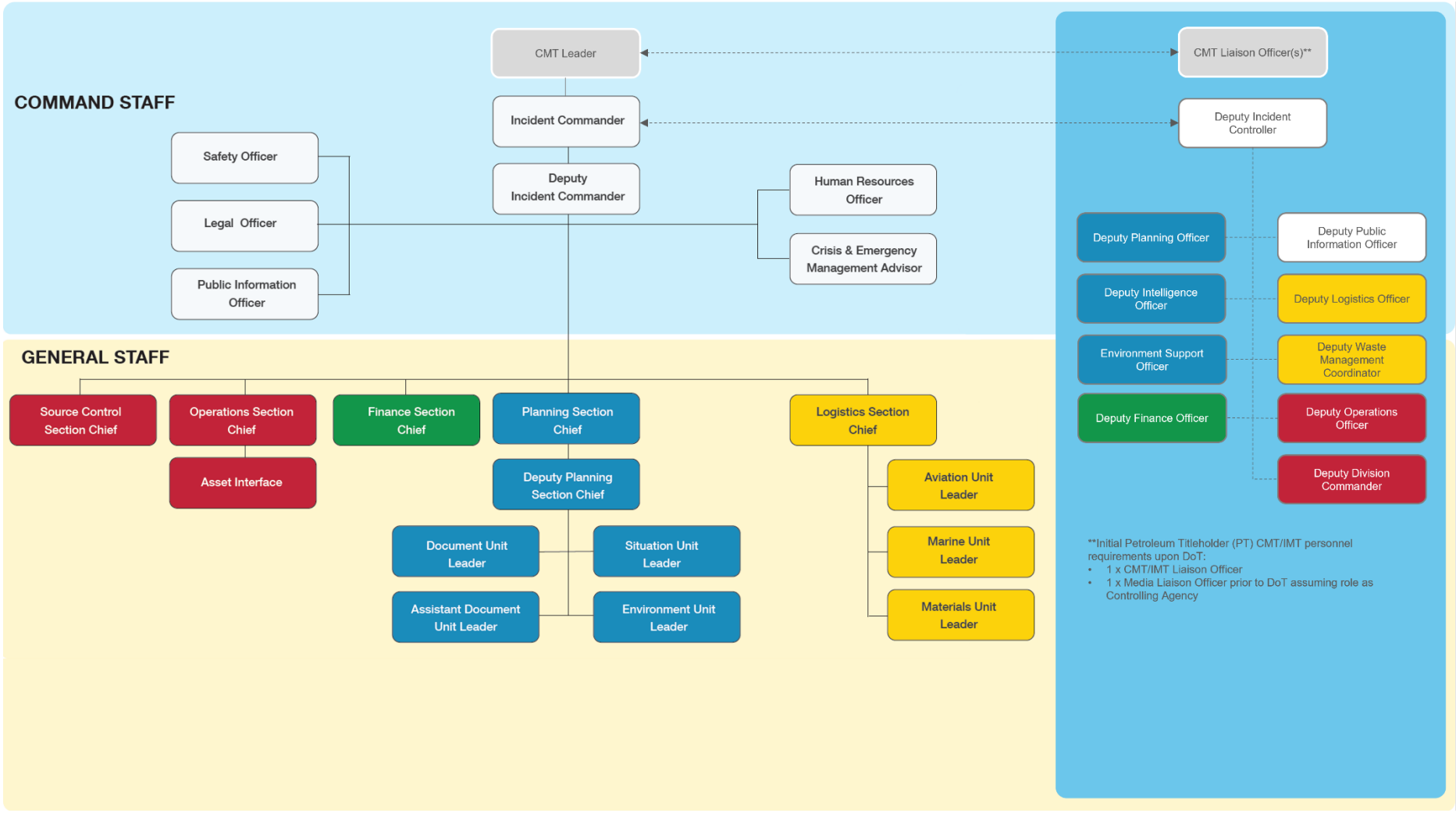
The Control Agency for a hydrocarbon spill in Commonwealth waters resulting from an offshore petroleum activity is Woodside (the Petroleum Titleholder).

The Control Agency/Hazard Management Authority (HMA) for a hydrocarbon spill in State waters/shorelines resulting from an offshore petroleum activity is DoT. DoT will appoint an Incident Controller and form a separate IMT to only manage the spill within State waters/shorelines.

[3] Adapted from DoT Offshore Petroleum Industry Guidance Note, Marine Oil Pollution: Response and Consultation Arrangements July 2020. Note: For full structure up to Commonwealth Cabinet/Minister refer to Marine Oil Pollution: Response and Consultation Arrangements Section 6.5, Figure 4.

APPENDIX E – WOODSIDE INCIDENT MANAGEMENT STRUCTURE

Woodside incident management structure for hydrocarbon spill (including Woodside Liaison Officers command structure within DoT IMT if required).



APPENDIX F – WOODSIDE LIAISON OFFICER RESOURCES TO DOT

In the event that DoT is required to establish an IMT, Woodside will make available an appropriate number of appropriately qualified persons to work within the DoT IMT.

It is an expectation that Woodside's nominated CMT Liaison Officer and the Deputy Incident Controller attend the DoT Fremantle Incident Control Centre (ICC) as soon as possible after the formal request has been made by the State Marine Pollution Coordinator (SMPC), and that the remaining initial cohort will attend no later than 8 am on the day following the request being formally made to Woodside by the SMPC. For Woodside personnel designated to serve in DoT's Forward Operating Base (FOB), it is expected that they arrive at the FOB no later than 24 hours from the formal request being made by the SMPC.

Area	Role	Woodside Liaison Role[4]	Key Duties	#
DoT Maritime Environmental Emergency Coordination Centre (MEECC)	CMT Liaison Officer	CIMT Liaison	• Provide a direct liaison between the CMT and the MEECC. • Facilitate effective communications and coordination between the CIMT Leader and State Marine Pollution Coordinator (SMPC). • Offer advice to SMPC on matters pertaining to PT crisis management policies and procedures.	1
DoT IMT Incident Control	Deputy Incident Controller	Deputy Incident Commander (Deputy IC)	• Provide a direct liaison between the PT IMT and DoT IMT. • Facilitate effective communications and coordination between the PT IC and the DoT IC. • Offer advice to the DoT IC on matters pertaining to PT incident response policies and procedures. • Offer advice to the Safety Coordinator on matters pertaining to PT safety policies and procedures, particularly as they relate to PT employees or contractors operating under the control of the DoT IMT.	1
DoT IMT Intelligence	Deputy Intelligence Officer	Situation Unit Leader (Intelligence)	• As part of the Intelligence Team, assist the Intelligence Officer in the performance of their duties in relation to situation and awareness. • Facilitate the provision of relevant modelling and predications from the PT IMT. • Assist in the interpretation of modelling and predictions originating from the PT IMT. • Facilitate the provision of relevant situation and awareness information originating from the DoT IMT to the PT IMT. • Facilitate the provision of relevant mapping from the PT IMT. • Assist in the interpretation of mapping originating from the PT IMT. • Facilitate the provision of relevant mapping originating from the DoT IMT to the PT IMT.	1

[4] *These positions would be mobilised, in consultation with DoT, to align to the actual spill scenario. The selected roles and/or individual personnel would be subject to continued evaluation to ensure continued 'best fit'. For CIMT roster arrangements, contact the WCC. During a prolonged response, additional personnel may be sourced through internal resourcing and mutual Aid agreements such as the AMOSC Core Group via [11]*

Area	Role	Woodside Liaison Role[4]	Key Duties	#
DoT IMT Intelligence – Environment	Environment Support Officer	Deputy Environment Unit Leader	• As part of the Intelligence Team, assist the Environment Coordinator in the performance of their duties in relation to the provision of environmental support into the planning process. • Assist in the interpretation of the PT OPEP and relevant TRP plans. • Facilitate in requesting, obtaining and interpreting environmental monitoring data originating from the PT IMT. • Facilitate the provision of relevant environmental information and advice originating from the DoT IMT to the PT IMT.	1
DoT IMT Planning-Plans/ Resources	Deputy Planning Officer	Deputy Planning Section Chief	• As part of the Planning Team, assist the Planning Officer in the performance of their duties in relation to the interpretation of existing response plans and the development of incident action plans and related sub plans. • Facilitate the provision of relevant IAP and sub plans from the PT IMT. • Assist in the interpretation of the PT OPEP from the PT. • Assist in the interpretation of the PT IAP and sub plans from the PT IMT. • Facilitate the provision of relevant IAP and sub plans originating from the DoT IMT to the PT IMT. • Assist in the interpretation of the PT existing resource plans. • Facilitate the provision of relevant components of the resource sub plan originating from the DoT IMT to the PT IMT. **(Note this individual must have intimate knowledge of the relevant PT OPEP and planning processes)**	1
DoT IMT Public Information-Media/ Community Engagement	Deputy Public Information Officer	Deputy Public Information Officer	• As part of the Public Information Team, provide a direct liaison between the PT Media team and DoT IMT Media team. • Facilitate effective communications and coordination between the PT and DoT media teams. • Assist in the release of joint media statements and conduct of joint media briefings. • Assist in the release of joint information and warnings through the DoT Information and Warnings team. • Offer advice to the DoT Media Coordinator on matters pertaining to PT media policies and procedures. • Facilitate effective communications and coordination between the PT and DoT Community Liaison teams. • Assist in the conduct of joint community briefings and events. • Offer advice to the DoT Community Liaison Coordinator on matters pertaining to the PT community liaison policies and procedures. • Facilitate the effective transfer of relevant information obtained from through the Contact Centre to the PT IMT.	1

Area	Role	Woodside Liaison Role[4]	Key Duties	#
DoT IMT Logistics	Deputy Logistics Officer	Deputy Logistics Section Chief	• As part of the Logistics Team, assist the Logistics Officer in the performance of their duties in relation to the provision of supplies to sustain the response effort. • Facilitate the acquisition of appropriate supplies through the PTs existing OSRL, AMOSC and private contract arrangements. • Collects Request Forms from DoT to action via PT IMT. **(Note this individual must have intimate knowledge of the relevant PT logistics processes and contracts)**	1
DoT IMT Finance-Accounts/ Financial Monitoring	Deputy Finance Officer	Deputy Finance Section Chief	• As part of the Finance Team, assist the Finance Officer in the performance of their duties in relation to the setting up and payment of accounts for those services acquired through the PTs existing OSRL, AMOSC and private contract arrangements. • Facilitate the communication of financial monitoring information to the PT to allow them to track the overall cost of the response. • Assist the Finance Officer in the tracking of financial commitments through the response, including the supply contracts commissioned directly by DoT and to be charged back to the PT.	1
DoT IMT Operations	Deputy Operations Officer	Deputy Operations Section Chief	• As part of the Operations Team, assist the Operations Officer in the performance of their duties in relation to the implementation and management of operational activities undertaken to resolve an incident. • Facilitate effective communications and coordination between the PT Operations Section and the DoT Operations Section. • Offer advice to the DoT Operations Officer on matters pertaining to PT incident response procedures and requirements. • Identify efficiencies and assist to resolve potential conflicts around resource allocation and simultaneous operations of PT and DoT response efforts.	1
DoT IMT Operations – Waste Management	Deputy Waste Management Coordinator	Deputy Waste Coordinator (Materials)	• As part of the Operations Team, assist the Waste Management Coordinator in the performance of their duties in relation to the provision of the management and disposal of waste collected in State waters. • Facilitate the disposal of waste through the PT's existing private contract arrangements related to waste management and in line with legislative and regulatory requirements. • Collects Request Forms from DoT to action via PT IMT.	1
DoT FOB Operations Command	Deputy Division Commander	FOB Deputy Incident Commander	• As part of the Field Operations Team, assist the Division Commander in the performance of their duties in relation to the oversight and coordination of field operational activities undertaken in line with the IMT Operations Section's direction. • Provide a direct liaison between the PT FOB and DoT FOB.	1

Area	Role	Woodside Liaison Role[4]	Key Duties	#
			• Facilitate effective communications and coordination between the PT Division Commander and the DoT Division Commander. • Offer advice to the DoT Division Commander on matters pertaining to PT incident response policies and procedures. • Assist the Safety Coordinator deployed in the FOB in the performance of their duties, particularly as they relate to PT employees or contractors. • Offer advice to the Safety Coordinator deployed in the FOB on matters pertaining to PT safety policies and procedures.	
			Total	11

APPENDIX G – DOT LIAISON OFFICER RESOURCES TO WOODSIDE

Once DoT activates a State waters/shorelines IMT, DoT will make available the following roles to Woodside.

Area	DoT Liaison Role	Personnel Sourced from:	Key Duties	#
Woodside CIMT	DoT Liaison Officer (prior to DoT assuming Controlling Agency)/ Deputy Incident Controller – State waters (after DoT assumes Controlling Agency)	DoT	• Facilitate effective communications between DoT's SMPC/ Incident Controller and the Petroleum Titleholder's appointed CMT Leader / Incident Controller. • Provide enhanced situational awareness to DoT of the incident and the potential impact on State waters. • Assist in the provision of support from DoT to the Petroleum Titleholder. • Facilitate the provision technical advice from DoT to the Petroleum Titleholder Incident Controller as required.	1
Woodside Public Information – Media	DoT Media Liaison Officer	DoT	• Provide a direct liaison between the PT Media team and DoT IMT Media team. • Facilitate effective communications and coordination between the PT and DoT media teams. • Assist in the release of joint media statements and conduct of joint media briefings. • Assist in the release of joint information and warnings through the DoT Information & Warnings team. • Offer advice to the PT Media Coordinator on matters pertaining to DoT and wider Government media policies and procedures.	1
			Total DoT Personnel Initial Requirement to Woodside	2

APPENDIX K: WOODSIDE MASTER EXISTING ENVIRONMENT

Description of the Existing Environment

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1. INTRODUCTION

1.1 Purpose

This document applies, where indicated in the relevant Environment Plan (EP), to Woodside Energy Ltd. (Woodside) activities and operations.

1.2 Scope

This document describes the existing environment within the Woodside areas of activity located in Commonwealth waters off north-western Western Australia (WA), with a focus on the North-west Marine Region (NWMR) (Figure 1-1). This document includes details of the particular and relevant values and sensitivities of the environment as required by the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cth) (OPGGS (E) Regulations) to inform the impact and risk evaluation of Woodside's activities within the NWMR. Furthermore, the key values of the South-west Marine Region (SWMR) and the North Marine Region (NMR) are summarised to encompass areas outside the NWMR. This is with reference to the environment that may be affected (EMBA), as defined and described in individual EPs, for unplanned hydrocarbon spill risks. Additional information appropriate to the nature and scale of the impacts and risks of activities that may interact with the environment will be used to further inform impact and risk assessments and be included in the Description of the Existing Environment of individual EPs.

This document is informed by a variety of resources that includes: a search of the Department of Climate Change, Energy, the Environment and Water (DCCEEW) Protected Matters Search Tool (PMST) for the marine bioregions (NWMR, SWMR and NMR) and the three PMST reports provided in Appendix A; State (WA)/ Commonwealth Marine Park Management Plans, the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) Species Profile and Threats Database (SPRAT), EPBC Act Part 13 statutory instruments (recovery plans, conservation advices and wildlife conservation plans for listed threatened and migratory species); and peer reviewed scientific publications, as well as Woodside and Joint Venture (JV) funded studies and other titleholder funded study findings available in the public domain.

1.3 Review and Revision

The information presented in this document is reviewed and updated on at least a five-year basis. Key updates are captured in a 'change register'. Material risk may trigger updates within the five-year review period, as per the OPGGS (E) Regulations. Key updates may include but are not limited to the status of EPBC Act listed species, Part 13 Instruments, policies and guidelines, key advice from external stakeholders and recently published scientific literature.

1.4 Regional Context

Where relevant, the physical, biological and social environments within the areas of interest are discussed with reference to the three marine bioregions of Australia: North-west Marine Region (NWMR), South-west Marine Region (SWMR) and North Marine Region (NMR). The Marine Bioregional Plans has been prepared under section 176 of the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)[1] (Table 1-1). The NWMR is the focal marine bioregion for the Woodside Description of the Existing Environment as this is currently the location of most of Woodside's activities.

[1] https://www.dcceew.gov.au/environment/marine/marine-bioregional-plans (accessed:04/08/2024)

Table 1-1: Description of the marine bioregions

Marine Bioregion	Description
North-west (DSEWPAC, 2012a)	The NWMR includes all Commonwealth waters (from three nautical miles (NM) from the Territorial Sea Baseline to the 200 NM Exclusive Economic Zone (EEZ) boundary) extending from the WA/Northern Territory border to Kalbarri, south of Shark Bay in WA, covering an area of approximately 1.07 million km^2 and includes extensive areas of shallower waters on the continental shelf, as well as deep areas of abyssal plain where water depths are 5000 m or greater.
South-west (DSEWPAC, 2012b)	The SWMR comprises Commonwealth waters from the eastern end of Kangaroo Island in South Australia to Shark Bay in WA. The region spans approximately 1.3 million km^2 of temperate and subtropical waters and abuts the coastal waters of SA and WA.
North (DSEWPAC, 2012c)	The NMR comprises Commonwealth waters from West Cape York Peninsula to the NT/WA border). The region covers approximately 625,689 km^2 of tropical waters in the Gulf of Carpentaria and Arafura and Timor seas, and abuts the coastal waters of Queensland and the NT.

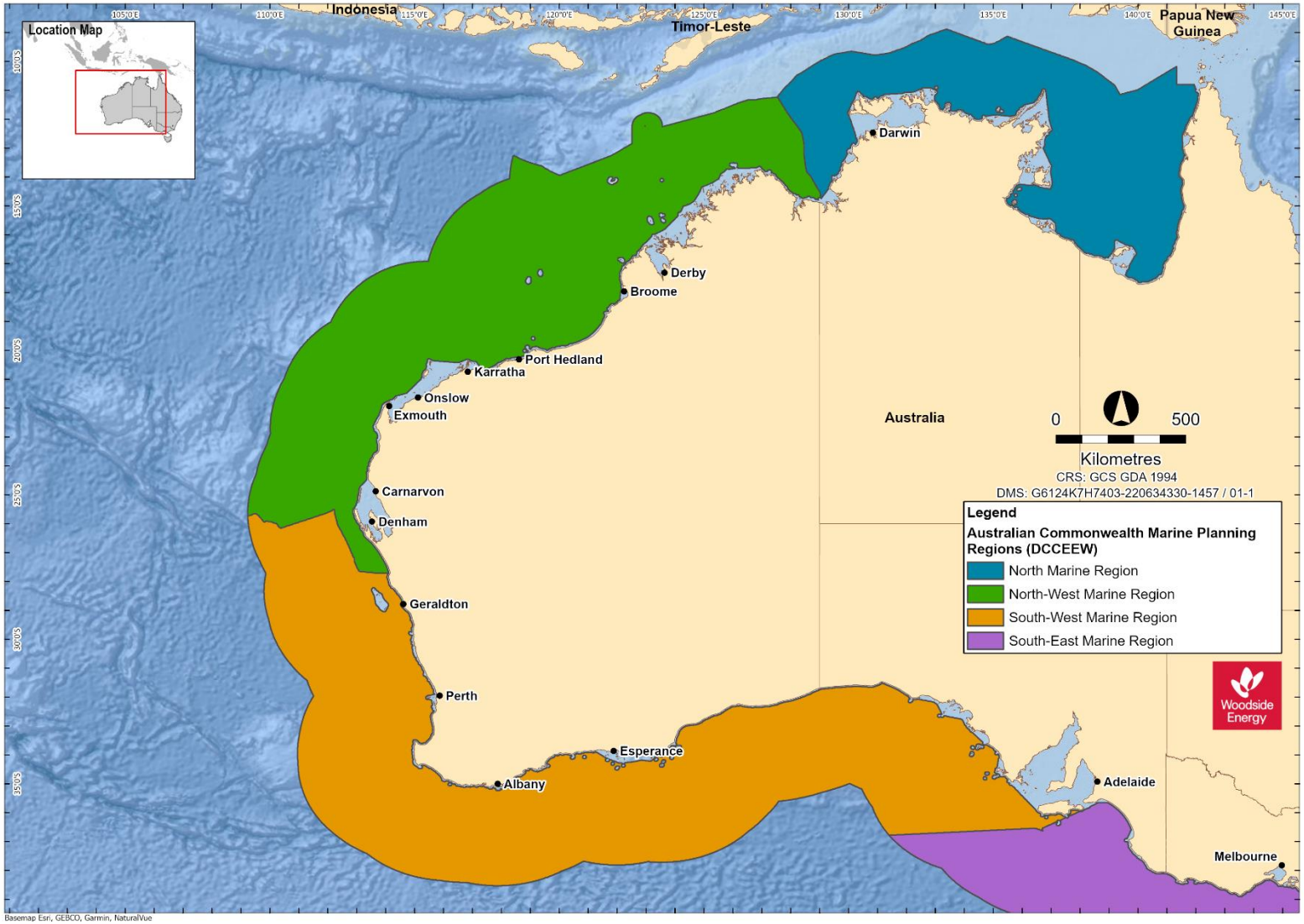


Figure 1-1: Marine bioregions: NWMR, SWMR, NMR and South-East (as defined under the EPBC Act, refer to (DCCEEW, 2021b)

2. PHYSICAL ENVIRONMENT

2.1 Regional Context

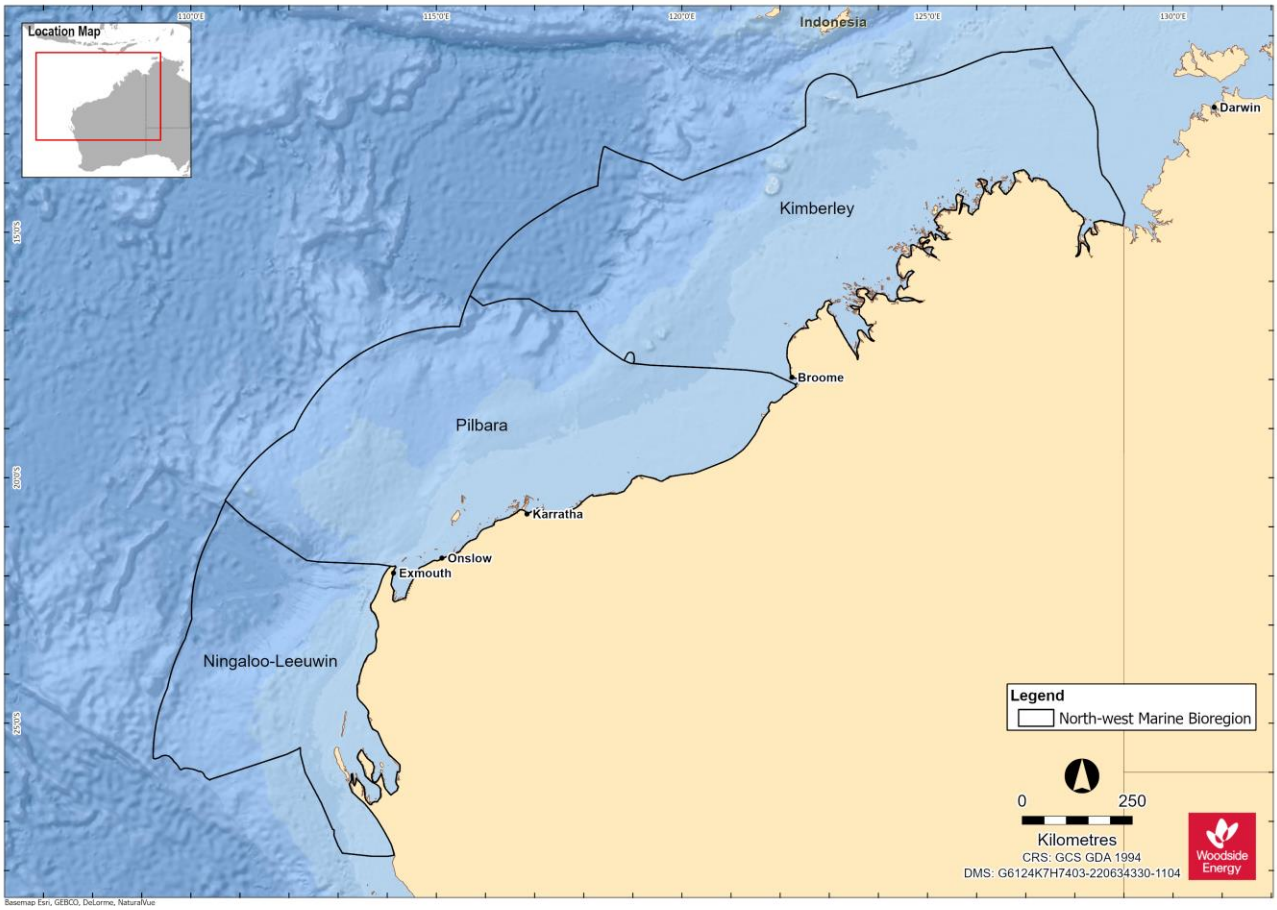
The key physical characteristics of the NWMR, SWMR and NMR are presented in Table 2-1. The remainder of this section then focuses entirely on the NWMR.

Table 2-1: Key physical characteristics of the NWMR, SWMR and NMR

Bioregion	Key Characteristics
North-west Marine Region	The NWMR experiences a tropical monsoonal climate towards the northern extent of the region, transitioning to tropical arid and subtropical arid within the central and southern areas of the region (DSEWPAC, 2012a).
	The NWMR is part of the Indo-Australian Basin, the ocean region between the north-west coast of Australia and the Indonesian islands of Java and Sumatra. Dominant currents in the Region include: the South Equatorial Current, the Indonesian Throughflow; the Eastern Gyral Current, and the Leeuwin Current (DEWHA, 2007a).
	The seafloor of the NWMR consists of four general feature types: continental shelf; continental slope; continental rise; and abyssal plain and is distinguished by a range of topographic features including canyons, plateaus, terraces, ridges, reefs, and banks and shoals.
South-west Marine Region	The SWMR contains both subtropical and temperate climates, with overall light climatic cycles.
	The SWMR experiences complex and unusual oceanographic patterns, driven largely by the Leeuwin Current and its associated currents that have a significant influence on biodiversity distribution and abundance.
	The major seafloor features of the SWMR include a narrow continental shelf on the West coast to the waters off South-west WA, and a wide continental shelf dominated by sandy carbonate sediments of marine origin in the Great Australian Bight. The region also contains a steep, muddy continental slope, many canyons and large tracts of abyssal plains (DSEWPAC, 2012b).
North Marine Region	The NMR experiences a tropical monsoonal climate with complex weather cycles, including high temperatures and heavy seasonal yet variable rainfall and cyclones, which can be both destructive (loss of seagrass and mangroves) and constructive (mobilisation of sediment into coastal habitats).
	The NMR comprises Commonwealth waters from West Cape York Peninsula to the NT–WA border, covering tropical waters in the Gulf of Carpentaria and Arafura and Timor seas. Currents in the NMR are driven largely by strong winds and tides, with only minor influences from oceanographic currents such as the Indonesian Throughflow and the South Equatorial Current (DSEWPAC, 2012c).
	The seafloor of the NMR consists mainly of a wide continental shelf, as well as other geomorphological features such as shoals, banks, terraces, valleys, shallow canyons and limestone pinnacles.

2.2 Marine Systems of the North-west Marine Region (NWMR)

The NWMR is divided into three large scale ecological marine systems on the basis of the influence of major ocean currents, seafloor features and eco-physical processes (e.g. climate, tides, freshwater inflow) upon the Region (DSEWPAC, 2012a). The three large scale marine systems approximate the Woodside activity areas within the NWMR (Figure 2-1). The key characteristics of each marine system are outlined in Table 2-2.



Note: Woodside areas align with the marine systems as described in DEWHA (2007a)

Figure 2-1: The marine systems of the NWMR (data source: DEWHA, 2007a)

Table 2-2: Key characteristics of the marine systems of the NWMR

Marine System	Woodside Activity Area	Key Characteristics
Kimberley	Browse	Tropical monsoonal climate Strong influence from Indonesian Throughflow Predominantly tropical Indo-Pacific species Subject to episodic offshore cyclonic activity, rarely crossing the coast Large tidal regimes Freshwater input from terrestrial monsoonal run-off Turbid coastal waters (i.e. light limited systems) Dominated by shelf environments Predominantly hard substrates in inner to mid-shelf environments Includes a number of shelf-edge atolls (i.e. Scott Reef, Rowley Shoals)
Pilbara	North West Shelf (NWS) / Scarborough	Tropical arid climate Transition between Indonesian Throughflow and Leeuwin Current dominated areas Predominantly tropical species High cyclone activity with frequent crossing of the coast Transitional tidal zone Internal tide activity Large areas of shelf and slope Dry coast with ephemeral freshwater inputs
Ningaloo-Leeuwin	North-west Cape	Subtropical arid climate Leeuwin Current consolidates Transitional tropical/temperate faunal area Higher water clarity in near-shore and offshore environments Narrow shelf and slope Marginal tidal range Seasonal wind forcing more dominant influence on marine environment

2.3 Meteorology and Oceanography

This section describes the general meteorological conditions and oceanography for the NWMR and provides further detail for the three Woodside activity areas (Table 2-3). The NWMR is influenced by a complex system of ocean currents that change between seasons and between years, which generally result in its surface waters being warm and nutrient-poor, and of low salinity (DEWHA, 2007a). The mix of bathymetric features, complex topography and oceanography across the whole North-west marine environment has created and supports a globally important marine biodiversity hotspot (Wilson, 2013). The purpose of Table 2-3 is to provide high-level physical characteristics of the marine environment within and across the NWMR. This subsection does not describe warming trends or discuss forecast trajectories for the NWMR.

Table 2-3: NWMR climate and oceanography summary

Receptor	Description
Meteorology	
Seasonal patterns	The NWMR associated land mass of the Australian continent is characterised as a hot and humid summer climate zone. The broader NWMR experiences variations of a tropical or monsoon climate. In the far north-west (Kimberley), there is a hot summer season from December to March and a milder winter season between April and November. The Pilbara area is described as having a tropical arid climate with high cyclone activity (DEWHA, 2007a). The Pilbara and North-west Cape has a hot summer season from October to April and a milder winter season between May and September with transition periods between the summer and winter regimes.
Air temperature and rainfall	In summer (between September and March), maximum daily temperatures range from 18ºC to 36ºC. During winter (May to July), mean daily temperatures range from 12ºC to 30ºC (BOM, 2023c), refer to Figure 2-2. Rainfall in the region typically occurs during the summer, with highest falls observed late in the season. This is often associated with the passage of tropical low-pressure systems and cyclones.
Wind	Wind patterns in north-west WA are dictated by the seasonal movement of atmospheric pressure systems. During summer, high-pressure cells produce prevailing winds from the north-west and south-west, which vary between 10 and 13 ms-1. During winter, high-pressure cells over central Australia produce north-easterly to south-easterly winds with average speeds of between 6 and 8 ms-1. Refer to Figure 2-3.
Tropical cyclones	The NWS and Pilbara coast (within the NWMR) experiences more cyclonic activity than any other region of the Australian mainland coast (BOM, 2021a). Tropical cyclone activity typically occurs between November and April and is most frequent in the region during December to March (i.e. considered the peak period), with an average of about one cyclone per month (BOM, 2021a). Refer to Figure 2-4.
Oceanography	
Ocean temperature	Waters in NWMR are tropical year-round, with sea surface temperature in open shelf waters reaching ~26°C in summer and dropping to ~22°C in winter. Nearshore temperatures (as recorded for the NWS area) fluctuate more widely on an annual basis from ~<23°C in winter to ~31°C in summer (Hallenberger et al., 2022), indicative of present-day sea surface temperatures, acquired from the CISRO Oceans and Atmosphere database. Refer to Figure 2-5**,** for the seasonal variation across and within the NWMR.
Currents	The major surface currents influencing north-west WA flow towards the poles and include the Indonesian Throughflow, the Leeuwin Current, the South Equatorial Current, and the Eastern Gyral Current. The Ningaloo Current, the Holloway Current, the Shark Bay Outflow, and the Capes Current are seasonal surface currents in the region. Below these surface currents are several subsurface currents, the most important of which are the Leeuwin Undercurrent and the West Australian Current. These subsurface currents flow towards the equator in the opposite direction to surface currents (DEWHA, 2007a). Refer to Figure 2-6. The offshore waters of the NWMR are characterised by surface and subsurface boundary currents that flow along the continental shelf/slope and are enhanced through inflows from the ocean basins and are an important conduit for the poleward heat and mass transport along the West coast (Wijeratne et al., 2018). Local physical oceanography is strongly influenced by the large-scale water movements of the Indonesian Throughflow (Liu et al., 2015; Sutton et al., 2019). Typically, a warm and well-mixed oligotrophic surface layer, and a cooler and more nutrient rich deeper water layer (Menezes et al., 2013).
Waves	Sea surface waves within the NWMR generally reflect the direction of the synoptic winds and flow predominately from the South-west in the summer and East in winter (Pearce et al., 2003). The NWS within the NWMR is a known area of internal wave generation. Both internal tides and internal waves are thought to be more prevalent during summer months due to the increased stratification of the water column (DEWHA, 2007a). Along the continental slope of the NWMR, strong internal waves and interaction between semi-diurnal tidal currents and seabed topographic features facilitates upwelling events and localised productivity events (Holloway, 2001).

Receptor	Description
Tides	Tides on the NWS (NWMR) increase as the water moves from deep towards the shallower coast. The highest offshore tides are experienced at the border of the Browse and Canning basins. The smallest tides are experienced at the Exmouth Plateau, near the coast. Tides of the NWS (NWMR) are predominantly semi-diurnal (two highs and two lows each day), but with increasing importance of the diurnal (once per day) inequality at the southern and northern extremities of the NWS. The tide range—represented by the Mean Spring Range (MSR)—increases northwards along the coast from 1.4 m at North-west Cape (Point Murat) to 7.7 m at Broome, before decreasing again (apart from local amplification in King Sound and Collier Bay) to about 5 m off Cape Londonderry. The MSR then increases again through Joseph Bonaparte Gulf and on up 5.5 m at Darwin (RPS, 2016).

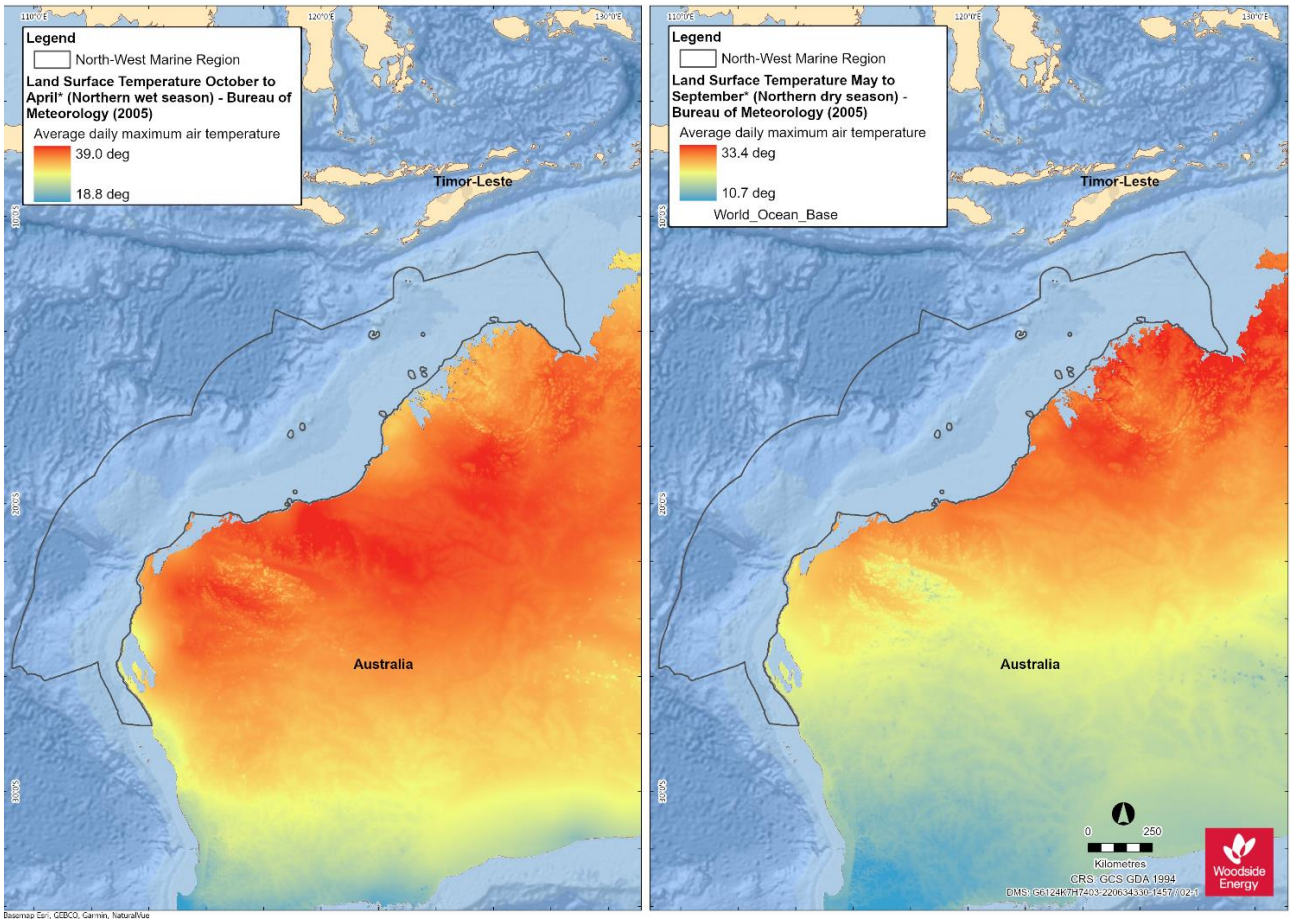


Figure 2-2: Average daily maximum air temperature for land surface adjacent to NWMR: (a) summer (northern wet season) and (b) winter (northern dry season)

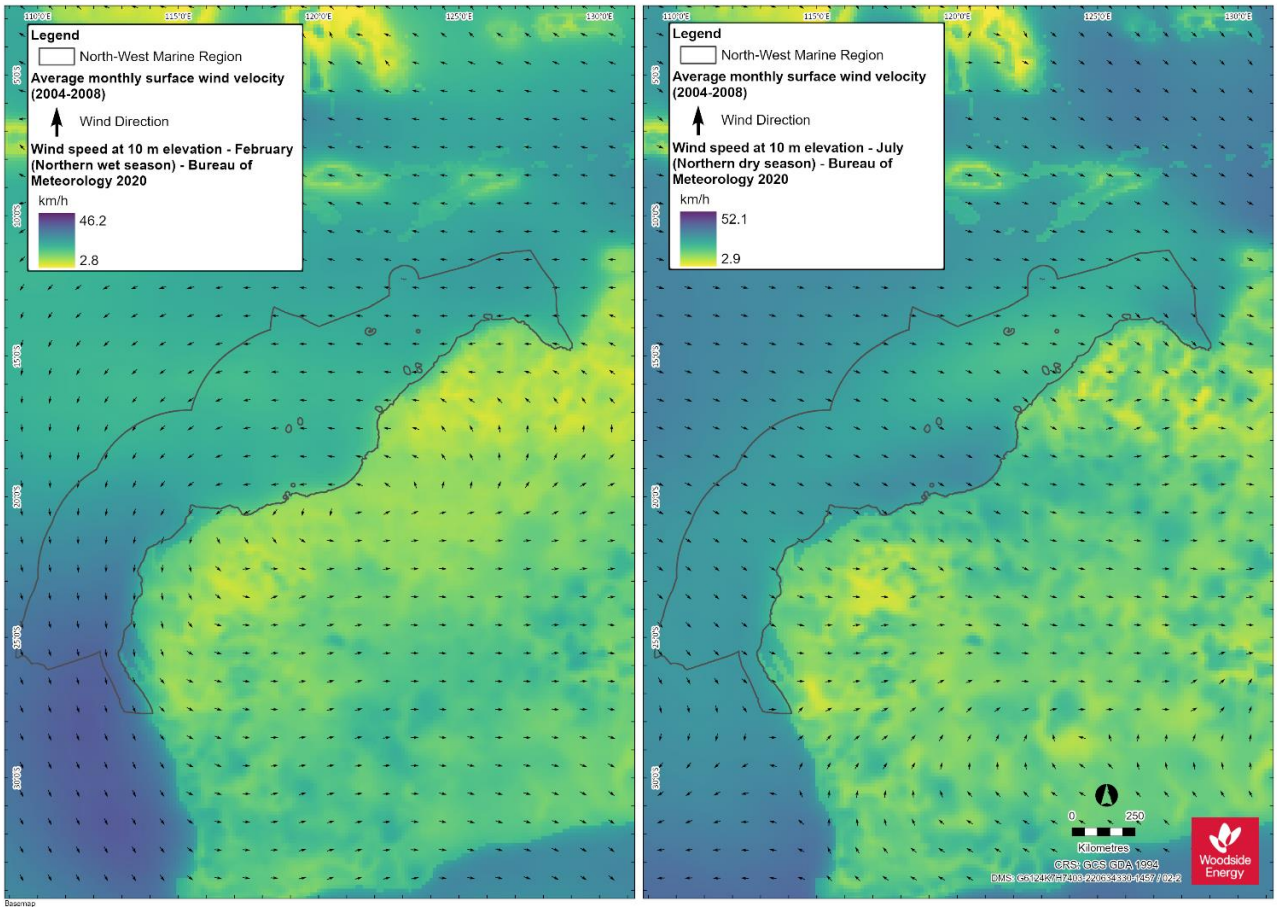


Figure 2-3: Average monthly surface wind direction and velocity for NWMR: (a) summer (February, northern wet season) and (b) winter (July, northern dry season)

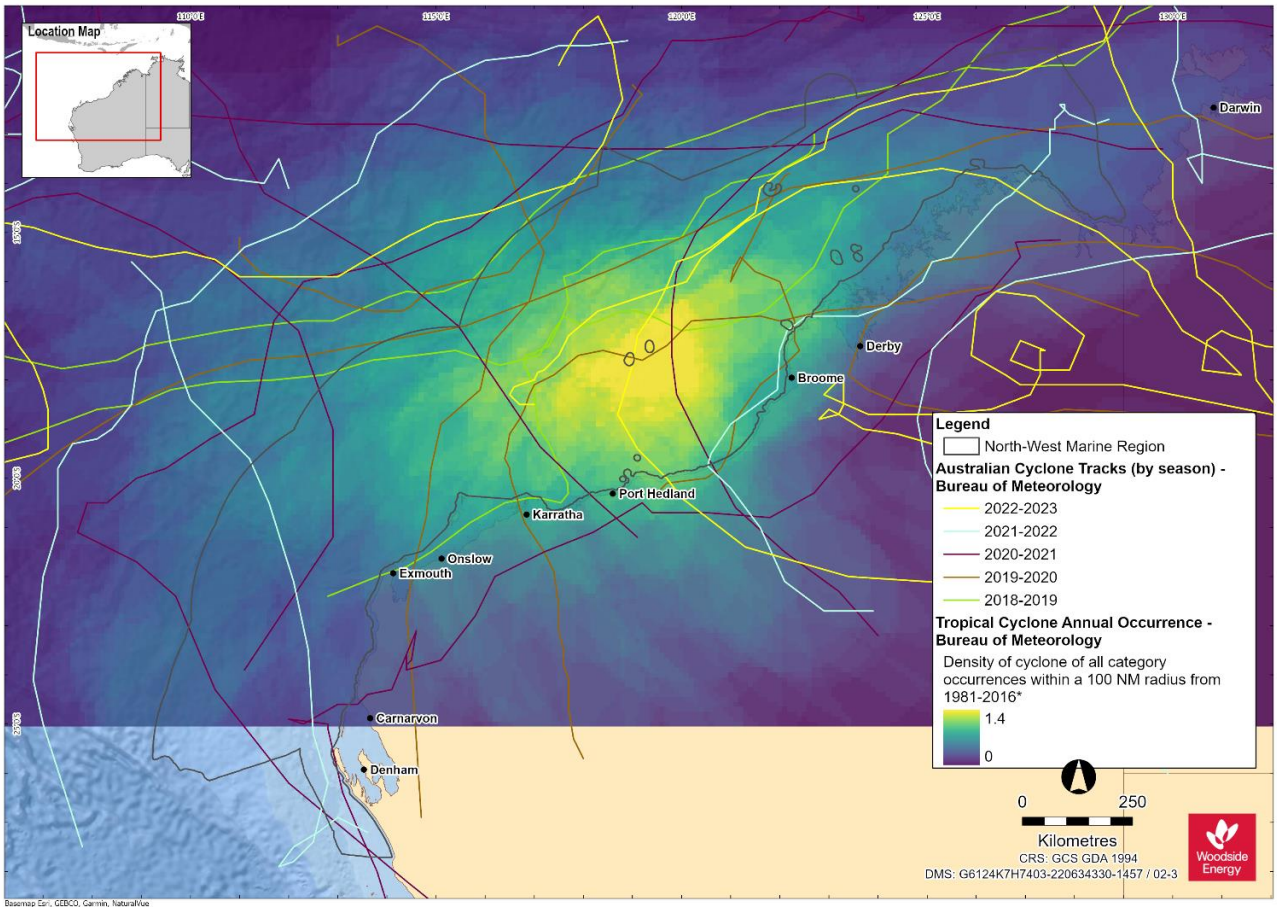


Figure 2-4: Tropical cyclone annual occurrence and cyclone tracks for NWMR

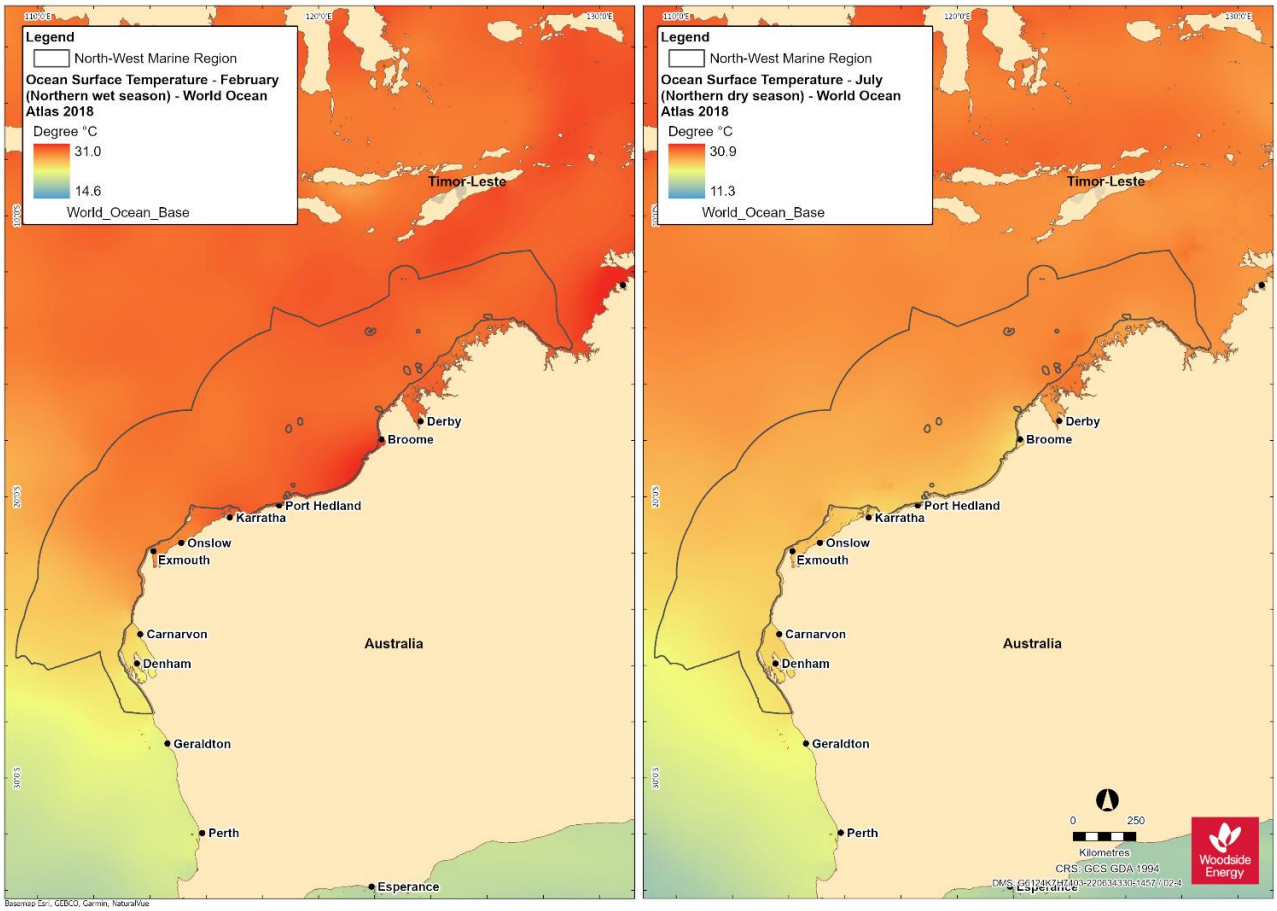


Figure 2-5: Ocean surface temperature for NWMR: (a) summer (February, northern wet season) and (b) winter (July, northern dry season) (data source: Locarnini et al., 2018 in World Ocean Atlas, 2018)

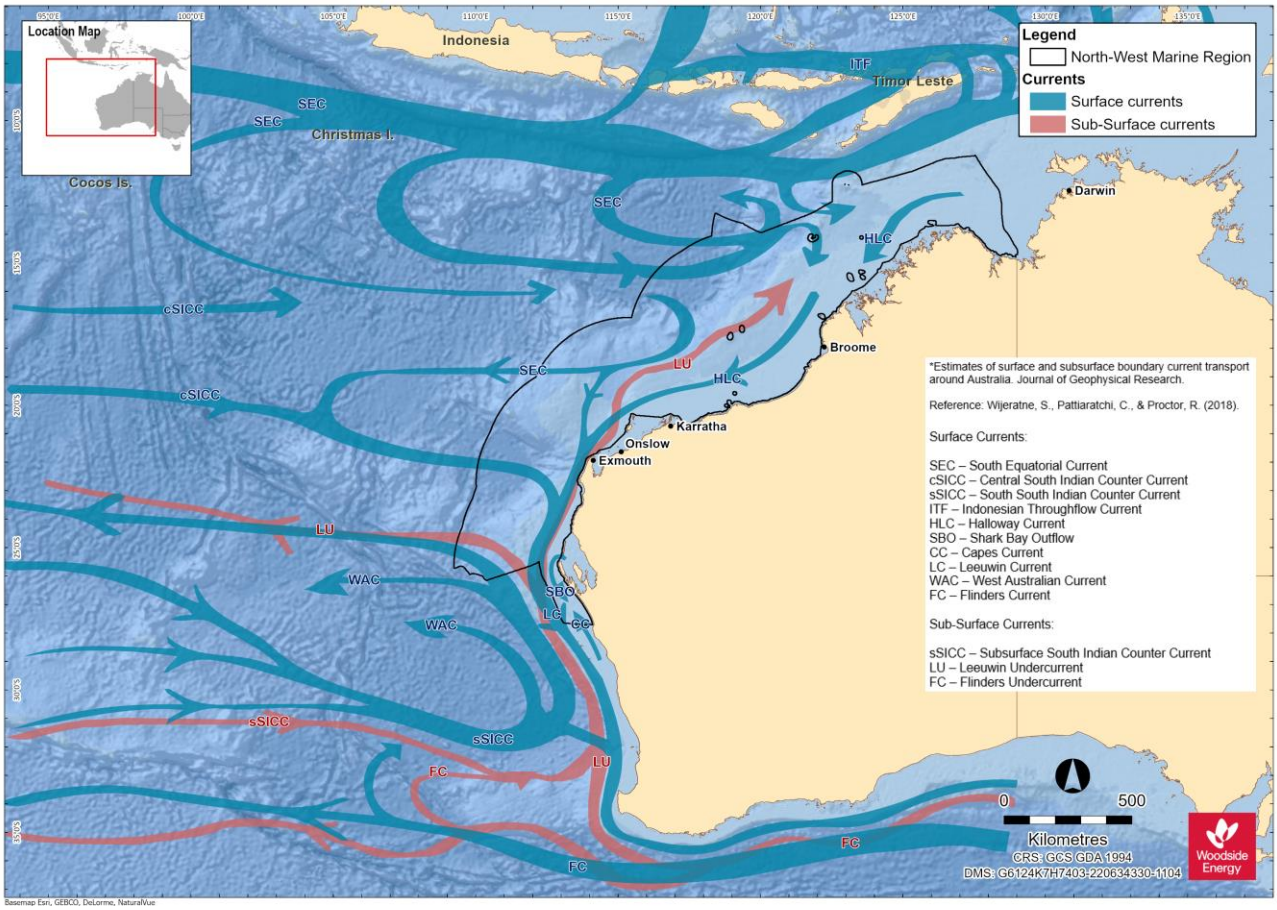


Figure 2-6: Ocean surface and sub-surface currents of the NWMR and wider region (data source: adopted from Wijeratne et al., 2018)

2.3.1 Browse

Table 2-4: Summary meteorology and oceanography for Browse (refer to Appendix B for supporting metocean figures and data sources)

Receptor	Description
Meteorology	
Seasonal patterns	The Browse area overlapping the Kimberley marine system experiences tropical monsoon climate with two distinct seasons: the wet season from December to March and dry season from April to November.
Air temperature	The mean annual air temperature recorded at Troughton Island between 2010 and 2020 ranged from 22.5ºC in 2019 to 32.8ºC in 2016 and highest mean monthly air temperatures were recorded for the months of November and December (BOM, 2023a).
Rainfall	Rainfall recorded from Troughton Island in the Browse basin ranged from barely detectable (<1 mm) mean monthly level to >100 mm in December to March, with the highest rainfall recorded for January (reflecting the wet monsoon season of the Kimberley marine system) (BOM, 2023a).
Wind	The dry season experiences high-pressure systems that bring East to South-easterly winds with average wind speeds during the season of approximately 16.6 km/h and maximum wind gusts of 65 km/h. In contrast the wet season brings predominately westerly winds with average wind speeds approximately 17 km/h and maximum gusts exceeding 100 km/h (generally associated with tropical cyclones (MetOcean Engineers, 2005).
Oceanography	
Currents	Surface currents exhibit seasonal directionality, with flow to the South-west during March to June and more variable outside this period (Woodside, 2019). This is consistent with the stronger Leeuwin Current flow during winter months, with more variable currents driven by local wind stress during periods of weaker Leeuwin Current flow.

2.3.2 North West Shelf / Scarborough

Table 2-5: Summary meteorology and oceanography for the North West Shelf and Scarborough (refer to Appendix B for supporting metocean figures and data sources)

Receptor	Description
Meteorology	
Seasonal patterns	The NWS and Scarborough areas experience the monsoonal climate of the wider NWMR with a distinct wet and dry seasonal regime and transitions periods between seasons.
Air temperature	Air temperatures as measured at the North Rankin A platform on the NWS ranged from a maximum average of 39.8ºC in summer to a minimum average temperature of 15.2ºC in winter (Woodside, 2015).
Rainfall	Rainfall patterns annually reveal the wet season with highest rainfalls during the late summer, often associated with the passage of tropical low-pressure systems and cyclones. Rainfall in the dry season is typically extremely low (Pearce et al*.,* 2003) and Appendix B.
Wind	Winds are typically from the southwest during the wet season (summer) and tending from the south-east during the dry season (winter). The summer south-westerly winds are driven by high pressure cells that pass from west to east over the Australian continent. During the winter period, the relative position of the high-pressure cells shifts further north, leading to prevailing south-easterly winds from the mainland (Pearce et al*.,* 2003) and Appendix B.
Oceanography	
Currents	The large-scale ocean currents of the NWMR, primarily the Indonesian Throughflow and Leeuwin Current (and Holloway Current), are the primary influence on the NWS and Scarborough areas. The Indonesian Throughflow and Leeuwin Current are strongest during the late summer and winter and flow reversals to the north-east, typically short-lived and weak when there are strong south-westerly winds, can generate localised upwelling on the shelf edge (Holloway and Nye, 1985; James et al*.,* 2004; Condie et al*.,* 2006).

2.3.3 North-west Cape

Table 2-6: Summary meteorology and oceanography for the North-west Cape (refer to Appendix B for supporting metocean figures and data sources) for supporting metocean figures)

Receptor	Description
Meteorology	
Seasonal patterns	The climate of the NWMR is dry tropical exhibiting a hot summer season and a mild winter season. There are often distinct transition periods between the summer and winter regimes, characterised by periods of relatively low winds.
Air temperature	Air temperatures in the North-west Cape area range from high summer temperatures (maximum average of 38ºC) and mild winter temperatures (minimum average of 11.5ºC) as recorded from the Learmonth Airport (BOM, 2023b).
Rainfall	Rainfall typically occurs during the summer, with highest rainfall during later summer and autumn (mean monthly level to >19 mm), with the highest rainfall recorded during June, often associated with the passage of tropical low-pressure systems and cyclones. Rainfall is typically low in winter (<2 mm) (BOM, 2023b).
Wind	Winds vary seasonally, generally from the south-west quadrant during summer months and the south, south-east quadrant during the autumn and winter months. The summer south-westerly winds are driven by high pressure cells that pass from west to east over the Australian continent. Winds typically weaken and are more variable during the transitional period between the summer and winter seasons, generally between April to August.
Oceanography	
Currents	Surface currents exhibit seasonal directionality, with flow to the south-west during March to June and more variable outside this period (Woodside, 2022). This is consistent with the stronger Leeuwin Current flow during winter months, with more variable currents driven by local wind stress during periods of weaker Leeuwin Current flow.

2.4 Physical Environment of NWMR

Based on the Integrated Marine and Coastal Regionalisation of Australia (IMCRA) Version 4.0, there are eight provincial bioregions that occur within the NWMR, which are based on patterns of demersal fish diversity, benthic habitat and oceanographic data (Commonwealth of Australia, 2006), Figure 2-7. Of the eight provincial bioregions that occur within the NWMR, these include four offshore (~65% of total NWMR area) and four shelf (~35% of total NWMR area) bioregions (Baker et al., 2008).

The NWMR is a tropical carbonate margin that comprises an extensive area of shelf, slope and abyssal plain/deep ocean floor, as well as complex areas of bathymetry such as plateau, terraces and major canyons (Harris et al., 2005). A series of reefs are located on the outer shelf/slope of the NWMR, including Ashmore, Cartier, Scott and Seringapatam reefs (Baker et al., 2008). The distribution of seafloor geomorphic features has been systematically mapped over much of the Australian margin and adjacent seafloor. The mapped area can be divided into 10 geomorphic regions, of which the NWMR overlays two; the Western Margin and Northern Margin (Harris et al., 2005). Most of the region consists of either continental slope (61%) or continental shelf (28%) (DEWHA, 2007a), with more than 40% of the NWMR having a water depth less than 200 m. The shallow shelf is contrasted by features such as the Cuvier and Argo abyssal plains, which reach depths of more than 5 km. A unique feature of the region is the significant narrowing of the continental shelf around North-west Cape (approximately 7 km wide) from the broad continental shelf in the north of the region (approximately 400 km wide at Joseph Bonaparte Gulf) (DEWHA, 2007a), Figure 2-8.

The geological history of the region, as well as its geomorphology and oceanography, has influenced the composition and distribution of sediments (DEWHA, 2007a). The sedimentology of the NWMR is dominated by marine carbonates, which show a broad zoning and fining with water depth. Main trends of the NWMR sediments include a tropical carbonate shelf that is dominated by sand and

gravel, an outer shelf/slope zone that is dominated by mud and a relatively homogenous rise and abyssal plain/deep ocean floor that is dominated by non-carbonate mud (Baker et al., 2008), Figure 2-9. The distribution and resuspension of sediments on the inner shelf is strongly influenced by the strength of tides across the continental shelf as well as episodic events such as cyclones. Further offshore, on the mid to outer shelf and on the slope itself, sediment movement is primarily influenced by ocean currents and internal tides (DEWHA, 2007a).

This variation in bathymetry and interactions with oceanographic processes provides a diversity of habitats to marine fauna and flora within the NWMR.

2.5 Air Quality

The ambient air quality of all three marine regions is largely unpolluted due to the extent of the open ocean area, the activities currently carried out in each and the relative remoteness of each region.

Vessel traffic and existing offshore surface infrastructure are the only likely sources of pollutants in the marine region. Closer to the coast there may be localised and temporary reductions in air quality around areas of high vessel traffic, or due to the occurrence of dust storms and bushfires. International contributors to reduced air quality in the marine region may include ‘slash-and-burn’ agricultural methods and large forest fires in South-east Asian regions (Vadrevu et al., 2014; Kim Oanh et al., 2018).

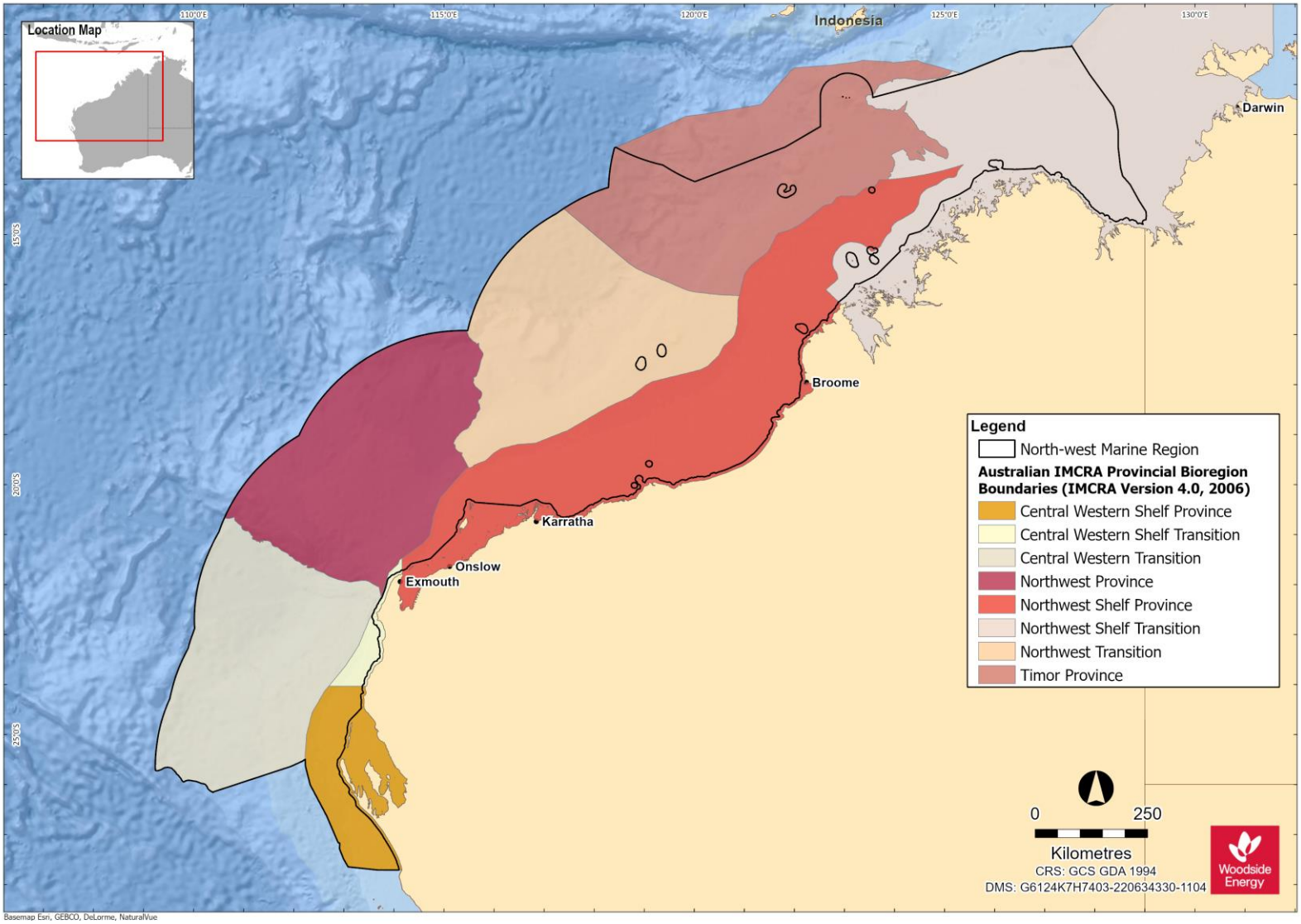


Figure 2-7: The eight Integrated Marine and Coastal Regionalisation of Australia (IMCRA) v4.0 provincial bioregions of the NWMR (GA, 2024)

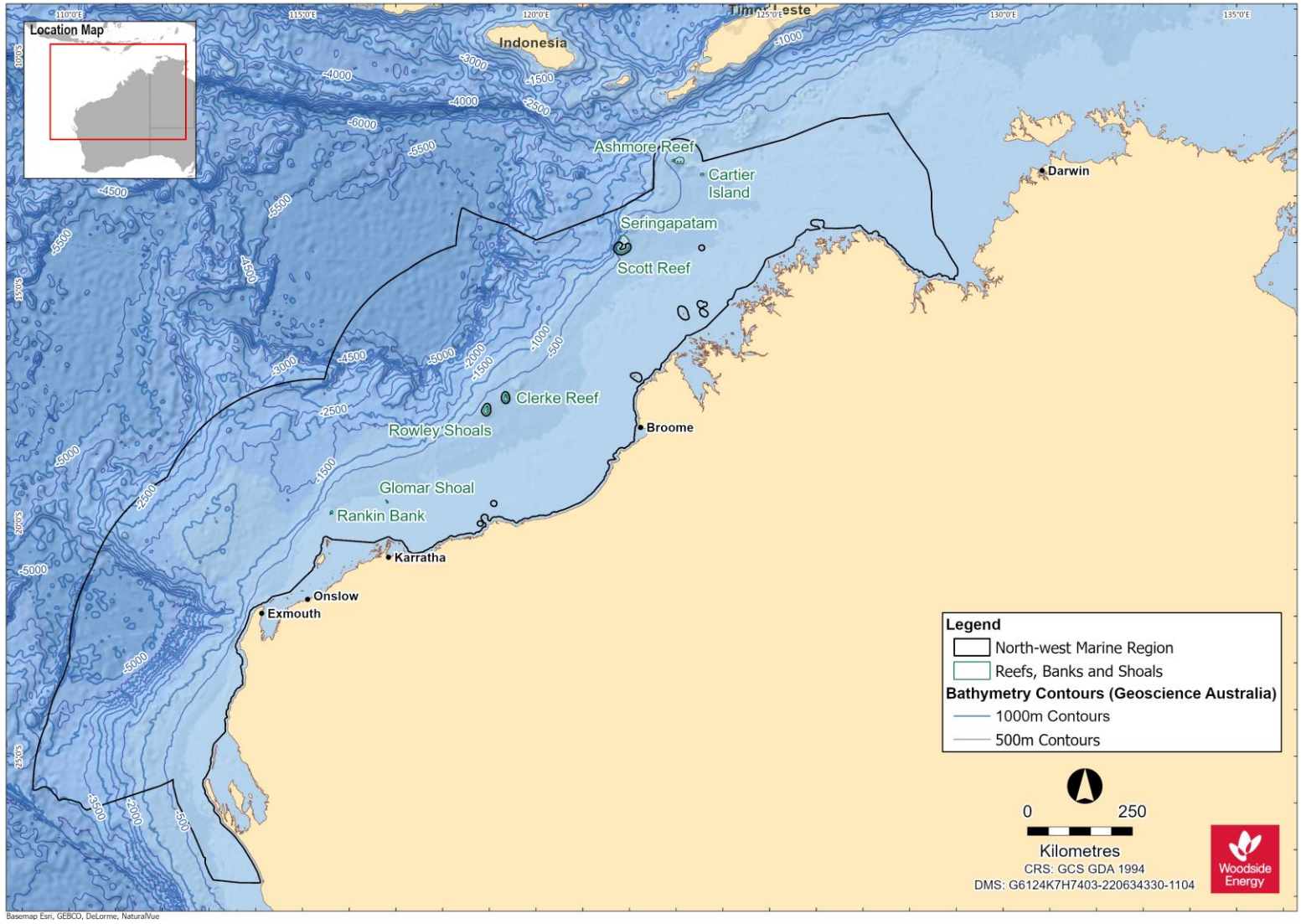


Figure 2-8: Bathymetry of the NWMR (data source: Geoscience Australia)

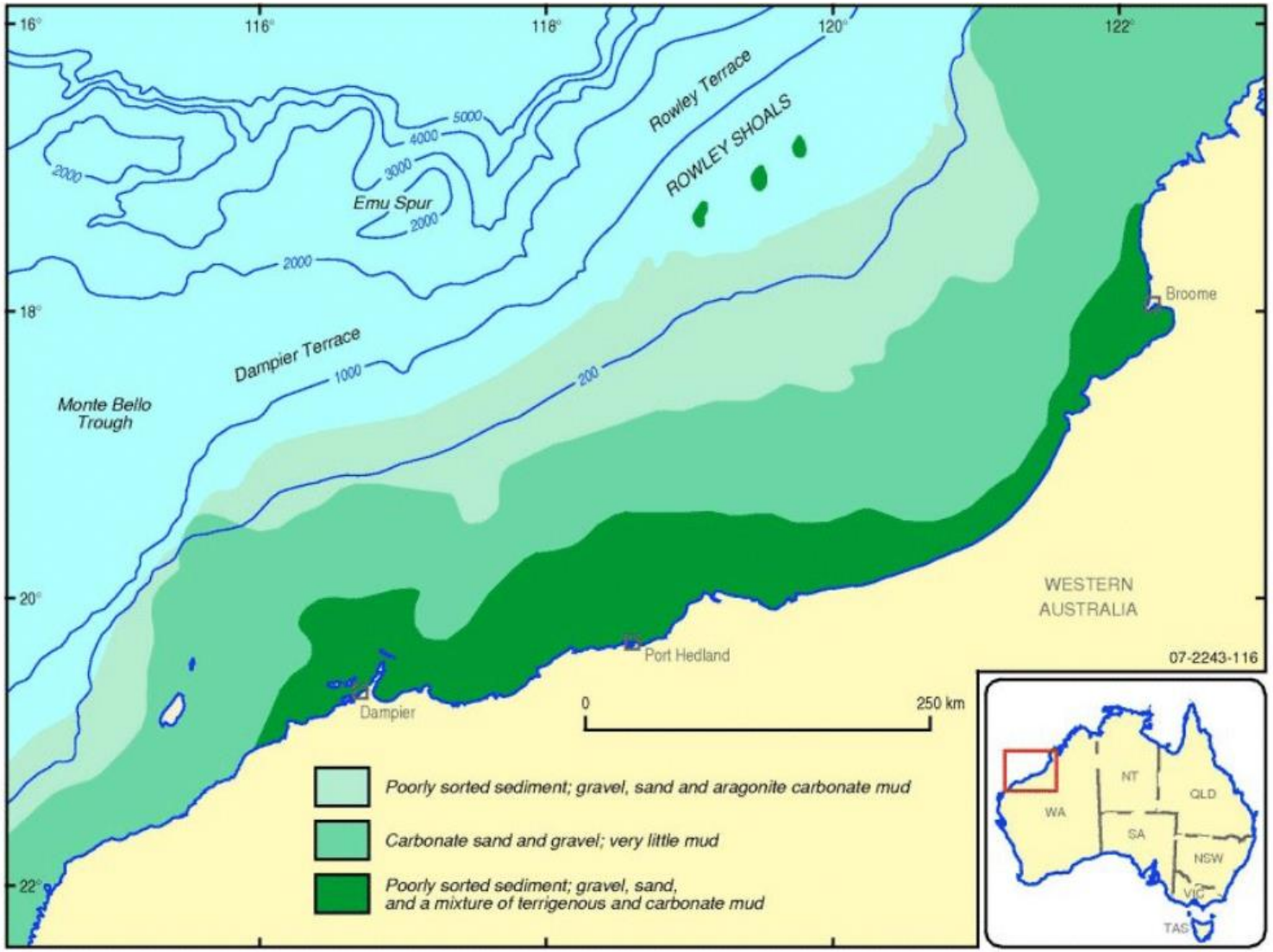


Figure 2-9: Overview of the seabed sediments of the NWMR (data source: Baker et al., 2008)

3. MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE (EPBC ACT)

3.1 Summary of Matters of National Environmental Significance (MNES)

This section summarises the matters of national environmental significance (MNES) reported for the three bioregions; NWMR (Table 3-1), SWMR (Table 3-2) and NMR (Table 3-3), based on the Protected Matters search reports (Appendix A).

Additional information on these MNES is provided in subsequent sections (referenced in Table 3-1, Table 3-2 and Table 3-3).

Table 3-1: Summary of MNES identified by the EPBC Act Protected Matters Search Tool (PMST) within and potentially occurring within the NWMR

MNES	Number	Description	Section of this Document
World Heritage Properties	2	Shark Bay The Ningaloo Coast	Section 11
National Heritage Places	5	Shark Bay The Ningaloo Coast The West Kimberley The Dampier Archipelago (including Burrup Peninsula) Dirk Hartog Landing Site 1616	Section 11
Wetlands of International Importance (Ramsar)	4	Ashmore Reef National Nature Reserve Eighty Mile Beach Ord River Floodplain Roebuck Bay	Section 11
Commonwealth Marine Areas	5	EEZ and Territorial Sea Key Ecological Features (KEFs) Australian Marine Parks (AMPs) Australian Whale Sanctuary Extended Continental Shelf	Section 11
Listed Threatened Ecological Communities	1	Monsoon vine thickets on the coastal sand dunes of Dampier Peninsula	Terrestrial community and not considered further
Listed Threatened Species	109	Refer NWMR PMST report (Appendix A)	Section 5 to Section 9
Listed Migratory Species	97	Refer NWMR PMST report (Appendix A)	Section 5 to Section 9

Table 3-2: Summary of MNES identified by the EPBC Act PMST within and potentially occurring within the SWMR

MNES	Number	Description	Section of this Document
World Heritage Properties	1	Australian Convict Sites (Fremantle Prison).	Section 11
National Heritage Places	5	Cheetup Rock Shelter Batavia Shipwreck site HMAS Sydney II and HSK Kormoran Fitzgerald River National Park Fremantle Prison (former).	Section 11
Wetlands of International Importance (Ramsar)	6	Becher Point Wetlands Forrestdale and Thomsons Lakes Peel-Yalgorup System Vasse-Wonnerup System Lake Gore Lake Warden System	Section 11
Commonwealth Marine Areas	5	EEZ and Territorial Sea KEFs AMPs Australian Whale Sanctuary Extended Continental Shelf	Section 11
Listed Threatened Ecological Communities	9	SWMR Subtropical and Temperate Coastal Saltmarsh Terrestrial Banksia Woodlands of the Swan Coastal Plain ecological community Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain ecological community Aquatic Root Mat Community 3 in Caves of the Leeuwin Naturaliste Ridge Thrombolite (microbial) community of coastal freshwater lakes of the Swan Coastal Plain (Lake Richmond) Sedgelands in Holocene dune swales of the southern Swan Coastal Plain Honeymyrtle shrubland on limestone ridges of the Swan Coastal Plain Bioregion Empodisma peatlands of southwestern Australia	Section 11
Listed Threatened Species	166	Refer SWMR PMST report (Appendix A)	N/A
Listed Migratory Species	89	Refer SWMR PMST report (Appendix A)	N/A

Table 3-3: Summary of MNES identified by the EPBC Act PMST within and potentially occurring within the NMR

MNES	Number	Description	Section of this Document
World Heritage Properties	0	N/A	N/A
National Heritage Places	0	N/A	N/A
Wetlands of International Importance (Ramsar)	0	N/A	N/A
Commonwealth Marine Areas	5	EEZ and Territorial Sea KEFs AMPs Australian Whale Sanctuary Extended Continental Shelf	Section 11
Listed Threatened Ecological Communities	0	N/A	N/A
Listed Threatened Species	82	Refer NMR PMST report (Appendix A)	N/A
Listed Migratory Species	82	Refer NMR PMST report (Appendix A)	N/A

3.2 Part 13 Statutory Instruments for EPBC Act Listed Threatened and Migratory Species in the NWMR, South-west Marine Region (SWMR) and North Marine Region (NMR)

A screening process was conducted to identify which EPBC Act listed threatened and migratory species, and associated Part 13 statutory instruments, are relevant in the context of the assessment of impacts and risks associated with petroleum activities in each of the Woodside activity areas. The screening criteria included:

- overlap among the Woodside activity areas with habitat critical for survival (e.g. marine turtles) and with biologically important areas (BIAs) (overlapping the marine environment) for any listed threatened and/or migratory species as reported in the PMST searches
- published literature, unpublished reports and/or credible anecdotal information (e.g. feedback from stakeholders) indicating species presence/occurrence within the Woodside activity areas
- temporal overlap between the likely timing of petroleum activities and peak periods for key critical life stage behaviours (e.g. breeding, nesting, calving, resting, foraging, migration)
- environmental aspects associated with petroleum activities that have been identified as a key threat to a species in a Part 13 statutory instrument (e.g. anthropogenic noise, light emissions, marine debris).

Relevant EPBC Act threatened and migratory species and their Part 13 statutory instruments are listed in Table 3-4. For the full list of EPBC Act listed species for each marine bioregion refer to the PMST reports (Appendix A).

Table 3-4: Summary of EPBC Act threatened and migratory species to be considered for impact or risk evaluation for Woodside operations

Species	EPBC Act Part 13 Statutory Instrument
All vertebrate marine fauna	Threat Abatement Plan for the impacts of marine debris on vertebrate marine life (Commonwealth of Australia, 2018)
Marine Mammals	
Blue whale	Conservation Management Plan for the Blue Whale: A Recovery Plan under the *Environment Protection and Biodiversity Conservation Act 1999* 2015–2025 (Commonwealth of Australia, 2015a)
Southern right whale	National Recovery Plan for the Southern Right Whale *Eubalaena australis* (DCCEEW, 2024a)
Sei whale	Conservation Advice *Balaenoptera borealis* sei whale (Threatened Species Scientific Committee, 2015a)
Fin whale	Conservation Advice *Balaenoptera physalus* fin whale (Threatened Species Scientific Committee, 2015c)
Australian sea lion	Recovery Plan for the Australian Sea Lion (*Neophoca cinerea*) 2013 (DSEWPAC, 2013a) Conservation Advice *Neophoca cinerea* Australian Sea Lion (Threatened Species Scientific Committee, 2020a) (in effect under the EPBC Act from 23-Dec-2020)
Marine Reptiles	
All marine turtle species (loggerhead, green, leatherback, hawksbill, flatback, olive ridley)	Recovery Plan for Marine Turtles in Australia 2017–2027 (Commonwealth of Australia, 2017) National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds (DCCEEW, 2023d)
Mitchell's water monitor	Conservation Advice for *Varanus mitchelli* (Mitchell's water monitor) (DCCEEW, 2023c)
Short-nosed sea snake	Approved Conservation Advice for *Aipysurus apraefrontalis* (Short-nosed Sea Snake) (DSEWPAC, 2011a)
Leaf-scaled sea snake	Approved Conservation Advice for *Aipysurus foliosquama* (Leaf-scaled Sea Snake) (DSEWPAC, 2011b)
Fishes, Sharks, Rays and Sawfishes	
Grey nurse shark (West coast population)	Recovery Plan for the Grey Nurse Shark (*Carcharias taurus*) 2014 (DOE, 2014)
White shark	Recovery Plan for the White Shark (*Carcharodon carcharias*) 2013 (DSEWPAC, 2013b)
Whale shark	Conservation Advice *Rhincodon typus* whale shark (Threatened Species Scientific Committee, 2015d)
All sawfishes (largetooth, green, dwarf, speartooth, narrow)	Sawfish and River Sharks Multispecies Recovery Plan (Commonwealth of Australia, 2015b)

Species	EPBC Act Part 13 Statutory Instrument
Seabirds	
Migratory seabird species	Wildlife Conservation Plan for Seabirds (Commonwealth of Australia, 2020) National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds (DCCEEW, 2023d)
Australian fairy tern	National Recovery Plan for the Australian Fairy Tern *Sternula nereis nereis* (Commonwealth of Australia, 2020) EPBC Act Threat Abatement Plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans (DoEE, 2018)
Australian lesser noddy	Conservation Advice *Anous tenuirostris melanops* Australian lesser noddy (Threatened Species Scientific Committee, 2015e) EPBC Act Threat Abatement Plan to reduce the impacts of exotic rodents on biodiversity on Australian offshore islands of less than 100,000 hectares (DEWHA, 2009)
Amsterdam petrel	National Recovery Plan for albatrosses and petrels (DCCEEW, 2022) EPBC Act Threat Abatement Plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans (DoEE, 2018)
Brown booby	EPBC Act Threat Abatement Plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans (DoEE, 2018)
Wedge-tailed shearwater	
Flesh-footed shearwater	
Wilson's storm petrel	
Shorebirds	
Migratory shorebird species	Wildlife Conservation Plan for Migratory Shorebirds (Commonwealth of Australia, 2015c) EPBC Act Policy Statement 3.21—Industry guidelines for avoiding, assessing, and mitigating impacts on EPBC Act listed migratory shorebird species (DoEE, 2017) National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds (DCCEEW, 2023d)
Eastern curlew, far eastern curlew	Conservation Advice *Numenius madagascariensis* Far eastern curlew (DCCEEW, 2023e)
Curlew sandpiper	Conservation Advice *Calidris ferruginea* curlew sandpiper (DCCEEW, 2023f)
Bar-tailed godwit (*menzbieri*)	Conservation Advice *Limosa lapponica menzbieri* Bar-tailed godwit (northern Siberia) (DCCEEW, 2024e)
Lesser sand plover	Conservation Advice *Charadrius mongolus* Lesser sand plover (Threated Species Scientific Committee, 2016)
Australian painted snipe	Conservation Advice *Rostratula australis* Australian painted snipe (Threatened Species Scientific Committee, 2013a)
Great knot	Conservation Advice *Calidris tenuirostris* Great knot (DCCEEW, 2024g)

Species	EPBC Act Part 13 Statutory Instrument
Red knot, knot	Conservation Advice *Calidris canutus* Red knot (DCCEEW, 2024f)
Greater sand plover	Conservation Advice *Charadrius leschenaultii* Greater sand plover (DCCEEW, 2023g)
Black-tailed godwit	Conservation Advice for *Limosa limosa* black-tailed godwit (DCCEEW, 2024h)
Common greenshank	Conservation Advice for *Tringa nebularia* (common greenshank) (DCCEEW, 2024i)
Asian dowitcher	Conservation Advice for *Limnodromus semipalmatus* (Asian dowitcher) (DCCEEW, 2024j)
Ruddy turnstone	Conservation Advice for *Arenaria interpres* (ruddy turnstone) (DCCEEW, 2024k)
Sharp-tailed sandpiper	Conservation Advice for *Calidris acuminata* (sharp-tailed sandpiper) (DCCEEW, 2024l)
Terek sandpiper	Conservation Advice for *Xenus cinereus* (terek sandpiper) (DCCEEW, 2024m)
Grey plover	Conservation Advice for *Pluvialis squatarola* (grey plover) (DCCEEW, 2024n)

4. HABITAT AND BIOLOGICAL COMMUNITIES

4.1 Regional Context

The NWMR habitats range from nearshore benthic primary producer habitats such as seagrass beds, coral communities and mangrove forests, to offshore soft sediment seabed habitats and submerged and emergent reef systems. These habitats support biological communities that range from low density sessile and mobile benthos, such as sponges, molluscs and echinoids (with noted areas of sponge hotspot diversity) in offshore soft sediment habitat (DSEWPAC, 2012a) to complex, diverse, remote coral reef systems.

Benthic primary producer habitats, such as seagrass beds, coral communities and mangrove forests within the SWMR, are described as a mixture of tropical and temperate species, due to the seasonal influences of the tropical waters carried south by the Leeuwin Current and the temperate waters carried north by the Capes Current (DSEWPAC, 2012b).

The NMR shares similar habitat types to the NWMR. The predominant habitat of the region includes soft muddy sediments on relatively flat terrain. Other habitat types include seagrasses, reefs, shoals and coastal habitats such as mangroves and coastal wetlands (Rochester et al., 2007).

The summary of key habitats and biological communities provided in the following sub-sections is focused on the primary features of relevance to the activity areas within the NWMR – primarily the offshore habitats of the continental shelf and slope, submerged shoals and banks, and remote oceanic reef systems of recognised conservation value.

4.2 Biological Productivity of NWMR

Primary productivity of the NWMR is generally low and appears to be largely driven by offshore influences (Brewer et al., 2007), with periodic upwelling events and cyclonic influences driving coastal productivity with nutrient recycling and advection. Seasonal weather patterns also influence the delivery of nutrients from deep-water to shallow water. Cyclones and North-westerly winds during the North-west monsoon (approximately November–March) and the strong offshore winds of the South-east monsoon (approximately April–September) facilitate the upwelling and mixing of nutrients from deep-water to shallow water environments (Brewer et al., 2007).

The Indonesian Throughflow (ITF) has an important effect on productivity in the northern areas of the Region. Generally, its deep, warm and low nutrient waters suppress upwelling of deeper comparatively nutrient-rich waters, thereby forcing the highest rates of primary productivity to occur at depths associated with the thermocline. When the ITF is weaker, the thermocline lifts bringing deeper, more nutrient-rich waters into the photic zone and hence resulting in conditions favourable to increased productivity (DEWHA, 2007a). Similarly, the Leeuwin Current has a significant role in determining primary productivity in the southern areas of the NWMR. As with the ITF, the overlying warm oligotrophic waters of the Leeuwin Current suppress upwelling. A subsurface chlorophyll maximum is therefore formed at a depth in the water column where nutrients and light are sufficient for photosynthesis to proceed. Seasonal changes in the strength of the Leeuwin Current influence primary productivity levels, and seasonal interactions between the Leeuwin and Ningaloo currents in the south of the NWMR, are believed to be particularly important (DEWHA, 2007a).

Internal tides (defined as internal waves generated by the barotropic tide) are a striking characteristic of many parts of the NWMR and are associated with highly stratified water columns. Internal waves (solitons), which can raise cooler, generally more nutrient rich water higher in the water column, are generated between water depths of 400 m and 1000 m where bottom topography results in a significant change in water depth over a relatively short distance. Cyclones are episodic events in the NWMR that contribute to spikes in productivity through enrichment of surface water layers due to enhanced vertical mixing of the water column. Temporary increases in primary productivity as a result of cyclones generally last between one and two weeks, and it is believed that the impacts of

cyclones are generally limited to waters less than 100 m deep and affect benthic communities more substantially than pelagic systems (DEWHA, 2007a).

Water depth also has a significant overriding influence over productivity in the marine environment, due to its influence on light availability. This is reflected by distinct onshore and offshore assemblages of major pelagic groups of phytoplankton, microzooplankton, mesoplankton and ichthyoplankton. Productivity booms are thought to be triggered by seasonal changes to physical drivers or episodic events, as detailed above, which result in rapid increases in primary production over short periods, followed by extended periods of lower primary production. The trophic systems in the NWMR are able to take advantage of blooms in primary production, enabling nutrients generated to be used by different groups of consumers over long periods (DEWHA, 2007a).

Little detailed information is available about the trophic systems in the NWMR. The utilisation of available nutrients is thought to differ between pelagic and benthic environments, influenced by water depth and vertical migration of some species groups in the water column. In the pelagic system, it is thought that approximately half of the nutrients available are utilised by microzooplankton (e.g. protozoa) with the remainder going to macro/meso-zooplankton (e.g. copepods). As primary and secondary consumers, gelatinous zooplankton (e.g. salps, coelenterates) and jellyfish are thought to play an important role in the food web, contributing a significant proportion of biomass in the marine system during and for periods after booms in primary productivity. Salps are semi-transparent, barrel-shaped marine animals that can reproduce quickly in response to bursts in primary productivity and provide a food source for many pelagic fish species (DEWHA, 2007a).

4.3 Planktonic Communities in the NWMR

The NWMR has two distinct phytoplankton assemblages; a tropical oceanic community in offshore waters and a tropical shelf community confined to the NWS (Hallegraeff, 1995). MODIS (Moderate Resolution Imaging Spectrometer) satellite datasets from the NWMR indicates that chlorophyll (and thus phytoplankton) levels are low in summer months (December to March) and higher in the winter months (Schroeder et al., 2009). Low chlorophyll levels during summer months may be a result of lower plankton productivity during the wet season or lower nutrient inputs from warm surface waters dominant during summer. However, it is likely that much of the primary production is taking place below the surface, where the MODIS imagery does not penetrate (Schroeder et al., 2009). The winter months are relatively cloud-free and surface chlorophyll is high throughout most of the region.

Zooplankton may include organisms that complete their lifecycle as plankton (e.g. copepods, euphausiids) as well as larval stages of other taxa such as fishes, corals and molluscs. Peaks in zooplankton such as mass coral spawning events (typically in March and April) (Rosser and Gilmour, 2008) and fish larvae abundance (CALM, 2005a) can occur throughout the year. Spatial and temporal patterns in the distribution and abundance of macro-zooplankton on the North-west Shelf are influenced by sporadic climatic and oceanographic events, with large inter-annual changes in assemblages (Wilson et al., 2003). Amphipods, euphausiids, copepods, mysids and cumaceans are among the most common components of the zooplankton in the region (Wilson et al., 2003).

4.3.1 Browse

Phytoplankton within the Browse activity area is expected to reflect the conditions of the NWMR. There is a tendency for offshore phytoplankton communities in the NWMR to be characterised by smaller taxa (e.g. bacteria), whereas shelf waters are dominated by larger taxa such as diatoms (Hanson et al., 2007).

Zooplankton within the activity area may include organisms that complete their lifecycle as plankton (e.g. copepods, euphausiids) as well as larval stages of other taxa such as fishes, corals and molluscs. Peaks in zooplankton such as mass coral spawning events (typically in March and April) (Rosser and Gilmour, 2008; Simpson et al., 1993) and fish larvae abundance (CALM, 2005a) can occur throughout the year.

The influence of the Indonesian Throughflow restricts upwelling across the Kimberley System (approximately equates to the Browse activity area). However, small-scale topographically associated current movements and upwellings are thought to occur, which inject nutrients into specific locations within the system and result in 'productivity hot-spots'. Similarly, internal waves, generated at the shelf break (e.g. west of Browse Island and around submerged cliffs located at the continental shelf edge) play a role in making nutrients available in the photic zone (Sutton et al., 2019). Productivity within shallow nearshore waters is driven primarily by tidal movement and terrestrial runoff whereby nutrients are mixed by tidal action and new inputs of organic matter come from the land.

4.3.2 North West Shelf / Scarborough

Plankton communities within the NWS / Scarborough activity area are expected to reflect conditions of the NWMR. Internal tides along the NWS and Exmouth Plateau result in the drawing of deeper cooler waters into the photic zone, stirring up nutrients and triggering primary productivity. Broadly the greatest productivity within this sub-system is found around the 200 m isobath associated with the shelf break.

4.3.3 North-west Cape

Waters of the North-west Cape experience a relatively high diversity of phytoplankton groups including diatoms, coccolithophorids and dinoflagellates. During the warmer months blooms of *Trichodesmium* occur in the region, these have been observed particularly on the frontal systems around Point Murat (Heyward et al., 2000).

Average Leeuwin Current phytoplankton biomass is characteristic of low productivity oceanic waters like the Indian, Pacific and Atlantic Oceans (Hanson et al., 2005). However, the Canyons linking the Cuvier Abyssal Plain and Cape Range Peninsula KEF are connected to the Commonwealth waters adjacent to Ningaloo Reef and may also have connections to Exmouth Plateau. The canyons are thought to interact with the Leeuwin Current to produce eddies inside the heads of the canyons, resulting in waters from the Antarctic intermediate water mass being drawn into shallower depths and onto the shelf (Brewer et al., 2007). These waters are cooler and richer in nutrients and strong internal tides may also aid upwelling at the canyon heads (Brewer et al., 2007). The narrow shelf width (about 10 km) near the canyons facilitates nutrient upwelling and relatively high productivity. This high primary productivity leads to high densities of primary consumers, such as micro and macro-zooplankton, such as amphipods, copepods, mysids, cumaceans, euphausiids (Brewer et al., 2007).

4.4 Habitats and Biological Communities in the NWMR

4.4.1 Offshore Habitats and Biological Communities

The NWMR has a large area of continental shelf and continental slope, with a range of bathymetric features such as canyons, plateaus, terraces, ridges, reefs, banks and shoals. The marine environment in this region is typified by tropical to sub-tropical marine ecosystems with diverse habitats from soft sediments, canyons, remote oceanic coral reef systems and continental shelf limestone pavement seabed habitat. The NWMR encompasses large seabed areas of deepwater seabed habitats dominated by soft sediments (sandy and muddy substrata with occasional patches of coarser sediments) and spare benthic biota. Comprehensive surveys and documentation of habitats and biota from the shelf to deep waters (100 m to 1000 m) spanning 13 sites between Barrow Island and Ashmore Reef, running downslope across the continental shelf and slope of NWS were conducted in 2007 (Williams et al., 2010). Sites on the continental slope (approximately 400 m deep) predominately comprised soft, muddy sediments and epifauna were sparsely distributed and limited to isolated individual sessile biota such as crinoids, anemones, glass sponges and sea pens. Occasional non-sessile biota, characteristic of the deeper water benthic communities was recorded and included: echinoderms (urchins, holothurians and sea stars) and decapod crustaceans (prawns

and crabs). Similar benthic biota composition was reported for the continental slope seabed habitats at depths of 700-1000 m (Williams et al., 2010) With reference to the NWS, multiple surveys have documented habitats comprising bare unconsolidated carbonate sediments supporting a sparse assemblage of deposit and filter feeding organisms, including glass sponges, urchins, sea cucumbers, sea stars and crustaceans (URS, 2010). Filter feeding communities documented within the NWS include bryozoans, sponges, gorgonians, and hydroids attached to consolidated substrate; these were interspersed with sand which hosted fewer filter feeders (AIMS, 2014). Infauna associated with soft, unconsolidated sediment habitat such as polychaetes are widespread and well represented along the continental shelf and upper slopes (Brewer et al., 2007; RPS, 2012). The key habitats and biological communities that are representative of the broader NWMR are summarised in Table 4-1.

The key habitats and biological communities representative of the broader SWMR and NMR are summarised in Table 4-2 and Table 4-3.

There is a marked biodiversity gradient from high ecological valued coastal (primary producer habitats and associated benthic and mobile biota) to the lower valued deeper offshore habitats comprising soft, unconsolidated sediments and typically sparser biota (epifauna and infauna), with the exception of the submerged shoal features, remote oceanic reef systems of the Rowley Shoals, Scott Reef and Ashmore Reef, as well as the fringing reef habitats of Ningaloo, the Kimberley coastline, the offshore island groups such as Barrow Island, Lowendal and Montebello Islands, and the Dampier Archipelago. A brief overview of the high valued biodiversity reef and mesophotic habitats and associated benthic communities are presented in the following sub-sections.

4.4.2 Browse

The most diverse habitats and benthic communities in the Kimberley region of North-western Australia, are where the oceanic reef systems of Ashmore, Cartier, Scott and Seringapatam reefs, and the Rowley Shoals, sit near the edge of the continental shelf hundreds of kilometres from the mainland and from each other (Gilmour et al., 2019 and 2023), refer to Figure 4-1. The long-term monitoring program for Scott Reef and the Rowley Shoals conducted by AIMS since 1994 is now one of the world's longest studies of coral reef ecosystems and provides unprecedented understanding of the background (baseline) changes at oceanic reefs on Australia's North-west Shelf, encompassing the physical drivers, and underlying processes of change (impact and recovery) from acute disturbances (heat stress – coral mass-bleaching and cyclones).

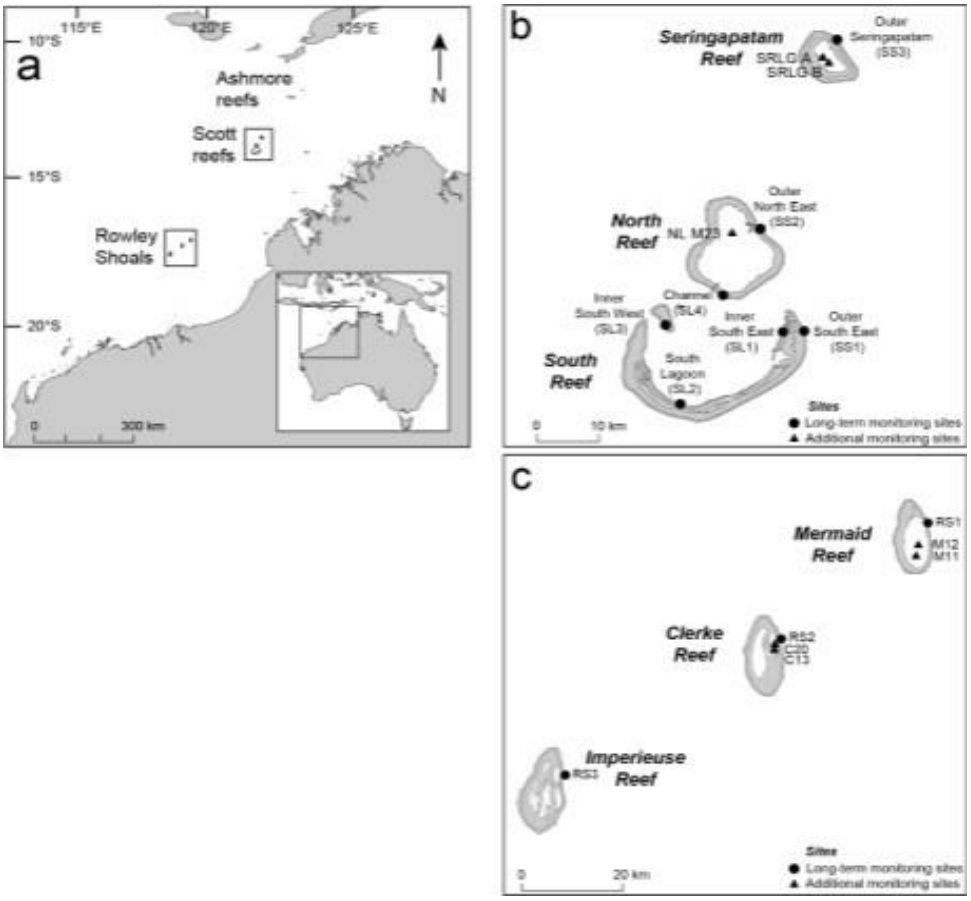


Figure 4-1: The position of Scott Reef, Ashmore and the Rowley Shoals off North-western Australia and location of permanent long-term monitoring sites (source: Gilmour et al., 2023)

Scott Reef is an annular reef approximately 17 km long and 16 km wide comprising two coral reef atolls rising steeply from depths of approximately 400 to 500 m. These atolls, referred to as South Scott Reef and North Scott Reef, are separated by a deep channel (Figure 4-1). North Scott Reef features an emergent reef flat, outer slope habitats and a shallow lagoon approximately 20 m deep with two small channels linking it to the surrounding ocean. The shallow closed waters of North Scott Reef lagoon contain a range of habitats from bare sand, sand with coral outcrops, and to shallow to deep lagoonal coral dominated habitats (Gilmour et al., 2013). This in contrast to the deeper, more open lagoon of South Scott Reef described as an extensive, unique mesophotic (30–70 m depth) coral dominated habitat comprising hard corals, calcareous algae, soft corals, sponges, bryzoans and other invertebrates (Gilmour et al. 2013; Heyward and Radford, 2019). It is largely protected from the direct influence of major storms by the surrounding horseshoe-shaped emergent reef rim (Heyward and Radford, 2019). South Scott Reef shallow water habitats also include reef flats (of low coral cover) and extensive outer reef slopes with the highest hard coral diversity of any habitat at Scott Reef (Gilmour et al., 2013).

Over the past 30 years the coral communities at Scott Reef have been extensively studied and the Scott Reef long-term monitoring program showed that from 1994 to 2021, the mean cover of hard and soft corals on the reef slopes was 36%, and ranged between 13% to 59%. Decreases in coral cover were caused by damaging waves, generated by storms and cyclones, and recurrent heat stress causing coral bleaching. The most severe heat stress and mass coral bleaching occurred in 1998 and 2016. Recovery from the first mass-bleaching event in 1998 took over a decade. By 2010, coral cover had reached pre-bleaching levels (45%). Despite moderate coral bleaching and cyclone disturbances, cover had increased by 49% in January 2016, after which the reefs were impacted by a second mass bleaching event that reduced mean coral cover to 15%. Five years after the 2016 mass bleaching event, total cover of hard and soft corals had reached 34%, showing a similar rate

of recovery to that following the 1998 mass bleaching (Gilmour et al., 2023). The Rowley Shoals comprise three distinct reef continental shelf atolls of similar dimension, shape and orientation, named Mermaid Reef, Clerke Reef and Imperieuse Reef. The reefs are orientated north-south and are approximately 30 to 40 km apart. Each atoll covers an area approximately 80 to 90 km² and extends almost vertically from seafloor depths of approximately 400 m. Each atoll comprises extensive lagoon habitat composed of bare sand, coral dominated patches and coral outcrops, emergent reef crests and outer reef slopes. At high tide only the sandy cays of Clerke Reef and Imperieuse Reef remain visible.

Across the Rowley Shoals, the reef crest and reef slope were most similar and the lagoon most unique in terms of habitat and benthic communities. Hard corals and coralline algae were the most abundant biota (>40%) and other benthic organisms such as sponges, ascidians and macroalgae are rare (<5%). Soft corals were also rare (<1%) at all reefs and habitats, apart from the reef slope (4%) at Mermaid Reef. Across all surveys (1995 to 2019), the mean cover of hard and soft corals at the reef slope was 46% and ranged between 26% and 58%. Decreases in coral cover were primarily due to frequent storms and cyclones. Between 2005 and 2008, three cyclones and moderate heat stress caused a mean reduction in coral cover (52% to 42%) at the reef slope habitat across the Rowley Shoals. Coral bleaching was low (<10%) in January 2016 except for minor to moderate (11 to 30%) bleaching at two lagoon sites at Mermaid Reef. A prolonged heat stress period (45 days) in May 2020 caused the worst coral bleaching on record (approximately 20%) across reef habitats, with the highest heat stress and declines in coral cover at the reef slope for Imperieuse Reef (9%) and minor bleaching and small decreases in coral cover at the reef slope (5%) and lagoon (3%) at Clerke Reef (Gilmour et al., 2023).

The reefs of Seringapatam, Scott Reef, Ashmore Reef and Cartier Island are recognised as key ecological features (KEFs) within NWMR, refer to Table 10-1. Protected Area status (Australian Marine Parks and State Marine Parks and Reserves) is listed and described in Section 11 and includes the Commonwealth Marine Parks of Ashmore Reef, Cartier Island, Kimberley and Mermaid Reef, and the State Marine Parks of the North Kimberley, the Rowley Shoals and Lalang-garram horizontal falls and North Lalang-garram.

4.4.3 North West Shelf / Scarborough

The NWS contains numerous submerged shoal features and as relatively recent surveys have revealed several of these features are of high biodiversity value comprising hard coral and macro-algae communities on upper reaches of the shoals and mesophotic filter-feeding benthic communities in deeper waters on and in proximity to the shoal features, namely, Rankin Bank and Glomar Shoal.

4.4.3.1 Rankin Bank

Rankin Bank comprises three main sedimentary banks rising steeply from between 80 and 120 m below sea level, reaching 20 – 40 m below the sea surface and featuring plateaus and troughs (Abdul Wahab et al., 2018). Rankin Bank is one of only two large, complex bathymetrical features on the outer western shelf of the West Pilbara (the other being Glomar Shoal, about 125 km West-south west) (Abdul Waheb et al., 2018), Figure 4-1.

Surveys of Rankin Bank were undertaken by the Australian Institute of Marine Science (AIMS) in 2013 and in 2017 to better understand the habitats and complexity of the submerged shoal ecosystems, and associated fish assemblages (AIMS, 2014; Abdul Waheb et al., 2018 and 2017; Jones et al., 2021). The surveys were undertaken using various methods, including multibeam survey, towed video, Stereo Baited Underwater Video Survey (SBRUVS) and beam transmissions (to measure turbidity), at depths between 20 and 115 m (Abdul Waheb et al., 2018). Water column data were also collected in January 2017 to examine potential temporal variation in these parameters (Abdul Waheb et al., 2018).

Seabed sediments at Rankin Bank were primarily carbonate with a grain size of mostly sand, with

finer muds found at the deeper sample sites (AIMS, 2014). Sand was also found to increase with depth and unconsolidated reef exceeded 30% at all depths (Abdul Waheb et al., 2018). Hydrocarbon and trace metal concentrations in sediments indicated the bank was unaffected by anthropogenic pollution (AIMS, 2014). Turbidity was lower at Rankin Bank than Glomar Shoal during the survey, with beam transmissions remaining above 95% at all depths (Abdul Waheb et al., 2018). Turbidity was slightly lower in 2017, whereas temperature and salinity were slightly higher at all depths (Abdul Waheb et al., 2018).

Proportion of cover by benthic taxa was highest for macroalgae and hard corals, particularly at depths less than 40 m, and decreased with increasing depth. Other benthic taxa included soft corals and sponges which were present in lower proportions at all depths. Encrusting corals were common, reaching cover of about 12.5% at depths less than 40 m. Solitary corals were also present (about 10% cover) primarily at depths between 40 and 60 m. Foliose and submassive/columnar corals were also present (Abdul Waheb et al., 2018).

Fish abundance and diversity at Rankin Bank were found to be comparable with other reefs in north-west Australia, and notably twice as abundant and 1.5 times more diverse than those fishes identified in a comparable survey at Glomar Shoal (Abdul Waheb et al., 2018). A total of 205 fish species were recorded at Rankin Bank, 100 of which were common to both Glomar Shoal and Rankin Bank. Depth, location, sand, sponges and hard coral were all found to contribute to the fish communities present. Specifically, fish communities were primarily associated with hard coral and shallow depths at Rankin Bank (Abdul Waheb et al., 2018).

4.4.3.2 Glomar Shoal

Glomar Shoal is a large (215 km^2) and complex bathymetrical feature situated on the outer continental shelf off the Pilbara. Glomar Shoal is about 8.5 times wider than Rankin Bank at the 60 m contour. Glomar Shoal rises from 80 m depth on its south-west side and 70 m depth on its north-eastern side to form a single plateau at 40 m depth (Abdul Waheb et al., 2018). Together with Rankin Bank, these remote shallow water areas represent regionally unique habitats and are considered likely to play an important role in the productivity of the Pilbara region (AIMS, 2014; Abdul Wahab et al., 2018), Figure 4-1.

Baseline biodiversity and habitat mapping surveys of the benthic habitats and communities at Glomar Shoal and Rankin Bank were undertaken in 2013 and 2017 by AIMS (2014) as detailed in Abdul Waheb et al. (2018) and Jones et al. (2021), respectively. Salinity and temperature were found to be slightly higher in 2017 compared with the 2013 values (Abdul Wahab et al., 2018), most likely due to seasonality. Substrates at Glomar Shoal were found to vary with depth, from coarse unconsolidated sediment at depths greater than 60 m and hard substrate (i.e. consolidate reef) supporting benthic communities comprising hard and soft corals, sponges and macroalgae at depths <40 m (Abdul Wahab et al., 2018). Total cover of benthic taxa (hard coral, soft coral, sponges and other benthic biota) was highest at depths <40 m and decreased with depth (Abdul Wahab et al., 2018). At depths of 60 to 80 m benthic cover was low (about 2%) and at depths greater than 80 m benthic cover was barely present (Abdul Wahab et al., 2018).

A total of 170 fish species were identified at Glomar Shoal and fish abundance and diversity of the demersal fish communities of Glomar Shoal were found to vary with seabed habitat type; sand, hard coral and sponge coverage influenced fish communities, with higher abundance and diversity of fish associated with shallow hard coral habitats. (Abdul Wahab et al., 2018). In general, the fish abundance and diversity of Glomar Shoal are considered comparable with other reefs and the submerged shoals and banks in the region, although less diverse and abundant than fish assemblages at Rankin Bank (Abdul Wahab et al., 2018).

Glomar Shoal is recognised as a KEF within NWMR, refer to Table 10-1. Protected Area status (Australian Marine Parks and State Marine Parks and Reserves) is described in Section 11 and includes the Commonwealth Marine Park of Montebello, and the State Marine Parks of Montebello Islands and Barrow Island and the Barrow Island marine management area.

4.4.4 North-west Cape

Ningaloo Reef and Shark Bay are among Australia's iconic marine areas, and the significance of these ecosystems is recognised through their inclusion in State and Commonwealth Marine Parks and the World Heritage Register. Ningaloo Reef is the only example in the world of an extensive fringing reef on the West coast of a continent and is host to over 200 coral species and more than 500 reef fish species. Shark Bay is the most westerly point of Australia and represents a transition zone between temperate and tropical marine fauna, resulting in high species diversity (Miller et al., 2015), including fringing coral communities on the leeside of the barrier islands of Dirk Hartog, Bernier and Dorre. Ningaloo Reef is one of the longest (approximately 300 km) and most pristine fringing reefs in the world, with an unusually narrow continental shelf. Deep oceanic waters, the reef and coastline habitats and benthic communities are in close proximity resulting in a huge array of internationally significant marine life coexisting. More than 200 hard coral, 500 fish, 650 mollusc, 600 crustacean, 1000 marine algae, 155 sponge and 25 echinoderm species have been recorded from the shelf, slope and deep-water habitats[2]. Refer to the CSIRO Ningaloo Outlook program for further information and publications relating to the shallow and deep-water reef systems, and megafauna species (marine turtles and whale sharks)[3].

The extensive reef system has been classified by topography and benthic cover using airborne hyperspectral surveys and much of the area was allocated as shallow, flat lagoons intersected by narrow, deeper channels that facilitate water circulation. Five distinct geomorphic/benthic classes of coral-algae mosaics in different topographic settings: coral and algal communities (reef flat and very shallow areas), coral and algal communities (backreef and shallow forereef), coral and algal communities (deep forereef and other deep areas), sand or limestone pavement (lagoonal slopes and flat lagoon areas) (Kobryn et al., 2022).

Ningaloo and the Muiron Islands fringing reef habitat supports benthic communities dominated by algae and consolidated reef in the shallow reef environment. Surveys conducted by AIMS in 2024 documented hard coral cover averaged approximately 13% across the Ningaloo Marine Park area (Miller et al., 2015). A notable pattern in the benthos recorded by Miller et al. (2015) was an increase in coral cover with latitude, with the highest coral cover recorded around Coral Bay and the reef areas in southern Ningaloo. Coral cover was the lowest at the East Ningaloo Province (northern Exmouth Gulf) (<6%). Relative to Scott Reef and the Rowley Shoals, the Ningaloo benthic communities are distinct in that they are characterised by high biotic cover overall, but dominated by algal cover and with less than half the cover of key biota including hard corals, soft corals and sponges as recorded on offshore reefs (Miller et al., 2015).

Ningaloo Reef is vulnerable to storm damage and marine heat stress events that have resulted in past localised coral damage and moderate coral bleaching. Coral bleaching occurred in 2022 due to warm ocean temperatures driven by the 2021–22 La Niña. The region's last severe marine heatwave was driven by the 2010–11 La Niña, which resulted in bleaching being recorded for the first time on Ningaloo[4]. Also of note is the recurrent deoxygenation events at Bills Bay (Coral Bay) following coral spawning events. In March 2022, the deoxygenation event was triggered by a combination of weather and oceanographic conditions that led to a prolonged trapping of coral spawn in Bills Bay and this in turn caused mass coral mortality and a large but localised fish kill. The 2022 deoxygenation event was the seventh such event recorded in documented history (Richards et al., 2024).

The Shark Bay region is renowned for its terrestrial and marine biodiversity including seagrass cover extending over 4000 km² of the bay and the 1.030 km² Wooramel Seagrass Bank is the largest structure of its type in the world. Baseline surveys conducted in 2014 by AIMS specifically targeted the outer Shark Bay area and the habitats and benthic communities surrounding the barrier islands

[2] https://www.dbca.wa.gov.au/management/world-heritage-areas/ningaloo-coast-world-heritage-area#:~:text=One%20of%20the%20longest%20and,life%20coexisting%20in%20one%20area [accessed on 18/08/2024]
[3] https://research.csiro.au/ningaloo/outlook/research-outputs/publications/
[4] https://www.csiro.au/en/research/environmental-impacts/climate-change/state-of-the-climate

of Dirk Hartog, Bernier and Dorre. Sand was a dominant feature of the benthos (>60%), particularly in areas inside the bay and in deep water outside the bay. Benthic communities in relatively sheltered areas of outer Shark Bay were characterised by seagrass and turf algae, whereas in more exposed locations, benthos was dominated by macroalgal and turf algal communities. Corals and sponges made up <1% of the cover in outer Shark Bay, although due to inclement weather during surveys shallow areas where coral species are more likely to occur could not be surveyed. Observations of patchy but high coral cover in shallow parts of some towed video transects suggests coral cover across outer Shark Bay may have been underestimated. The highest coral cover was recorded in the channel between Dirk Hartog and Dorre Islands, indicating this area may be particularly favourable for coral growth (Miller et al., 2015).

Commonwealth waters adjacent to Ningaloo Reef is recognised as a KEF within NWMR, refer to Table 10-1. Protected Area status (Australian Marine Parks and State Marine Parks and Reserves) is described in Section 11 and includes the Commonwealth Marine Parks of Ningaloo and Shark Bay, and the State Marine Parks of Ningaloo Reef, the Muiron Islands marine management area, Shark Bay marine park and Hamelin Pool nature reserve.

4.4.5 Shoreline, Coastal Habitats and Biological Communities

The NWMR encompasses offshore and coastal waters, islands and mainland shoreline habitats typified by mangroves, tidal flats, saltmarshes, coral reefs (remote, offshore reef systems to extensive fringing reef systems such as Ningaloo), sandy beaches, and smaller areas of rocky shores. Each of these shoreline types has the potential to support different flora and fauna assemblages due to the different physical factors (e.g. waves, tides, light,) influencing the habitat.

The key shoreline habitats representative of the broader NWMR are summarised in Table 4-1.

The key shoreline habitats representative of the broader SWMR and NMR are summarised in Table 4-2 and Table 4-3.

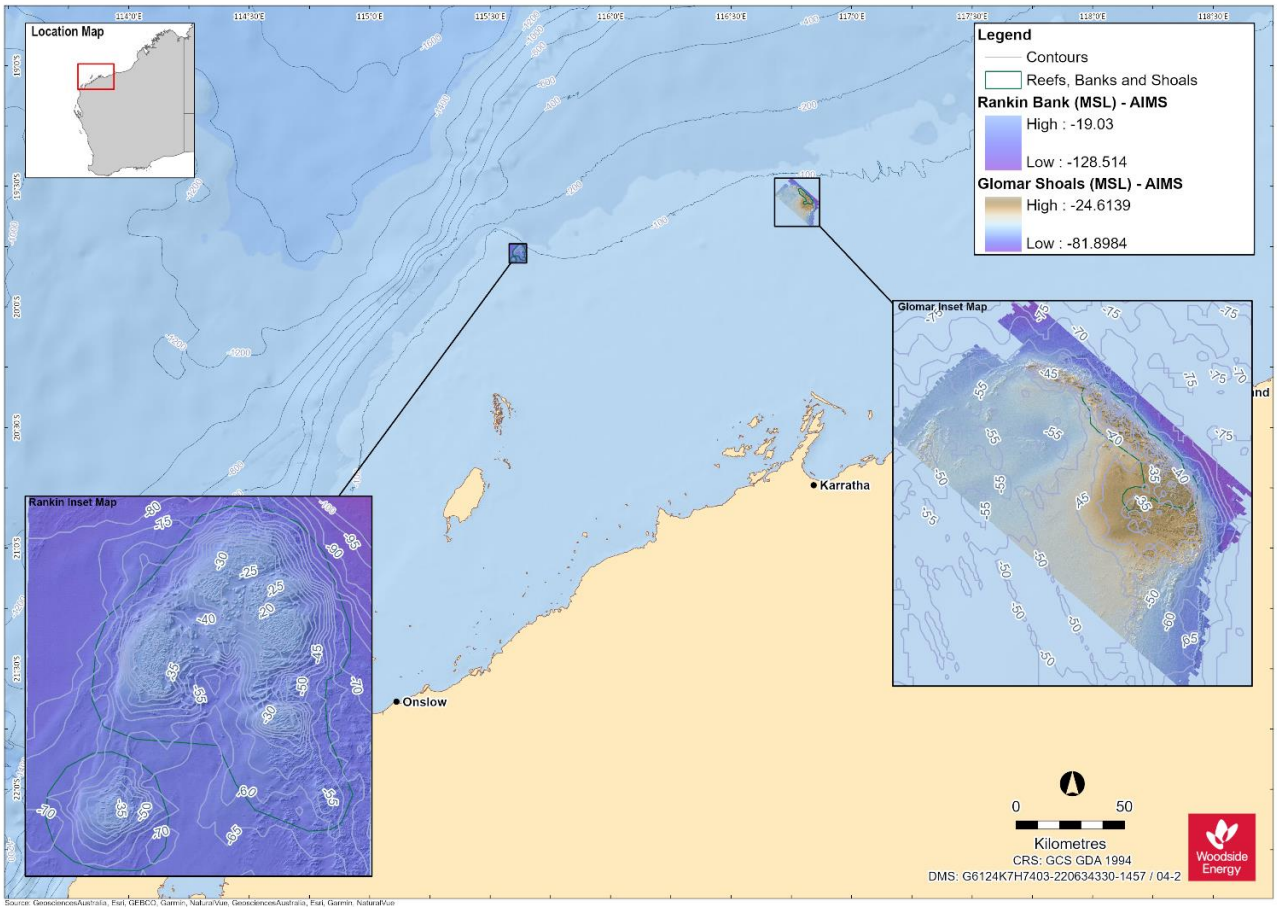


Figure 4-2: Habitat maps of Rankin Bank and Glomar Shoal (source: AIMS, 2014)

Table 4-1: Habitats and biological communities within the NWMR

Habitat/Community	Browse	NWS / Scarborough	North-west Cape	Reference
Offshore habitats and biological communities				
Soft sediment with infauna	The offshore environment of the NWMR comprises predominately of seabed habitats dominated by soft sediments (sandy and muddy substrata with occasional patches of coarser sediments) and sparse benthic biota. The benthic communities inhabiting the predominantly soft, fine sediments of the offshore habitats are characterised by infauna such as polychaetes, and sessile and mobile epifauna such as crustacea (shrimp, crabs and squat lobsters) and echinoderms (starfish, cucumbers). The density of benthic fauna is typically lower in deep-sea sediment habitats (greater than 200 m) than in shallower coastal sediment habitats, but the diversity of communities may be similar.			
Soft sediment with hard substrate outcropping	A unique seafloor feature combining both soft sediment and hard substrates, including outcrops, terraces, continental slope, and escarpments. This habitat is found in offshore areas of the NWMR, often associated with key ecological features such as the ancient coastline at 125 m depth contour KEF.			**Section 10**
	Ancient coastline at 125 m depth contour KEF Continental Slope Demersal Fish Communities KEF	Ancient coastline at 125 m depth contour KEF Continental Slope Demersal Fish Communities KEF	Ancient coastline at 125 m depth contour KEF Continental Slope Demersal Fish Communities KEF	**Section 10**
Coral reef	Coral reef habitats within the NWMR have a high species diversity that includes corals, and associated reef species such as fishes, crustaceans, invertebrates, and algae. Coral reef habitats of the offshore environment of the NWMR include remote oceanic reef systems, large platform reefs, submerged banks and shoals.			
	Browse Island Scott Reef Seringapatam Reef Ashmore Reef Cartier Island Hibernia Reef	Rowley Shoals (including Mermaid Reef, Clerke Reef, Imperieuse Reef) Glomar Shoal Rankin Bank		**Section 4.4.1** **Section 10** **Section 11**
Seagrass and macroalgae communities	Seagrass beds and benthic macroalgae reefs are a main food source for many marine species and also provide key habitats and nursery grounds (Heck et al., 2003; Wilson et al., 2010). In the northern half of Western Australia, these habitats are restricted to sheltered and shallow waters, including around offshore reef systems, due to large tidal movement, high turbidity, large seasonal freshwater run-off and cyclones.			
	Scott Reef, Seringapatam Reef, Ashmore Reef	Rowley Shoals (including Mermaid Reef, Clerke Reef, Imperieuse Reef)		**Section 11**

Habitat/Community	Browse	NWS / Scarborough	North-west Cape	Reference
Filter feeders/ heterotrophic	Filter feeder epifauna such as sponges, ascidians, soft corals and gorgonians are animals that feed by actively filtering suspended matter and food particles from water by passing the water over specialised filtration structures (DEWHA, 2008). Filter feeders generally live in areas that have strong currents and hard substratum, often associated with deeper environments of the shoals and banks in the offshore NWMR.			
	Lower outer reef slopes of the oceanic reef systems such as Scott Reef	Glomar Shoal Rankin Bank Ancient coastline at 125 m depth contour KEF	Cape Range canyon system	**Section 4.4.1** **Section 10** **Section 11**
Sandy beaches	Sandy beaches are dynamic environments, naturally fluctuating in response to external forcing factors (e.g. waves, currents, etc). Sandy beaches vary in length, width and gradient, and in sediment type, composition, and grain size throughout the NWMR, being found around islands and reefs in the offshore areas of the region.			
	Browse Island Scott Reef (Sandy Islet) Ashmore Reef Cartier Island	Montebello Islands Lowendal Islands Barrow Island	Muiron Islands	**Section 11**
Nearshore/coastal habitats and biological communities				
Coral reef	Coral reef habitats typically found in nearshore regions of the NWMR include the fringing reefs around coastal islands and the mainland shore.			
	Kimberley East Holothuria and Long Reefs Bonaparte and Buccaneer Archipelagos Montgomery Reef Adele complex (Beagle, Mavis, Albert, Churchill reefs, Adele Island)	Dampier Archipelago Montebello, Lowendal and Barrow Island Groups	Ningaloo Reef Exmouth Gulf Shark Bay	**Section 11**
Seagrass and macroalgae communities	Seagrass beds and benthic macroalgae reefs are a main food source for many marine species and also provide key habitats and nursery grounds (Heck Jr. et al., 2003; Wilson et al., 2010). In the nearshore areas of the NWMR, these habitats are restricted to sheltered and shallow waters due to large tidal movement, high turbidity, large seasonal freshwater run-off and cyclones. These areas include in bays and sounds and around reef and island groups.			
	King Sound	Roebuck Bay Dampier Archipelago Montebello, Lowendal and Barrow Island Groups	Ningaloo Reef Exmouth Gulf Shark Bay	**Section 11**

Habitat/Community	Browse	NWS / Scarborough	North-west Cape	Reference
Filter feeders/ heterotrophic	Filter feeder epifauna such as sponges, ascidians, soft corals and gorgonians are animals that feed by actively filtering suspended matter and food particles from water by passing the water over specialised filtration structures (DEWHA, 2007a). Filter feeders generally live in areas that have strong currents and hard substratum. Conversely, higher diversity infauna is mainly associated with soft unconsolidated sediment and infauna communities are considered widespread and well represented along the continental shelf and upper slopes of the NWMR. In nearshore areas of the NWMR, these species are generally found around reef systems.			
		Deeper habitats of Rankin Bank and Glomar Shoal	Deeper habitats of Ningaloo Reef and the protected sponge zone in the south	
Mangroves	Mangroves grow in intertidal mud and sand, with specially adapted aerial roots (pneumatophores) that provide for gas exchange during low tide (McClatchie et al., 2006). Mangrove forests can help stabilise coastal sediments, provide a nursery ground for many species of fish and crustacean, and provide shelter or nesting areas for seabirds (McClatchie et al., 2006). Mangroves are confined to shoreline habitats, in nearshore areas of the NWMR.			
	Dampier Peninsula (including Carnot Bay, Beagle Bay and Pender Bay)	Pilbara Coastline (including Ashburton River Delta, Coolgra Point, Robe River Delta, Yardie Landing, Yammadery Island and the Mangrove Islands) Montebello, Lowendal and Barrow Island Groups Roebuck Bay	Shark Bay Mangrove Bay, Cape Range Peninsula Exmouth Gulf	**Section 11**
Saltmarshes	Saltmarsh communities are confined to shoreline habitats and are typically dominated by dense stands of halophytic plants such as herbs, grasses, and low shrubs. The diversity of saltmarsh plant species increases with increasing latitude (in contrast to mangroves). The vegetation in these environments is essential to the stability of the saltmarsh, as they trap and bind sediments. The sediments are generally sandy silts and clays and can often have high organic material content.			
		Eighty Mile Beach Roebuck Bay	Shark Bay	**Section 11**
Sandy beaches	Sandy beaches are dynamic environments, naturally fluctuating in response to external forcing factors (e.g. waves, currents, etc). Sandy beaches vary in length, width and gradient, and in sediment type, composition, and grain size throughout the NWMR. Sandy beaches are important for both resident and migratory seabirds and shorebirds and can also provide an important habitat for turtle nesting and breeding. They are located along many coastlines of the nearshore environments of the NWMR.			
	Cape Domett Lacrosse Island	Eighty Mile Beach Eco Beach Dampier Archipelago Inshore Pilbara Islands (Northern, Middle, and Southern)	Ningaloo Coast Muiron Islands Exmouth Gulf	**Section 11**

Table 4-2: Habitats within the SWMR

Habitat/Community	Location
Offshore	
Soft sediment with infauna	Most of the SWMR seafloor is composed of soft unconsolidated sediments, but due to large variations in bathymetry there are marked differences in sedimentary composition and benthic assemblage structure across the region. Despite the prevalence of these habitats in the SWMR, very little is known about the composition or distribution of the region's sedimentary infauna (DEWHA, 2008b).
Soft sediment with hard substrate outcropping	A unique seafloor feature combining both soft sediment and hard substrates, including outcrops, terraces, continental slope, and escarpments.
	Perth Canyon Marine Park Ancient coastline at 90 to 120 m depth contour KEF Diamantina Fracture Zone Naturaliste Plateau
Coral reef	To date, studies and understanding of the corals within the SWMR have concentrated on the shallow water areas in State waters. Within the deeper Commonwealth waters of the SWMR little is known of the distribution of corals.
Filter feeders/ heterotrophic	Filter feeder epifauna such as sponges, ascidians, soft corals and gorgonians are animals that feed by actively filtering suspended matter and food particles from water by passing the water over specialised filtration structures (DEWR, 2007). Filter feeders generally inhabit deeper habitat (below the photic zone) that have strong currents and hard substratum.
	Ancient coastline at 90 to 120 m depth Diamantina Fracture Zone Naturaliste Plateau Perth Canyon Marine Park South-west Corner Marine Park
Nearshore	
Coral reef	The northern extent of the SWMR coincides loosely with the disappearance of abundant and diverse coral from coastal habitats. To the south of Shark Bay, abundant corals occur predominantly around offshore islands, with corals at inshore sites occurring in very isolated patches of non-reef coral communities, usually of reduced species richness.
	Houtman Abrolhos Islands Rottnest Island

Habitat/Community	Location
Seagrass and macroalgae communities	Within the SWMR, macroalgae and seagrass communities are noted for their extent, species richness and endemism. The clear waters of the region allow light to reach greater depths, with some species found at much greater depths than usual (down to 120 m) (DEWR, 2007). Of the known species there are more than 1000 species of macro-algae and 22 species of seagrass consisting of tropical and temperate species. Seagrass and macro-algae occur in areas with sheltered bays and in the inter-reef lagoons along exposed sections of the coast.
	Houtman Abrolhos Islands Jurien Marine Park Shoalwater Islands Marine Park Geographe Marine Park Cockburn Sound Rottnest Island Commonwealth marine environment within and adjacent to the West-coast inshore lagoons KEF Commonwealth marine environment within and adjacent to Geographe Bay KEF Commonwealth marine environment surrounding the Recherche Archipelago KEF
Filter feeders/ heterotrophic	Filter feeder epifauna such as sponges, ascidians, soft corals and gorgonians are animals that feed by actively filtering suspended matter and food particles from water by passing the water over specialised filtration structures (DEWR, 2007). Filter feeders generally live in areas that have strong currents and hard substratum.
	Houtman Abrolhos Islands Recherche Archipelago
Mangroves	Mangroves grow in intertidal mud and sand, with specially adapted aerial roots (pneumatophores) that provide for gas exchange during low tide (McClatchie et al., 2006). Mangrove forests can help stabilise coastal sediments, provide a nursery ground for many species of fish and crustacean, and provide shelter or nesting areas for seabirds (McClatchie et al., 2006). Mangroves are confined to shoreline habitats, in nearshore areas of the SWMR.
	Houtman Abrolhos Islands
Sandy beaches	Sandy beaches within the SWMR are important for both resident and migratory seabirds and shorebirds and can also host breeding populations of the Australian sea lion. They are found along many coastlines of the nearshore environments of the SWMR. In addition to this, beaches in the SWMR provide a variety of socio-economic values including tourism, commercial and recreational fishing, and support other recreational activities.
	Houtman Abrolhos Islands Marmion Marine Park Ngari Capes Marine Park Walpole and Nornalup Inlets Marine Park

Table 4-3: Habitats and biological communities within the NMR

Habitat/Community	Location
Offshore habitats and biological communities	
Soft sediment with infauna	Most of the offshore environment of the NMR is characterised by relatively flat expanses of soft sediment seabed. The soft sediments of the region are characterised by moderately abundant and diverse communities of infauna and mobile epifauna dominated by polychaetes, crustaceans, molluscs, and echinoderms.
Soft sediment with hard substrate outcropping	A unique seafloor feature combining both soft sediment and hard substrates, including outcrops, terraces, continental slope, and escarpments. The variability in substrate composition may contribute to the presence of unique ecosystems. Species present include sponges, soft corals and other sessile filter feeders associated with hard substrate sediments.
	Carbonate bank and terrace system of the Van Diemen Rise KEF Pinnacles of the Bonaparte Basin KEF
Coral reef	Offshore coral reefs within the NMR are generally associated with a series of submerged shoals and banks. The shoals/banks in the region support tropical marine biota consistent with that found on emergent reef systems of the Indo West Pacific region such as Ashmore Reef, Cartier Island, Seringapatam Reef and Scott Reef (Heyward et al*.,* 1997).
	Pinnacles of the Bonaparte Basin KEF Evans Shoal Tassie Shoal Blackwood Shoal
Filter feeders/ heterotrophic	Filter feeder epifauna such as sponges, ascidians, soft corals and gorgonians are animals that feed by actively filtering suspended matter and food particles from water by passing the water over specialised filtration structures (DEWHA, 2007b). Filter feeders generally live in areas that have strong currents and hard substratum and typically associated with the deeper habitats of the submerged shoals and banks, and canyon features.
	Carbonate bank and terrace system of the Van Diemen Rise KEF Pinnacles of the Bonaparte Basin KEF Tributary Canyons of the Arafura Depression KEF Evans Shoal Tassie Shoal Goodrich Bank

Habitat/Community	Location
Nearshore	
Coral reef	Within the NMR corals occur both as reefs and in non-reef coral communities. Nearshore reefs include patch reefs and fringing reefs sparsely distributed within the region. Coral reefs within the NMR provides breeding and aggregation areas for many fish species including mackerel and snapper and offer refuges for sea snakes and apex predators such as sharks.
	Submerged coral reefs of the Gulf of Carpentaria KEF Darwin Harbour
Seagrass and macroalgae communities	Seagrasses provide key habitats in the NMR. They stabilise coastal sediments and trap and recycle nutrients. They provide nursery grounds for commercially harvested fish and prawns and provide feeding grounds for dugongs and green turtles. Seagrass distribution in the region is largely associated with sheltered small bays and inlets including shallow waters surrounding inshore islands.
	Field Island The mainland coastline adjacent to Kakadu National Park
Filter feeders/ heterotrophic	Filter feeder epifauna such as sponges, ascidians, soft corals, and gorgonians are animals that feed by actively filtering suspended matter and food particles from water by passing the water over specialised filtration structures (DEWHA, 2007b). Filter feeders generally inhabit areas that have strong currents and hard substratum.
	Cape Helveticus
Mangroves	Mangroves grow in intertidal mud and sand, with specially adapted aerial roots (pneumatophores) that provide for gas exchange during low tide (McClatchie et al., 2006). Mangroves provide habitat for waterbirds and support many commercially and recreationally important fish and crustacean species for parts of their life cycles. They buffer the coast from large tidal movements, storm surges and flooding.
	Tiwi Islands Darwin Harbour The mainland coastline adjacent to the Daly River
Sandy beaches	Sandy beaches vary in length, width and gradient, and in sediment type, composition, and grain size throughout the NMR and are important for both resident and migratory seabirds and shorebirds. Sandy beaches can also provide an important habitat for turtle nesting. They are located along many coastlines of the nearshore environments of the islands and mainland shores of the NMR.
	Tiwi Islands Cobourg Peninsula Joseph Bonaparte Gulf

5. FISHES, SHARKS AND RAYS

5.1 Regional Context

Western Australian waters provide important habitat for listed fishes, sharks, and rays including areas that support key life stages such as breeding, foraging, and migration routes for fish species. Pelagic and demersal fishes occupy a range of habitats throughout each of the regions, from coral reefs to open offshore waters, and are an extremely important component of ecosystems, providing a link between primary production and higher predators, with many species being of conservation value and important for commercial and recreational fishing.

The NWMR supports a wide diversity of global fish species. Of the approximately 500 shark species found worldwide, 94 are found in the region (DEWHA, 2008). Approximately 54 species of syngnathids (seahorses, seadragons, pipehorses and pipefishes) and one species of solenostomids (ghostpipefishes) are also known to occur in the NWMR or adjacent State waters (DSEWPAC, 2012a).

The fish fauna of the SWMR includes more than 900 species occupying a large variety of habitats. However, only three species of bony fishes known to occur in the region are listed under the EPBC Act as threatened or marine species, and seven listed species of shark (DSEWPAC, 2012b).

The NMR is considered an important area for the sawfish and river shark species group, with five species of sawfishes and river sharks listed under the EPBC Act known to occur in the region (DSEWPAC, 2012c). Approximately 28 species of syngnathids and two species of solenostomids are listed marine and known to occur in the NMR, however there is a paucity of knowledge on the distribution, relative abundance and habitats of these species in the region (DEWHA, 2008).

The following sections focus on the fish species (including sharks and rays) listed as threatened or migratory that are known to occur within the NWMR. In addition, listed, conservation-dependent fish and shark species for the NWMR are described. A detailed account of commercial and recreational fisheries that operate in the region is provided in Section 12.

Table 5-1 outlines the threatened and migratory fish species that may or are known to occur within the NWMR, with their conservation status and relevant recovery plans and/or conservation advice.

Table 5-2 includes fish species listed as conservation dependent that may occur within the NWMR, NMR and SWMR.

Table 5-1: Fish species (including sharks and rays) identified by the EPBC Act PMST that may occur within the NWMR

Species Name	Common Name	Environment Protection and Biodiversity Conservation Act 1999 (Cth) (as per PMST report Appendix A)			*Biodiversity Conservation Act 2016* (WA)[5]	IUCN Red List of Threatened Species (non-statutory)[6]	EPBC Act Part 13 Statutory Instrument
		Threatened Status	Migratory Status	Listed	Conservation Status	Global Status	
Rhincodon typus	Whale shark	Vulnerable	Migratory	Marine	Migratory	Endangered	Conservation Advice *Rhincodon typus* whale shark. (Threatened Species Scientific Committee, 2015d)
Carcharias taurus	Grey nurse shark (west-coast population)	Vulnerable	N/A	Marine	Vulnerable	Critically Endangered	Recovery Plan for the Grey Nurse Shark (*Carcharias taurus*) (DOE, 2014)
Carcharodon carcharias	White shark	Vulnerable	Migratory	Marine	Vulnerable	Vulnerable	Recovery Plan for the White Shark (*Carcharodon carcharias*) (DSEWPAC, 2013b)
Isurus oxyrinchus	Shortfin mako	N/A	Migratory	Marine	Migratory	Endangered	N/A
Isurus paucus	Longfin mako	N/A	Migratory	Marine	Migratory	Endangered	N/A
Lamna nasus	Porbeagle shark, mackerel shark	N/A	Migratory	Marine	Migratory	Vulnerable	N/A
Carcharhinus longimanus	Oceanic whitetip shark	N/A	Migratory	Marine	N/A	Critically Endangered	N/A
Anoxypristis cuspidata	Narrow sawfish	N/A	Migratory	Marine	Migratory	Critically Endangered	N/A
Pristis clavata	Dwarf sawfish	Vulnerable	Migratory	Marine	Priority	Critically Endangered	Sawfish and River Sharks Multispecies Recovery Plan (Commonwealth of Australia, 2015b)
Pristis pristis	Largetooth (freshwater) sawfish	Vulnerable	Migratory	Marine	Priority	Critically Endangered	
Pristis zijsron	Green sawfish	Vulnerable	Migratory	Marine	Vulnerable	Critically Endangered	

[5] Threatened and Priority Fauna List – April 2024 - https://www.dbca.wa.gov.au/management/threatened-species-and-communities (accessed on 13/08/2024)
[6] IUCN. 2024. The IUCN Red List of Threatened Species. Version 2024-1. https://www.iucnredlist.org (accessed on 13/08/2024)

Species Name	Common Name	Environment Protection and Biodiversity Conservation Act 1999 (Cth) (as per PMST report Appendix A)			*Biodiversity Conservation Act 2016* (WA)[5]	IUCN Red List of Threatened Species (non-statutory)[6]	EPBC Act Part 13 Statutory Instrument
		Threatened Status	Migratory Status	Listed	Conservation Status	Global Status	
Glyphis garricki	Northern river shark	Endangered	N/A	Marine	Priority	Vulnerable	
Manta alfredi	Reef manta ray	N/A	Migratory	Marine	Migratory	Vulnerable	N/A
Manta birostris	Giant manta ray	N/A	Migratory	Marine	Migratory	Endangered	N/A

Table 5-2: EPBC Act listed Conservation Dependent species of fishes and sharks that may occur in the NWMR, NMR and SWMR

Species Name	Common Name	Likely Occurrence / Distribution	Listing Advice
Hoplostethus atlanticus	Orange roughy, deep-sea perch, red roughy	SWMR	No conservation listing advice for this species. Refer to the Marine bioregional plan for the SWMR (DSEWPAC, 2012b) for further information. Managed under AFMA's Orange Roughy Stock Rebuilding Strategy (AFMA, 2014).
Sphyrna lewini	Scalloped hammerhead	NWMR, NMR and SWMR[7]	Threatened Species Scientific Committee, 2018.
Galeorhinus galeus	School shark, eastern school shark, snapper shark, tope, soupfin shark	SWMR	Threatened Species Scientific Committee, 2009.
Centrophorus uyato	Little gulper shark	NWMR and SWMR	No conservation listing advice for this species. Refer to listing advice (Threatened Species Scientific Committee, 2013).

[7] A recurrent aggregation of scalloped hammerheads has been recorded within the Shoalwater Islands Marine Park (32° S; 115° E), 240 km south of Jurien Bay, observed from drone footage collected during the 2019 and 2020 Austral summers. The species has rarely been recorded south of Jurien Bay previously (López et al., 2022).

5.2 Protected Sharks, Sawfishes and Rays in the NWMR

The EPBC Act Protected Matters search (Appendix A) identified seven species of shark and five species of river shark or sawfish listed as threatened and/or migratory within the NWMR. In addition, two species of ray (the reef manta ray and giant manta ray) are listed as migratory within the region (Table 5-3).

5.2.1 Sharks and Sawfishes

The shark species that may or are known to occur within the NWMR include: the whale shark, grey nurse shark, white shark, shortfin mako, and longfin mako (Table 5-3).

Five species of river shark or sawfish that may or are known to occur in the NWMR include: the narrow sawfish, northern river shark, freshwater sawfish, green sawfish and dwarf sawfish (Table 5-3).

There are identified biologically important areas (BIAs) within the NWMR for the whale shark, freshwater sawfish, green sawfish, and dwarf sawfish (Table 5-5).

Table 5-3: Information on the EPBC-listed threatened shark, fish and sawfish species that may or are known to occur within the NWMR

Species	Preferred Habitat and Diet	Habitat Location
Whale shark	Preferred habitat: They have a widespread distribution in tropical and warm temperate seas, throughout oceanic and coastal Australian waters (Last and Stevens, 2009). Diet: Whale shark are planktivorous and feed on a variety of planktonic species including krill, jellyfish, and crab larvae (Last and Stevens, 2009).	Ningaloo Reef is the main known aggregation site for whale sharks in Australian waters and has the largest density of whale sharks per kilometre in the world (Martin, 2007). Acoustically tagged whale sharks have been detected on the NWS in June, July and October–January (Thomson et al. 2021). Satellite tagging and sightings of whale sharks off the Western Australian coast indicate that whilst whale sharks aggregate in higher numbers at Ningaloo Reef seasonally, they may be present year-round (Norman et al., 2017). Refer Table 5-5 for the BIA summary for the whale shark.
Grey nurse shark (west-coast population)	Preferred habitat: Most found in temperate waters on, or close to, the bottom of the continental shelf, from close inshore to depths of about 200 m (McAuley, 2004; Kyne et al., 2021). Diet: A variety of teleost and elasmobranch fishes and some cephalopods (Gelsleichter et al., 1999; Smale, 2005).	Details of movement patterns of the western sub-population are unclear (McAuley, 2004) and key aggregation sites have not been formally identified within the NWMR (Chidlow et al., 2006). The NWMR represents the northern limit of the West-coast population. Sighting and bycatch data have indicated grey nurse sharks are present near Exmouth and Shark Bay between May to December (Hoschke et al., 2023).
White shark	Preferred habitat: The species typically occurs in temperate coastal waters between the shore and the 100 m depth contour; however, adults and juveniles have been recorded diving to depths of 1000 m (Bruce et al., 2006; Bruce, 2008). Diet: Smaller white sharks (less than 3 m length) feed primarily on teleost and elasmobranch fishes, broadening their diet as larger sharks to include marine mammals (Last and Stevens, 2009).	There are no known aggregation sites for white sharks in the NWMR, and this species is most often found south of North-west Cape, in low densities (DSEWPAC, 2012a). Given the migratory nature of the species, it most likely has a broad distribution within the NWMR. No BIAs identified for NWMR.

Species	Preferred Habitat and Diet	Habitat Location
Shortfin mako	Preferred habitat: The shortfin mako shark is a pelagic species with a circumglobal, wide-ranging oceanic distribution in tropical and temperate seas (Mollet et al., 2000). Tagging studies indicate shortfin makos spend most of their time in water less than 50 m deep but with occasional dives up to 880 m (Abascal et al., 2011; Stevens et al., 2010). Satellite telemetry data suggest shortfin makos have multiple movement phases, displaying both high connectivity between Australian populations and periods of residency (Corrigan et al., 2018). Diet: Feeds on a variety of prey, such as teleost fishes, other sharks, marine mammals, and marine turtles (Campana et al., 2005).	Given the migratory nature of the species, it most likely has a broad distribution within the NWMR. No BIAs identified for NWMR.
Longfin mako	Preferred habitat: A pelagic species with a wide-ranging, patchy, oceanic distribution in tropical and temperate seas (Mollet et al., 2000; Kyne et al., 2021). They have been recorded at depth ranges of 0–1752 m (Kyne et al., 2021). Diet: Primarily teleost fishes and cephalopods (primarily squid) (Last and Stevens, 2009).	Records on longfin mako sharks are sporadic and their complete geographic range is not well known (Reardon et al., 2006). Given the migratory nature of the species, most likely has a broad distribution within the NWMR. No BIAs identified for NWMR.
Mackerel/ porbeagle shark	Preferred habitat: The porbeagle shark primarily inhabits offshore waters around the edge of the continental shelf. They occasionally move into coastal waters, but these movements are temporary (Campana and Joyce, 2004; Francis et al., 2002). The porbeagle shark is known to dive to depths exceeding 1300 m (Campana et al., 2010; Saunders et al., 2011). Depth range records are 0–370 m (Kyne et al., 2021). Diet: Primarily teleost fish, elasmobranchs, and cephalopods (primarily squid) (Joyce et al., 2002; Last and Stevens, 2009).	In Australia, the species occurs in waters from southern Queensland to South-west Australia (Last and Stevens, 2009). Distribution within the NWMR is unknown, but there are several records for this species within the NWS (Atlas of Living Australia (ALA)).
Oceanic whitetip shark	Preferred habitat: The oceanic whitetip shark is globally distributed in warm-temperate and tropical oceans (Andrzejaczek et al., 2018). The species may occur in tropical and sub-tropical offshore and coastal waters around Australia. They primarily occupy pelagic waters in the upper 200 m of the water column; however, they have been observed diving to depths of around 1000 m, potentially associated with foraging behaviour (Howey-Jordan et al., 2013; D'Alberto et al., 2017). The species is highly migratory, travelling large distances between shallow reef habitats in coastal waters and oceanic waters (Howey-Jordan et al., 2013). The species does exhibit a strong preference for warm and shallow waters above 120 m. Diet: Opportunistic feeders and generally target a variety of finfishes and pelagic squid, depending on habitat. Targets pelagics such as tuna in open ocean as noted by the large bycatch numbers in the long line fisheries.	Given the migratory nature of the species, it most likely has a broad distribution within the NWMR. No BIAs identified for NWMR.

Species	Preferred Habitat and Diet	Habitat Location
Narrow sawfish	Preferred habitat[1]: Shallow coastal, estuarine, and riverine habitats, however it may occur in waters up to 40 m deep (D'Anastasi et al., 2013). Diet: Shoaling fishes, such as mullet, as well as molluscs and small crustaceans (Cliff and Wilson, 1994).	Shallow coastal waters of the Pilbara and Kimberly coasts (Last and Stevens, 2009).
Northern river shark	Preferred habitat[1]: Rivers, tidal sections of large tropical estuarine systems and macrotidal embayments, as well as inshore and offshore marine habitats (Pillans et al., 2009; Thorburn and Morgan, 2004). Adults have been recorded only in marine environments. Juveniles and sub-adults have been recorded in freshwater, estuarine and marine environments (Pillans et al., 2009). Depth range of up to 23 m (Kyne et al., 2021). Diet: Variety of fish and crustaceans (Stevens et al., 2005).	The northern river shark has a relatively restricted northern Australian range (although with an extent of occurrence >20,000 km²) (Kyne et al., 2021). Within the NWMR records have come from both the West and East Kimberley, including King Sound, the Ord and King rivers, West Arm of Cambridge Gulf and also from Joseph Bonaparte Gulf (Thorburn and Morgan, 2004; Stevens et al., 2005; Thorburn, 2006; Field et al., 2008; Pillans et al., 2008, Whitty et al., 2008; Wynen et al., 2008).
Largetooth (freshwater) sawfish	Preferred habitat: Sandy or muddy bottoms of shallow coastal waters, estuaries, river mouths and freshwater rivers, and isolated water holes. Diet: Shoaling fishes, such as mullet, as well as molluscs and small crustaceans (Cliff and Wilson, 1994).	The largetooth sawfish has a wide Northern Australia range (Kyne et al., 2021). The Kimberley region, particularly the Fitzroy River, is identified as an important nursery site (Bateman et al. 2024). The Exmouth Gulf represents the approximate southern limit for the largetooth (freshwater) sawfish, although there are a few historical records further south (Bateman et al., 2024). Refer to Table 5-5 for the BIA summary for the Largetooth (freshwater) sawfish.
Green sawfish	Preferred habitat[1]: Inshore coastal environments including estuaries, river mouths, embayments, and along sandy and muddy beaches, as well as offshore marine habitat (Stevens et al., 2005; Thorburn et al., 2003). They are found at depths of up to 70 m (Kyne et al., 2021). Diet: Schools of baitfish and prawns (Poganoski et al., 2002), molluscs and small crustaceans (Cliff and Wilson, 1994).	An aggregation of green sawfish (*Pristis zijsron*) has been identified in the Garig Gunak Barlu National Park (Cobourg Peninsula, NMR). Davies et al. (2022) suggests this may be a nursery area. The Ashburton River Estuary (Onslow region) has been recorded as a nursery site, with juveniles also observed along the Pilbara coast and Exmouth Gulf (Bateman et al., 2024). Refer Table 5-5 for the BIA summary for the green sawfish.
Dwarf sawfish	Preferred habitat[1]: Shallow (up to 20 m) silty coastal waters and estuarine habitats, occupying relatively restricted areas and moving only small distances (Stevens et al., 2008; Kyne et al., 2015). Diet: Shoaling fish such as mullet, molluscs, and small crustaceans (Cliff and Wilson, 1994).	Literature indicates the most southern range for the dwarf sawfish is Port Hedland (Bateman et al., 2024). Refer Table 5-5 for the BIA summary for the dwarf sawfish.

[1] Preferred habitat as described within the Sawfish and River Sharks Multispecies Recovery Plan (Commonwealth of Australia, 2015b).

5.2.2 Rays

Rays are commonly found in the NWMR. Two listed and migratory species of ray are known to occur within the NWMR: the reef manta ray and giant manta ray.

No BIAs for either the reef or giant manta ray species have been identified in the NWMR.

Table 5-4: Information on migratory ray species within the NWMR

Species	Preferred Habitat and Diet	Habitat Location
Reef manta ray	Preferred habitat: The reef manta ray is commonly sighted within productive nearshore environments, such as island groups, atolls or continental coastlines. However, the species has also been recorded at offshore coral reefs, rocky reefs, and seamounts (Marshall et al., 2009). Recorded depth range of 0–432 m (Kyne et al., 2021). Diet: Feed on planktonic organisms including krill and crab larvae.	A resident population of reef manta rays has been recorded at Ningaloo Reef. No BIAs identified for NWMR.
Giant manta ray	Preferred habitat: The species primarily inhabits near-shore environments along productive coastlines with regular upwelling, but they appear to be seasonal visitors to coastal or offshore sites including offshore island groups, offshore pinnacles and seamounts (Marshall et al., 2011). Recorded depth range of up to 1000 m (Kyne et al., 2021). Diet: Feed on planktonic organisms including krill and crab larvae.	The Ningaloo coast is an important area for giant manta rays from March to August (Preen et al., 1997). No BIAs identified for NWMR.

5.3 Fish, Shark and Sawfish Biological Important Areas in the NWMR

A review of the Australian Marine Spatial Information System (GA, 2024) identified biologically important areas (BIAs) for four species of fish, shark and sawfish (whale shark, largetooth (freshwater) sawfish, green sawfish and dwarf sawfish) within the NWMR. The BIAs for the whale shark and the sawfish species include foraging, nursing, juvenile and pupping areas. These are described in Table 5-5.

Table 5-5: Fish, whale shark and sawfish BIAs within the NWMR (source: AMSIS, accessed 14/08/2024)

	Woodside Activity Area			BIAs			
	Browse	NWS	NWC	Reproduction - Pupping	Reproduction - Nursing	Juvenile	Foraging
Whale shark	✓	✓	✓	No pupping BIA identified within the NWMR	No nursing BIA identified within the NWMR	N/A	Foraging (high density) in Ningaloo Marine Park and adjacent Commonwealth waters (Mar–Jul) Foraging northward from Ningaloo along the 200 m isobath (Jul–Nov).
Green sawfish	✓	✓	-	Pupping in Cape Keraudren (pupping occurs in summer in a narrow area adjacent to shoreline) Pupping in Willie Creek Pupping in Roebuck Bay Pupping in Cape Leveque Pupping in waters adjacent to Eighty Mile Beach Pupping (likely) in Camden Sound	Nursing in Cape Keraudren Nursing in waters adjacent to Eighty Mile Beach	No juvenile BIA identified within the NWMR.	Foraging in Cape Keraudren Foraging in Roebuck Bay Foraging in Cape Leveque Foraging in Camden Sound
Largetooth (freshwater) sawfish	✓	✓	-	Pupping in the mouth of the Fitzroy River (Jan–May) Roebuck Bay (Jan–May) Pupping likely in waters adjacent to Eighty Mile Beach (Jan–May)	Nursing (likely) in King Sound	Waters adjacent to Eighty Mile Beach Roebuck Bay	Foraging in the mouth of the Fitzroy River (Jan–May) Foraging in King Sound Roebuck Bay (Jan–May) Foraging in waters adjacent to Eighty Mile Beach
Dwarf sawfish	✓	✓	-	Pupping in King Sound Pupping in waters adjacent to Eighty Mile Beach	Nursing in King Sound Nursing waters adjacent to Eighty Mile Beach	King Sound	Foraging in King Sound Foraging in Camden Sound Foraging in waters adjacent to Eighty Mile Beach

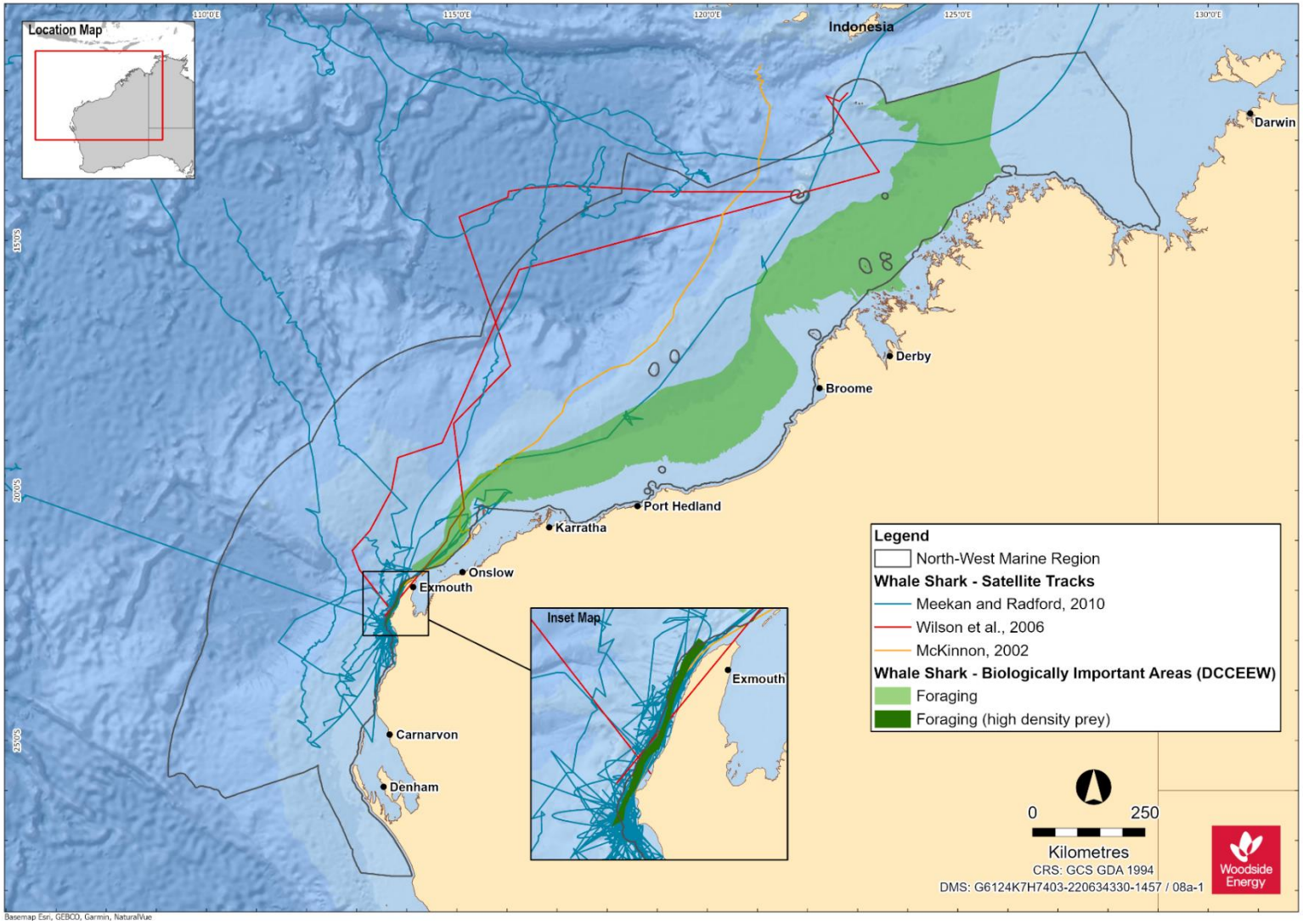


Figure 5-1: Whale shark biologically important areas (BIAs) for the NWMR and tagged whale shark satellite tracks (data source for BIAs: DCCEEW, 2024b)

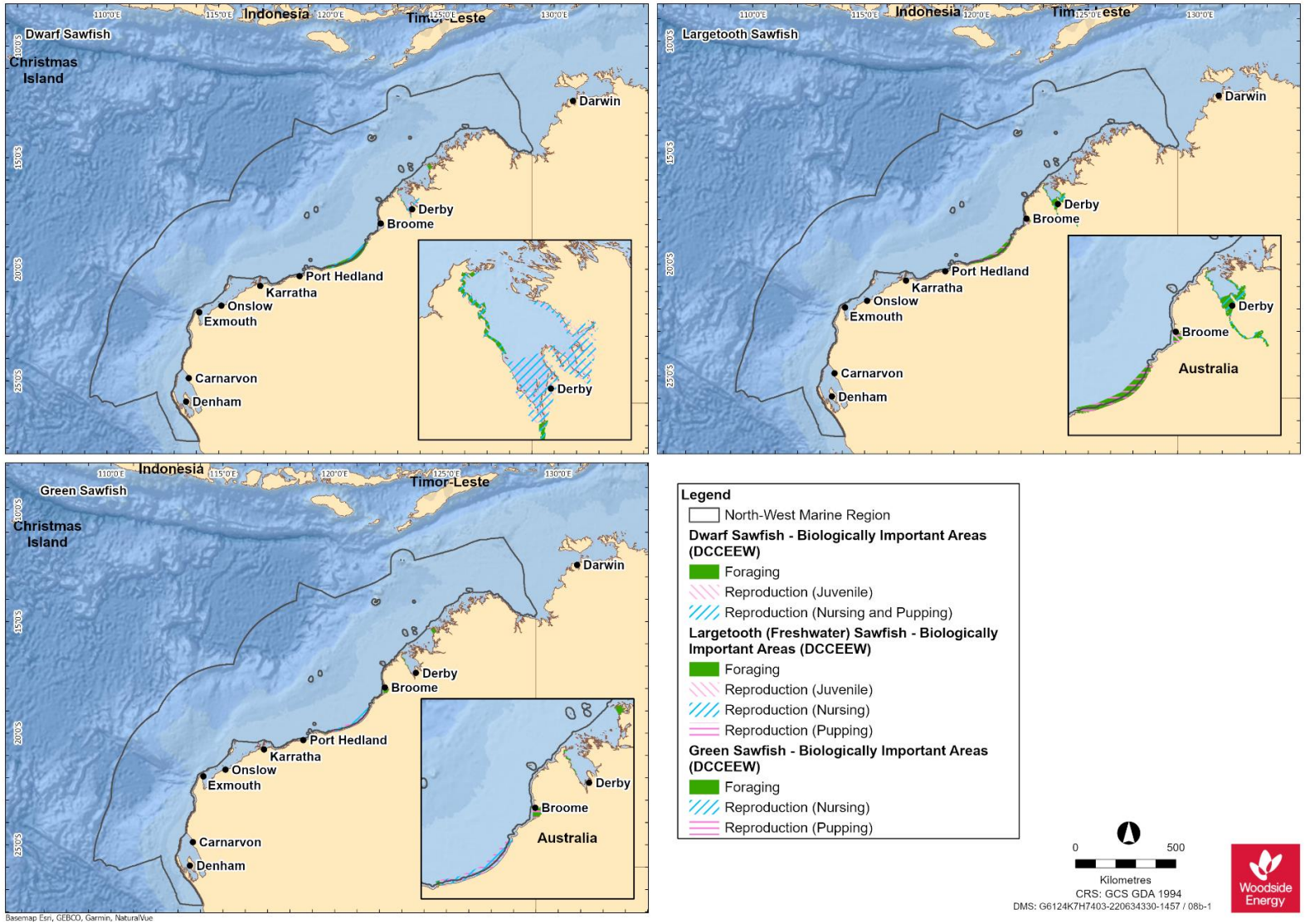


Figure 5-2: Sawfish BIAs for the NWMR (data source: DCCEEW, 2024b)

5.4 Fish Assemblages of the NWMR

5.4.1 Regional Context for Fish Assemblages of NWMR

The NWMR contains a diverse range of fishes of tropical Indo-west Pacific affinity (Allen et al., 1988). The region is characterised by the highest level of endemism and species diversity compared with other areas of the Australian continental slope. Last et al. (2005) recorded 1431 species from the three bioregions encompassing the continental slope, whilst also acknowledging some information gaps. A study of fish assemblages of the Dampier Archipelago found habitat type and complexity influenced fish abundance, with significantly higher abundance in mangrove and coral habitats (Moustaka, et al. 2024).

The NWMR is known for its demersal slope fish assemblages; the continental slope of the Timor Province and the North-west Transition supports more than 418 and 505 species of demersal fishes respectively, of which 64 are considered to be endemic. This is the second richest area for demersal fish species across the entire Australian continental slope. Conversely, the broad Southern Province, which covers most of southern Australia, supports 463 species with only 26 possibly being endemic. The continental slope demersal fish assemblages of the NWMR have been identified as a KEF (DEWHA, 2008), as described in Section 10.

The ancient coastline at 125 m depth contour KEF within the NWMR is thought to support enhanced diversity. Drivers of fish species richness, biodiversity and assemblage composition have been assessed, finding that depth, seafloor complexity and habitat type explain richness and abundance of fish assemblages (Currey-Randall et al., 2021). This study also found that fish communities along the ancient coastline KEF are similar to other mesophotic areas on the NWS. Most of the surveyed feature was characterised by soft sediment and highly mobile fish species (Currey-Randall et al., 2021).

The NWMR also features a diversity of pelagic fishes (those living in the pelagic zone) and bentho-pelagic fishes, including tuna, billfish, bramids, lutjanids, serranids and some sharks (DEWHA, 2007a). These species feed on salps and jellyfish, and more often on secondary consumers such as squid and bait fish. Water depth provides an indication of the level of interaction between pelagic and benthic communities within the NWMR; in waters deeper than 1000 m, for instance, the trophic system is pelagically-driven and benthic communities rely on particulates that fall to the seafloor (DEWHA, 2007a).

Pelagic fishes play an important ecological role within the NWMR; small pelagic fishes, such as lantern fish, inhabit a range of marine environments, including inshore and continental shelf waters and form a vital link in and between many of the region's trophic systems, feeding on pelagic phytoplankton and zooplankton and providing a food source for a wide variety of predators including large pelagic fishes, sharks, seabirds and marine mammals (Bulman, 2006; Mackie et al., 2007). Large pelagic fishes, such as tuna, mackerel, swordfish, sailfish and marlin are found mainly in oceanic waters and occasionally on the continental shelf (Brewer et al., 2007). Both juvenile and adult phases of the large pelagic species are highly mobile and have a wide geographic distribution, although the juveniles more frequently inhabit warmer or coastal waters (DEWHA, 2008).

5.4.1.1 Listed Fish Species in the NWMR

The family Syngnathidae is a group of bony fishes that includes seahorses, pipefishes, pipehorses and seadragons. Along with syngnathids, members of the related Solenostomidae family (ghost pipefishes) are also found in the NWMR (DSEWPAC, 2012a).

There are 55 solenostomid and syngnathid species that are listed marine species that may occur within the NWMR, although no species is currently listed as threatened or migratory, according to the PMST report (Appendix A).

Syngnathids live in nearshore and inner shelf habitats, usually in shallow coastal waters, among seagrasses, mangroves, coral reefs, macroalgae dominated reefs, and sand or rubble habitats (Dawson, 1985; Lourie et al., 1999; Lourie et al., 2004; Vincent, 1996). Two species, the winged seahorse (*Hippocampus alatus*) and western pipehorse (*Solegnathus sp. 2*) have been identified in deeper waters of the NWMR (up to 200 m) (DSEWPAC, 2012a), however, these species were not identified by the Protected Matters search of the NWMR.

Knowledge about the distribution, abundance and ecology of both syngnathids and solenostomids in the NWMR is limited. No BIAs for syngnathids and solenostomids have been identified in the NWMR.

5.4.2 Browse

The proposed Browse activity area includes biologically important habitat for the whale shark and three sawfish species, being:

- whale shark (foraging northward from Ningaloo along the 200 m isobath (July–November) (Table 9-1)
- largetooth (freshwater) sawfish (pupping, nursing and foraging areas)
- green sawfish (pupping, nursing and foraging areas)
- dwarf sawfish (pupping, nursing and foraging areas).

BIAs for the shark and sawfish species are outlined in Table 5-5 and Figure 5-1.

The proposed Browse activity area has partial overlap with the continental slope demersal fish communities KEF.

5.4.3 North West Shelf / Scarborough

The NWS / Scarborough activity area includes biologically important habitat for the whale shark and three sawfish species, being:

- whale shark (foraging northward from Ningaloo along the 200 m isobath (July–November) (Table 9-1)
- freshwater sawfish (pupping, nursing and foraging areas)
- green sawfish (pupping, nursing and foraging areas)
- dwarf sawfish (pupping, nursing and foraging areas).

BIAs for the whale shark and sawfish species are outlined in Table 5-5 and Figure 5-1.

The NWS / Scarborough activity area has partial overlap with the continental slope demersal fish communities KEF. The continental slope between North-west Cape and the Montebello Trough has more than 500 fish species, 76 of which are endemic, which makes it the most diverse slope bioregion in Australia (Last et al., 2005).

5.4.4 North-west Cape

The North-west Cape activity area includes biologically important foraging habitat for the whale shark, being:

- foraging (high density) in Ningaloo Marine Park and adjacent Commonwealth waters (March–July) (Table 9-1)
- foraging northward from Ningaloo along the 200 m isobath (July–November) (Table 9-1).

BIAs for the whale shark are outlined in Table 5-5 and Figure 5-1. The North-west Cape activity area coincides with part of the continental slope demersal fish communities KEF.

6. MARINE REPTILES

6.1 Regional Context for Marine Reptiles

The NWMR contains important habitat for listed marine reptiles, including areas that support key life stages such as nesting, internesting, migration and foraging for marine turtle species, and habitats supporting resident sea snake and crocodile populations.

Six of the seven marine turtle species occur in Australian waters, and all six (the green turtle, hawksbill turtle, loggerhead turtle, flatback turtle, leatherback turtle and olive ridley turtle) occur in the NWMR and NMR, with four species of marine turtles occurring in the SWMR (see Protected Matters reports in Appendix A).

There are 25 listed species of sea snake reported within or adjacent to the NWMR (Guinea, 2007a; Udyawer et al., 2016), of which four are endemic to reef habitats in the remote parts of the region (see NWMR Protected Matters report in Appendix A).

There are significantly fewer marine reptile species that frequently occur within the SWMR and presently include four species of listed marine turtle and six sea snake species. Other species of sea snake may occur because of the southward-flowing Leeuwin Current as vagrants in the region (DSEWPAC, 2012b) (see SWMR Protected Matters report in Appendix A).

Twenty-eight listed sea snake species ‘may’ occur in the NMR, as reported in the Protected Matters report in Appendix A).

The following sections focus on the listed marine reptile species known to occur within the NWMR.

Table 6-1 outlines the threatened and migratory marine reptile species that may or are known to occur within the NWMR, with their conservation status and relevant recovery plans and/or conservation advice.

Table 6-1: Marine reptile species identified by the EPBC Act PMST that may occur within or utilise habitats in the NWMR for key life cycle stages

Species Name	Common Name	Environment Protection and Biodiversity Conservation Act 1999 (Cth) (as per PMST report in Appendix A).			*Biodiversity Conservation Act 2016* (WA)[8]	IUCN[1] Red List of Threatened Species (non-statutory)[9]	EPBC Act Part 13 Statutory Instrument
		Threatened Status	Migratory Status	Listed	Conservation Status	Global Status	
Caretta caretta	Loggerhead turtle	Endangered	Migratory	Marine	Endangered	Vulnerable	Recovery Plan for Marine Turtles in Australia 2017–2027 (Commonwealth of Australia, 2017)
Chelonia mydas	Green turtle	Vulnerable	Migratory	Marine	Vulnerable	Endangered	
Dermochelys coriacea	Leatherback turtle	Endangered	Migratory	Marine	Vulnerable	Vulnerable	
Eretmochelys imbricata	Hawksbill turtle	Vulnerable	Migratory	Marine	Vulnerable	Critically Endangered	
Natator depressus	Flatback turtle	Vulnerable	Migratory	Marine	Vulnerable	Data Deficient	
Lepidochelys olivacea	Olive ridley turtle	Endangered	Migratory	Marine	Endangered	Vulnerable	
Varanus mitchelli	Mitchell's water monitor	Critically Endangered	N/A	N/A	N/A	Critically Endangered	Conservation Advice for *Varanus mitchelli* (Mitchell's water monitor) (DCCEEW, 2023c)
Aipysurus apraefrontalis	Short-nosed sea snake	Critically Endangered	N/A	Marine	Critically Endangered	Data Deficient	Approved Conservation Advice for *Aipysurus apraefrontalis* (Short-nosed Sea Snake) (DSEWPAC, 2011a)
Aipysurus foliosquama	Leaf-scaled sea snake	Critically Endangered	N/A	Marine	Critically Endangered	Data Deficient	Approved Conservation Advice for *Aipysurus foliosquama* (Leaf-scaled Sea Snake) (DSEWPAC, 2011b)
Aipysurus fuscus	Dusky sea snake	Endangered	N/A	Marine	N/A	Endangered	Conservation Advice for *Aipysurus fuscus* (dusky sea snake) (DCCEEW, 2024o)
Crocodylus porosus	Salt-water crocodile	N/A	Migratory	Marine	Migratory	Least Concern	N/A

[8] Threatened and Priority Fauna List – April 2024 - https://www.dbca.wa.gov.au/management/threatened-species-and-communities (accessed on 13/08/2024)
[9] IUCN. 2024. The IUCN Red List of Threatened Species. Version 2024-1. https://www.iucnredlist.org (accessed on 13/08/2024)

6.2 Marine Turtles in the NMWR, SWMR and NMR Bioregions

According to the Protected Matters search (Appendix A) six species of marine turtle known to occur within the NWMR are listed as threatened and migratory (three Vulnerable and three Endangered) under the EPBC Act—the green (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*), flatback (*Natator depressus*), loggerhead (*Caretta caretta*), leatherback (*Dermochelys coriacea*) and olive ridley (*Lepidochelys olivacea*) turtles (DSEWPAC, 2012a) (refer Table 6-1).

The NWMR supports globally significant breeding populations of four marine turtle species: the green, hawksbill, flatback and loggerhead turtle. Olive ridley turtles are known to forage within the NWMR, but there are only occasional records of the species nesting in the region. Leatherback turtles regularly forage over Australian continental shelf waters within the NWMR but there are also no records of the species nesting in the region (DSEWPAC, 2012a).

The six marine turtle species reported for the NWMR also occur within the NMR.

Four marine turtle species; the green, loggerhead, flatback, and leatherback turtle, have presumed feeding areas within the SWMR; however, no known nesting areas exist within the region (DSEWPAC, 2012b).

Discrete genetic stocks have evolved within each marine turtle species. This is the result of marine turtles returning to the location where they hatched. These genetically distinct stocks are defined by the presence of regional breeding aggregations. Stocks are composed of multiple rookeries in a region and are delineated by where there is little or no migration of individuals between nesting areas. Turtles from different stocks typically overlap at feeding grounds (Commonwealth of Australia, 2017). There are 17 genetic stocks across both the NWMR and NMR (nine in the NWMR, six in the NMR, and two overlapping both regions). Of these 17 genetic stocks, nine are known to occur within Woodside's three areas of activity (Table 6-2).

6.2.1 Life Cycle Stages

Marine turtles are highly migratory during non-reproductive life phases and have high site fidelity during breeding and nesting life phases. The majority of their lives are spent in the ocean, with only adult female marine turtles coming ashore to lay eggs in the sand above the high-water mark on natal beaches (Commonwealth of Australia, 2017). Figure 6-1 summarises the generalised life cycle of marine turtles. Species-specific life cycle information is outlined within the Recovery Plan for Marine Turtles of Australia (Commonwealth of Australia, 2017).

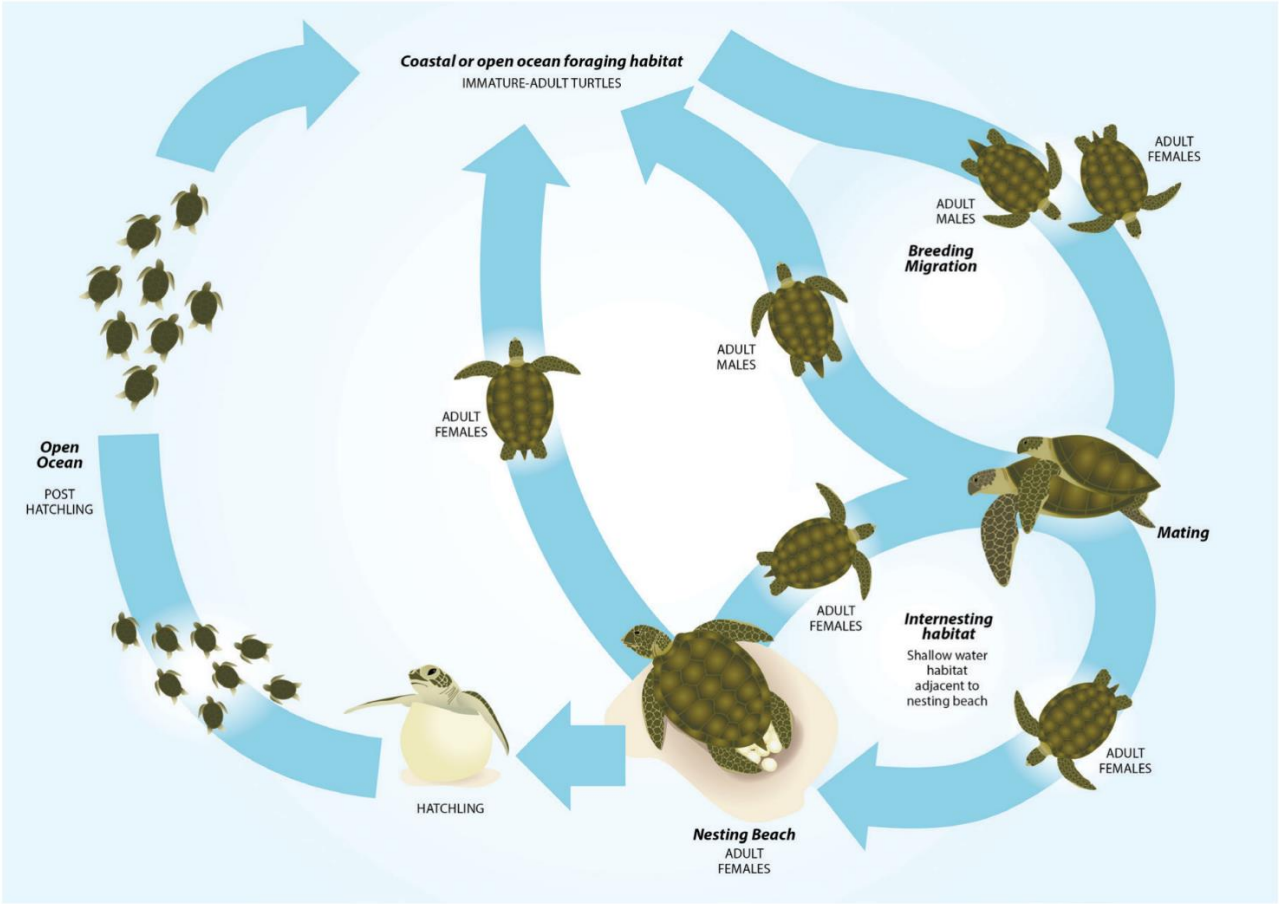


Figure 6-1: Generalised life cycle of marine turtles (Commonwealth of Australia, 2017)

6.2.2 Habitat Critical to Survival for Marine Turtles in the NWMR

The Recovery Plan for Marine Turtles of Australia (Commonwealth of Australia, 2017) identifies habitat critical to the survival of a species for marine turtle stocks under the EPBC Act. Habitat critical to survival is defined by the EPBC Act *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance* as areas necessary:

- for activities such as foraging, breeding or dispersal
- for the long-term maintenance of the species (including the maintenance of species essential to the survival of the species)
- to maintain genetic diversity and long-term evolutionary development
- for the reintroduction of populations or recovery of the species.

The Recovery Plan for Marine Turtles of Australia (Commonwealth of Australia, 2017) has identified nesting locations and associated internesting areas as habitat critical to survival for four marine turtle species within the NWMR and these are identified, described and mapped in Table 6-2 and Figure 6-2. No habitat critical to survival has been identified within the NWMR for olive ridley or leatherback turtles.

Table 6-2 outlines the relevant genetic stock, habitat critical to survival and key life cycle stage seasonality of the four species of marine turtles within the NWMR.

Table 6-2: Genetic stock, habitat critical to survival and key life cycle stage seasonality of the four species of marine turtles within the NWMR

Species	Woodside Activity Area			Habitat Critical to Survival			
	Browse	NWS/S	NWC	Nesting (*Major Rookery[1])	Internesting Buffer	Seasonality Nesting	Preferred Habitat[2]
Green Turtle							
NWS Stock (G-NWS)	✓	✓	✓	Adele Island Maret Island Cassini Island Lacepede Islands* Barrow Island* Montebello Islands (all with sandy beaches)* Serrurier Island Dampier Archipelago Thevenard Island Northwest Cape* Ningaloo Coast	20 km radius	Nov–Mar	Nearshore reef habitats in the photic zone.
Ashmore Reef Stock (G-AR)	✓	-	-	Ashmore Reef* Cartier Reef*		All year (peak: Dec–Jan)	
Scott Reef-Browse Island Stock (G-ScBr)	✓	-	-	Scott Reef (Sandy Islet)* Browse Island*		Nov–Mar	

Species	Woodside Activity Area			Habitat Critical to Survival			
	Browse	NWS/S	NWC	Nesting (*Major Rookery[1])	Internesting Buffer	Seasonality Nesting	Preferred Habitat[2]
Hawksbill Turtle							
Western Australia Stock (H-WA)	-	✓	-	Dampier Archipelago (including Rosemary Island and Delambre Island)* Montebello Islands (including Ah Chong Island, South East Island and Trimouille Island)* Lowendal Islands (including Varanus Island, Beacon Island and Bridled Island) Sholl Island	20 km radius	Oct–Feb	Nearshore and offshore reef habitats.
Flatback Turtle							
Cape Domett Stock (F-CD)	✓	-	-	Cape Domett* Lacrosse Island	60 km radius	All year (peak: Jul–Sep)	Nearshore and offshore sub-tidal and soft bottomed habitats of offshore islands.
South-west Kimberley Stock (F-swKim)	-	✓	-	Eighty Mile Beach* Eco Beach* Lacepede Islands		Oct–Mar	
Pilbara Stock (F-Pil)	-	✓	-	Montebello Islands Mundabullangana Beach* Barrow Island* Cemetery Beach Dampier Archipelago (including Delambre Island* and Huay Island) Coastal islands from Cape Preston to Locker Island		Oct–Mar	

Species	Woodside Activity Area			Habitat Critical to Survival			
	Browse	NWS/S	NWC	Nesting (*Major Rookery[1])	Internesting Buffer	Seasonality Nesting	Preferred Habitat[2]
Unknown genetic stock Kimberley, Western Australia	✓	✓	-	Maret Islands Montilivet Islands Cassini Island Coronation Islands (includes Lamarck Island) Napier-Broome Bay Islands (West Governor Island, Sir Graham Moore Island – near Kalumbaru) Champagny, Darcy and Augustus Islands (Camden Sound)		May–July	
Loggerhead Turtle							
Western Australia Stock (LH-WA)	-	-	✓	Dirk Hartog Island* Muiron Islands* Gnaraloo Bay* Ningaloo Coast	20 km radius	Nov–May	Nearshore and island coral reefs, bays and estuaries in tropical and warm temperate latitudes.

[1] *Major rookeries as outlined in the Recovery Plan (Commonwealth of Australia, 2017)*

[2] *Preferred habitat as outlined in the Recovery Plan (Commonwealth of Australia, 2017)*

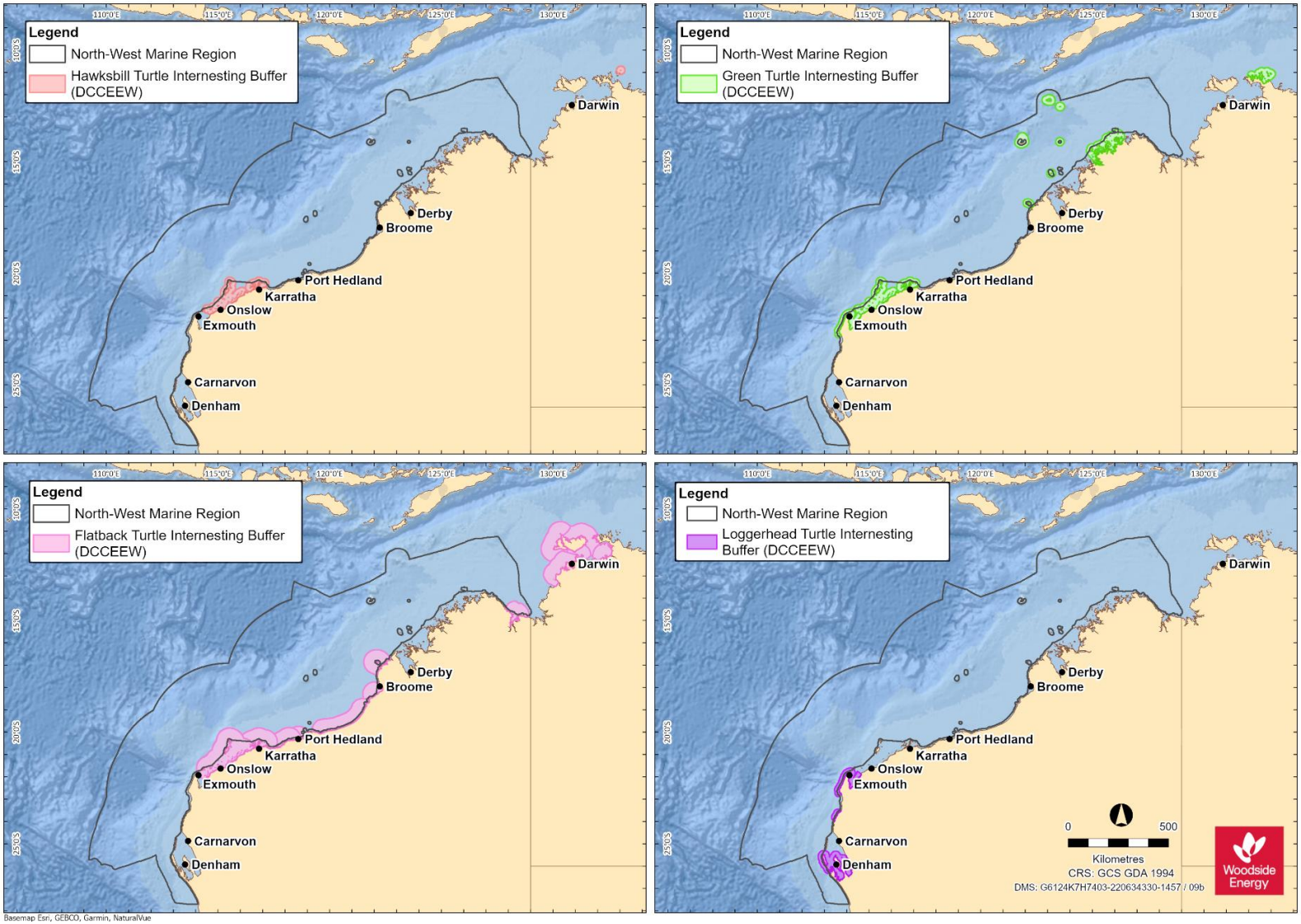


Figure 6-2: Marine turtle species habitat critical to survival (nesting beaches and internesting buffers) for the NWMR (data source: DCCEEW, 2024b)

6.3 Marine Turtle Biological Important Areas in the NWMR

A review of the Australian Marine Spatial Information System (GA, 2024), the Marine Bioregional Plan for the North-west Marine Region (DSEWPAC, 2012a) and the Recovery Plan for Marine Turtles in Australia (CoA, 2017) identified BIAs for the four marine turtle species that occur within the NWMR. These are described in Table 6-3.

Table 6-3: Marine turtle BIAs within the NWMR

Species	Woodside Activity Area			BIAs				
	Browse	NWS/S	NWC	Mating	Nesting	Internesting	Foraging	Migration[10]
Green turtle	✓	✓	✓	Barrow Island Montebello Islands (including Hermite Island, North West Island, Trimouille Island) Dampier Archipelago (islands to the west of the Burrup Peninsula) Ashmore Reef	Barrow Island Montebello Islands (including Hermite Island, North West Island, Trimouille Island) Middle Island Dampier Archipelago (islands to the west of the Burrup Peninsula) North and South Muiron Islands North West Cape Delambre Island Legendre Island and Huay Island Lacepede Islands Scott Reef – Sandy Island Ashmore Reef Cartier Island Cassini Island	Locations of 20 km internesting buffer BIAs for green turtles are described in the Marine Bioregional Plan for the North-west Marine Region (DSEWPAC, 2012a). Year round and seasonal 20 km internesting buffer BIAs are located around nesting sites. Habitat critical to survival internesting buffer (Table 6-2) is the legally recognised area of protection under the EPBC Act	Foraging inshore areas of Barrow Island Foraging at Montgomery Reef Foraging at Montebello Islands Foraging at Dixon Island Foraging around Ashmore Reef Foraging at Seringapatam Reef and Scott Reef Foraging in the De Grey River area to Bedout Island Foraging around the Islands between Cape Preston and Onslow and inshore of Barrow Island Foraging around Dampier Archipelago (islands to the west of the Burrup Peninsula) Foraging at Legendre Island and Huay Island Foraging around Delambre Island Foraging in the Joseph Bonaparte Gulf	Migration corridor at Dampier Archipelago (islands to the west of the Burrup Peninsula). Green turtles can migrate more than 2600 km between their feeding and nesting grounds. Individual turtles foraging in the same area do not necessarily take the same migration route (Limpus et al., 1992). Ferreira et al. (2021) broadly identified two migratory corridors, one used by the NWS stock-Pilbara and another used by the NWS stock-Kimberley and the Scott-Browse stock with some overlap at the northern and southern extents respectively. This study showed that the foraging distribution of green turtles from two stocks in WA expands throughout North-west and northern Australian coastal waters,

[10] Migration BIA included in AMSIS (GA, 2024). General information for migratory behaviours also provided.

Species	Woodside Activity Area			BIAs				
	Browse	NWS/S	NWC	Mating	Nesting	Internesting	Foraging	Migration[10]
							Foraging in waters adjacent to James Price Point	including the NT and Queensland.
Hawksbill turtle	✓	✓	✓	Montebello Islands Barrow Island Lowendal Island Group Dampier Archipelago (to the west of the Burrup Peninsula)	Lowendal Island Group Montebello Islands (including Ah Chong and South East islands) Rosemary Island Delambre Island Barrow Island Varanus Island and Thevenard Island Dampier Archipelago (to the west of the Burrup Peninsula) Ningaloo Coast and Jurabi Coast Sandy Islet at Scott Reef	Locations of 20 km internesting buffer BIAs for hawksbill turtles are described in the Marine Bioregional Plan for the North-west Marine Region (DSEWPAC, 2012a). Year round and seasonal 20 km internesting buffer BIAs are located around nesting sites. Habitat critical to survival internesting buffer (Table 6-2) is the legally recognised area of protection under the EPBC Act	Recent data shows foraging ranges from the north of Exmouth Gulf to offshore Broome (Fossette et al., 2021a). Foraging around the Lowendal Island group Foraging at Delambre Island Foraging around Dixon Island Foraging in the De Grey River area to Bedout Island Foraging around the islands between Cape Preston and Onslow and inshore of Barrow Island Foraging around the islands of the Dampier Archipelago (to the west of the Burrup Peninsula) Foraging at Ashmore Reef	Migration corridor at Dampier Archipelago (islands to the west of the Burrup Peninsula). Individuals may migrate up to 2400 km between their nesting and foraging grounds (DSEWPAC, 2012a), although reproductive migration distances over 1000 km appear less common in hawksbill turtles than other species (Fossette et al., 2021a). Recent satellite tracking data shows turtles migrating from WA rookeries remained on the continental shelf, with the majority following the coastline and dispersing in a north-easterly direction, with some turtles from the Montebello Archipelago and Lowendals moving in a south-westerly direction and some stopping around Barrow Island. A migratory corridor was observed from

Species	Woodside Activity Area			BIAs				
	Browse	NWS/S	NWC	Mating	Nesting	Internesting	Foraging	Migration[10]
								Cape Preston to De Grey River (Fossette et al., 2021a)
Flatback turtle	✓	✓	-	Lacepede Islands Montebello Islands Dampier Archipelago (islands to the West of the Burrup Peninsula) Mating at Barrow Island	Thevenard Island – South Coast (summer) high use on beaches with high dune height Barrow Island Montebello Islands (including Hermite Island, North West Island, Trimouille Island) Dampier Archipelago (islands to the west of the Burrup Peninsula) Delambre Island Legendre Island and Huay Island Dixon Island Intercourse Island West of Cape Lambert Various locations along the Pilbara coast between Karratha and Broome, including Cape Thouin, Mundabullangana, Cowrie Beach, Port Hedland (Cemetery Beach, Paradise	Locations of 80 km internesting buffer BIAs for flatback turtles are described in the Marine Bioregional Plan for the North-west Marine Region (DSEWPAC, 2012a). Year-round and seasonal internesting buffer BIAs of 80 km are located around nesting sites, extending 20 km further than the habitat critical to survival. Habitat critical to survival internesting buffer (Table 6-2) is the legally recognised area of protection under the EPBC Act	Foraging at the islands between Cape Preston and Onslow and inshore of Barrow Island. Foraging at Montebello Islands Foraging at Dampier Archipelago (islands to the West of the Burrup Peninsula) Foraging at Legendre Island and Huay Island Foraging at Delambre Island Foraging in the Joseph Bonaparte Depression Foraging in waters adjacent to James Price Point	Migration corridor at Dampier Archipelago (islands to the west of the Burrup Peninsula). The flatback turtle is a resident to Australian waters and spends 99% of its time within the Australian EEZ. A migratory corridor connects the coastlines between the Kimberley and Pilbara (Peel et al., 2024). There is evidence that some flatback turtles undertake long-distance migrations between breeding and feeding grounds (Limpus et al., 1983). However, flatback turtles generally do not have a pelagic phase to their lifecycle. Instead, hatchlings grow to maturity in shallow coastal waters thought to be close to their natal beaches (DSEWPAC, 2012a). A study predicting the dispersal of flatback

Species	Woodside Activity Area			BIAs				
	Browse	NWS/S	NWC	Mating	Nesting	Internesting	Foraging	Migration[10]
					Beach) and 80 Mile Beach Lacepede Islands			turtle hatchlings found that core areas were predominantly on the continental shelf (<200 m depth contour) during all dispersal phases, indicating that flatback turtles remain in neritic areas (Wilson et al., 2023).
Loggerhead turtle	✓	✓	-	No mating BIA identified within the NWMR	Dirk Hartog Island Muiron Islands Ningaloo and Jurabi coasts Montebello Islands Lowendal Island Rosemary Island Gnaraloo Station	Locations of 20 km internesting buffer BIAs for loggerhead turtles are described in the Marine Bioregional Plan for the North-west Marine Region (DSEWPAC, 2012a). Year-round and seasonal 20 km internesting buffer BIAs are located around nesting sites. Habitat critical to survival internesting buffer (Table 6-2) is the legally recognised area of protection under the EPBC Act	Foraging in the De Grey River area to Bedout Island Foraging on the Western Joseph Bonaparte Depression Foraging in the waters adjacent to James Price Point	No migration BIA identified within the NWMR. Adult loggerhead turtles dispersing from Dirk Hartog Island beaches (near Shark Bay) have remained within WA waters from southern WA to the Kimberley. Turtles dispersing from the North-west Cape – Muiron Islands nesting area have ranged north as far as the Java Sea and the North-western Gulf of Carpentaria, and to south-west WA (DSEWPAC, 2012a)

Species	Woodside Activity Area			BIAs				
	Browse	**NWS/S**	**NWC**	**Mating**	**Nesting**	**Internesting**	**Foraging**	**Migration[10]**
Olive ridley turtle	✓	✓	-	No mating BIA identified within the NWMR	No nesting BIA identified within the NWMR	No internesting BIA identified within the NWMR	No foraging BIA identified within the NWMR, however may forage at: • the Western Joseph Bonaparte Depression and Gulf • Dampier Archipelago (islands to the West of the Burrup Peninsula).	No migration BIA identified within the NWMR. Migration routes and distances between nesting beaches and foraging areas are not known for Australian olive ridley turtles

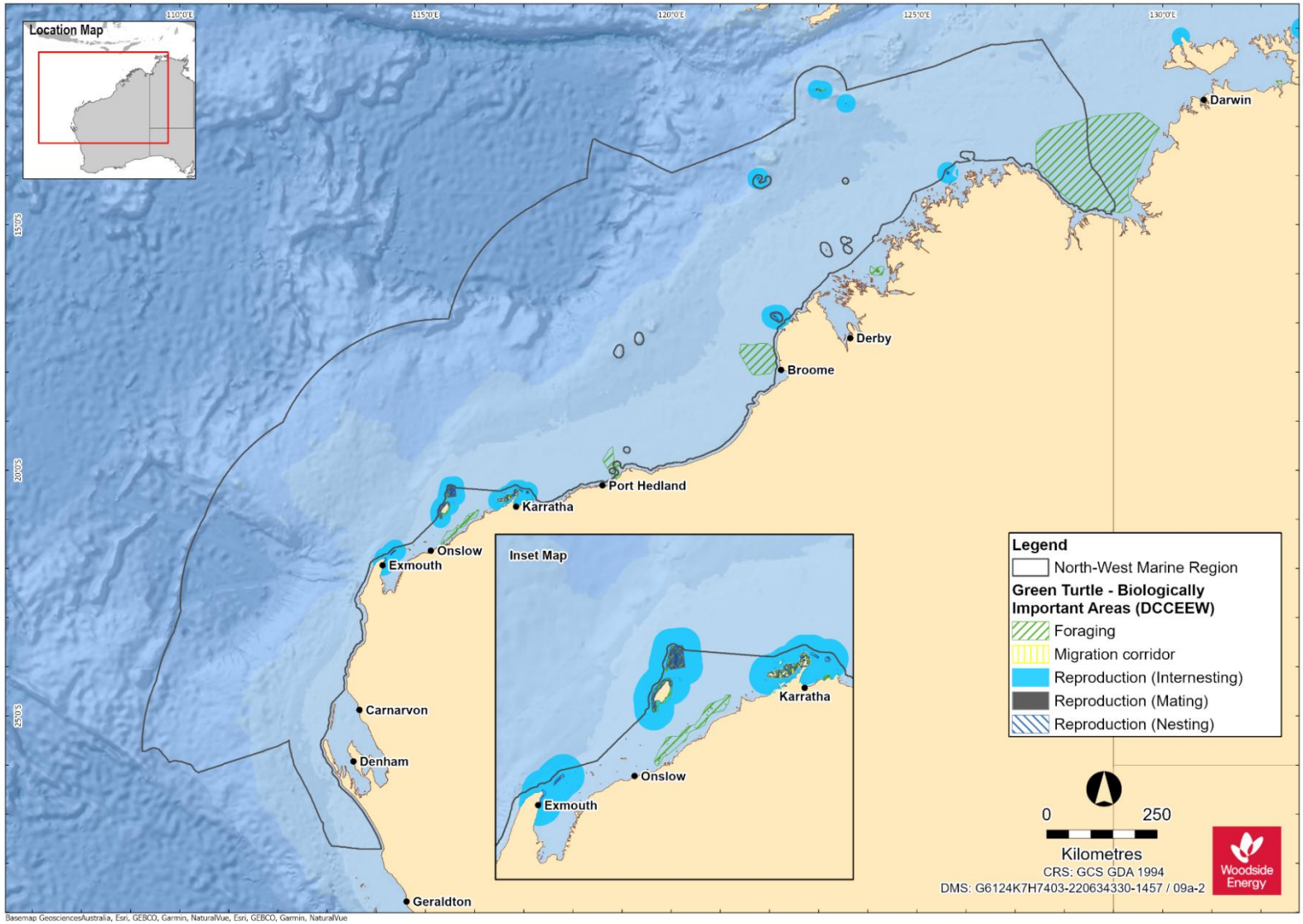


Figure 6-3: Green turtle BIAs within the NWMR (data source: DCCEEW, 2024b)

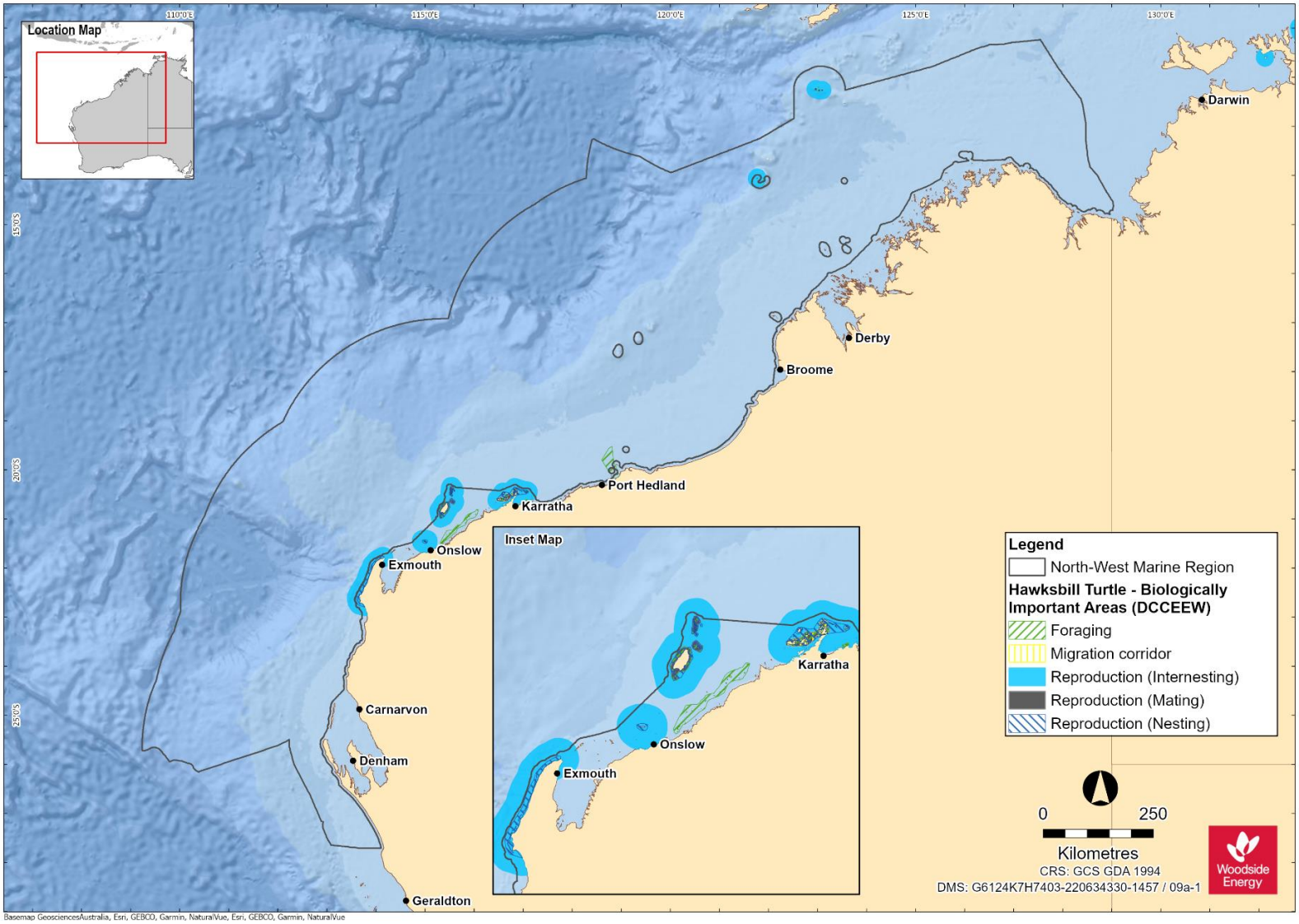


Figure 6-4: Hawksbill turtle BIAs within the NWMR (data source: DCCEEW, 2024b)

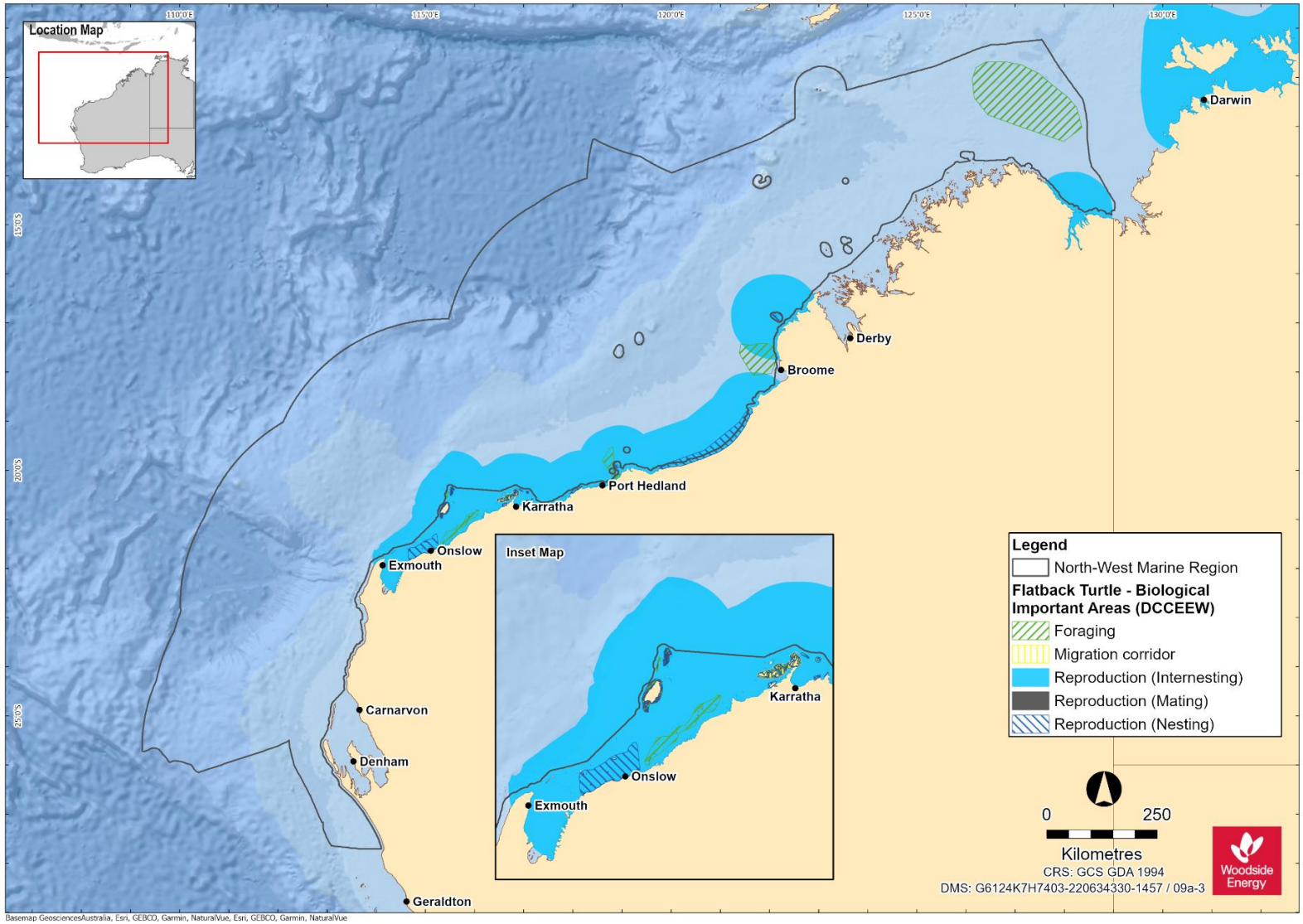


Figure 6-5: Flatback turtle BIAs within the NWMR (data source: DCCEEW, 2024b)

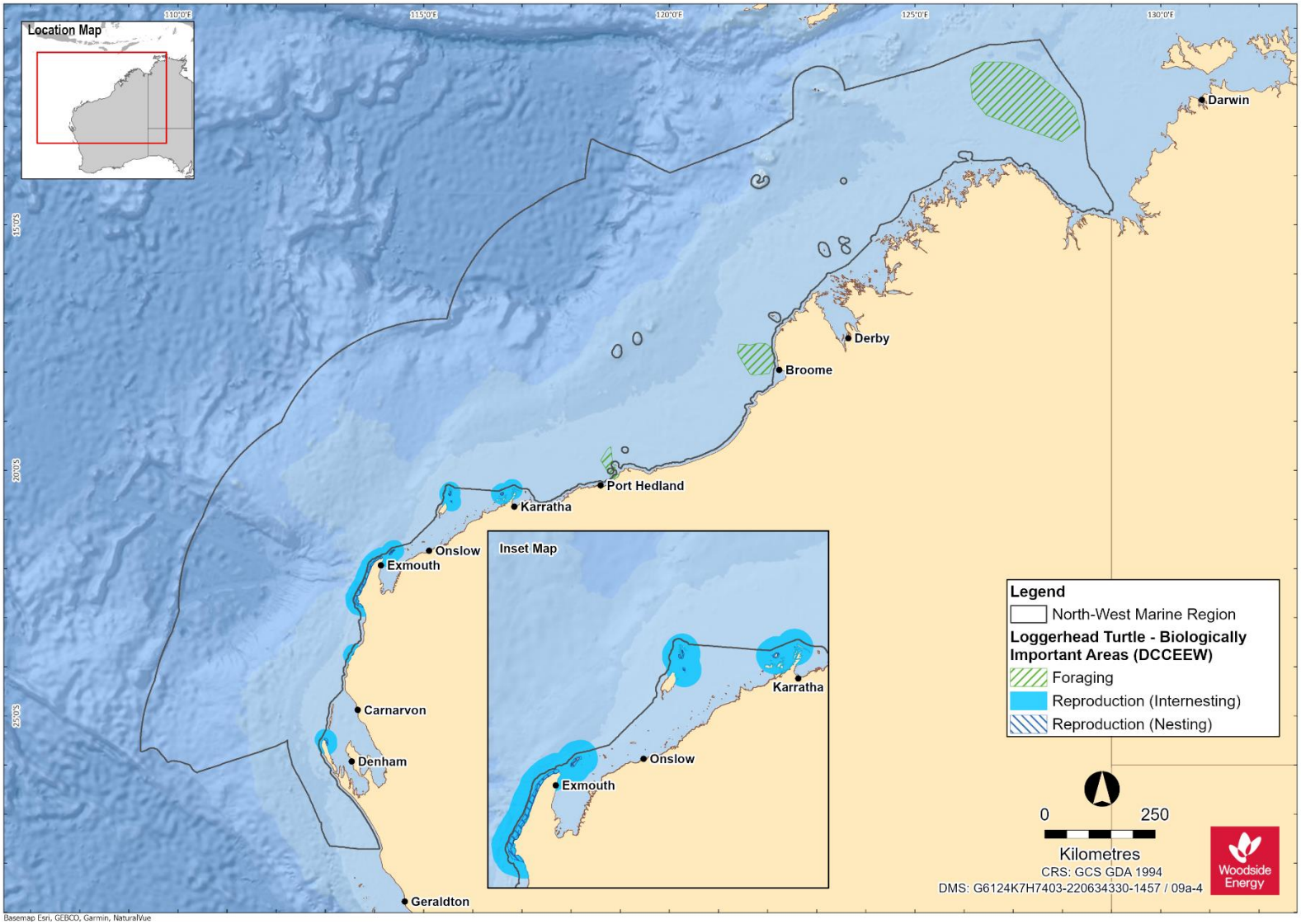


Figure 6-6: Loggerhead turtle BIAs within the NWMR (data source: DCCEEW, 2024b)

6.4 Marine Turtle Summary for NWMR

Six of the seven marine turtle species occur within the Woodside activity areas. Across all three areas, globally significant breeding populations of four marine turtle species; the green, hawksbill, flatback and loggerhead turtle, have been recorded.

However, offshore waters do not represent biologically important habitat for marine turtles in any of the three Woodside activity areas. Isolated records of transient individuals (on post-nesting migration) are expected, but there is no evidence of important habitat or behaviours for marine turtles in the offshore, open water environment of the NWS, in general.

6.4.1 Browse

The proposed Browse activity area includes major nesting areas that support globally significant breeding populations of two marine turtle species:

- the green turtle, including two distinct genetic stocks (Ashmore Reef and Scott Reef-Browse Island)
- the flatback turtle, Cape Domett genetic stock.

Locations of habitat critical for each of the two species are outlined in Table 6-2 and Figure 6-2.

BIAs for the green and flatback turtle are outlined in Table 6-3 and Figure 6-3.

Table 6-4: Marine turtle key information for Browse activity area.

Species / Genetic Stock	Key Information
Green Turtle	
Ashmore Reef Stock (G-AR)	The G-AR stock nests in a localised area of the Indian Ocean in the Ashmore Reef and Cartier Island Australian Marine Park (AMP) areas. Population estimates are not available for Ashmore Reef, although annual breeding numbers are thought to be in the low hundreds (Whiting, 2000). Designated habitat critical for the G-AR stock are the nesting locations of Ashmore Reef and Cartier Reef, and an internesting buffer of 20 km radius around these rookeries, year-round with peak internesting activity occurring December to January (refer Table 6 of the Recovery Plan). Juvenile and adult turtles forage within the tidal/sub-tidal habitats of offshore islands and coastal waters with coral reef, mangrove, sand, rocky reefs, and mudflats where there are algal turfs or seagrass meadows present (Commonwealth of Australia, 2017).
Scott Reef-Browse Island Stock (G-ScBr)	The G-ScBr stock is a discrete unit known to nest at only two locations within the North-east Indian Ocean—Sandy Islet and Browse Island. There is currently very limited data available for the G-ScBr stock, therefore population numbers are not known. Designated habitat critical for the G-ScBr stock are the nesting locations of Sandy Islet and Browse Island, and an internesting buffer of 20 km radius around these rookeries, for the period November to March (refer Table 6 of the Recovery Plan). Surveys conducted at Scott Reef in 2006, 2008 and 2009 indicate that the summer months from late November to February are the preferred breeding season for green turtles at Sandy Islet (Guinea, 2009). Satellite tagging studies (Pendoley, 2005; Guinea, 2011) have provided an indication of the behaviour and migratory routes of adult green turtles leaving Scott Reef. Most animals appear to swim through South Reef lagoon and disperse toward the Western Australian mainland via two distinct post-nesting migration pathways; travelling east and north toward the Bonaparte Archipelago and then north along the coast to foraging areas in NT waters or travelling south to Cape Leveque and then south along the coast to the Turtle Islands off the mouth of the De Grey River in the Pilbara region (Ferreira et al., 2021).
Flatback Turtle	
Cape Domett Stock (F-CD)	Cape Domett is an important high density nesting area (Tucker et al., 2021). Combined with a smaller site at Lacrosse Island, the F-CD stock is one of the largest flatback turtle stocks in Australia. Average nesting abundance at Cape Domett is estimated at 3250 females per year (Whiting et al., 2008). Designated habitat critical for the F-CD stock are the nesting locations of Cape Domett and Lacrosse Island, and an internesting buffer of 60 km radius around these rookeries, year-round with peak internesting activity occurring July to September. Extending further than the habitat critical internesting buffer, an internesting buffer BIA of 80 km is located at Cape Domett and Lacrosse Island.

6.4.2 North West Shelf / Scarborough

The NWS / Scarborough activity area includes major nesting areas that support globally significant breeding populations of three marine turtle species, representing four discreet genetic stocks:

- the green turtle, NWS genetic stock
- the hawksbill turtle, WA genetic stock
- the flatback turtle, South-west Kimberley stock and Pilbara genetic stock.

Locations of habitat critical for each of the four species are outlined in Table 6-2 and Figure 6-2.

BIAs for the green, hawksbill, and flatback turtles are outlined in Table 6-3 and Figure 6-3.

Table 6-5: Marine turtle key information for NWS / Scarborough activity area

Species / Genetic Stock	Key Information
Green Turtle	
NWS Stock (G-NWS)	The G-NWS stock is one of the largest green turtle stocks in the world and the largest in the Indian Ocean. The G-NWS stock is estimated at approximately 20,000 individuals (DSEWPAC, 2012a) and the trend for the stock is reported as stable (Commonwealth of Australia, 2017). Major rookeries of the NWS stock within the NWS / Scarborough activity area are located at Lacepede Islands, Montebello Islands, Barrow Island (Tucker et al., 2021), Bells Beach, Delambre Island, Mundabullangana, Port Hedland, and Thevenard Island. These areas are designated habitat critical for survival of the stock and include an internesting buffer of 20 km radius around these rookeries from November to March.
Hawksbill Turtle	
Western Australia Stock (H-WA)	The H-WA stock is the largest in the Indian Ocean. The majority of the nesting for this stock is located in the Pilbara. The Dampier Archipelago has the largest nesting aggregation recorded. In particular, Rosemary Island supports the most significant hawksbill turtle rookery in the WA region and one of the largest in the Indian Ocean; approximately 500 to 1000 females nest on the island annually, more than at any other WA rookery (Pendoley, 2005; Pendoley et al., 2016). Major rookeries of the H-WA stock within the NWS / Scarborough activity area are located at Rosemary Island, Delambre Island and the Montebello Islands. These areas are designated habitat critical for the stock and include an internesting buffer of 20 km radius around these rookeries from October to February.
Flatback Turtle	
South-west Kimberley Stock (F-swKim)	The genetic relationship between this nesting aggregation and the Cape Domett and Pilbara stocks is currently under review. Population numbers of the F-swKim stock are unknown. Major rookeries of the F-swKim stock are located at Eighty Mile Beach and Eco Beach. These areas are designated habitat critical for the stock and include an internesting buffer of 60 km radius around these rookeries from October to March.
Pilbara Stock (F-Pil)	The extent of genetic relatedness of flatback turtles along the WA coast is currently under review. Population numbers of the F-Pil stock are unknown. This stock nests on many islands in the Pilbara and southern Kimberley, with major rookeries at Mundabullangana Beach, Delambre Island, Rosemary Island and Barrow Island. These areas are designated habitat critical for the F-Pil stock and include an internesting buffer of 60 km radius around these rookeries from October to March. A study using aerial photogrammetry showed nesting beaches were spread across the Pilbara from Y Island (Exmouth Gulf) in the southwest, to Bedout Island in the north and Mulla Mulla Downs Creek in the east (Fossete et al., 2021b). Other large flatback rookeries include Legendre Island and Thevenard Island. The Dampier Archipelago has been identified as a high-use area for flatback nesting (i.e. >50% of the stock) (Fossete et al., 2021b). Extending further than the habitat critical internesting buffer, a year-round internesting buffer BIA of 80 km is located north and north-west of the Montebello Islands. However, use level for this BIA has been defined as very low (Commonwealth of Australia, 2017) and the habitat critical internesting buffer is the legally recognised area of protection under the EPBC Act *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance*. Post-nesting satellite tracking indicates foraging occurs along the WA coast in water shallower than 130 m and within 315 km of shore (Commonwealth of Australia, 2017). Flatbacks exhibit high fidelity to nesting beaches during periods of nesting attempts (Peel et al., 2024).

6.4.3 North-west Cape

The North-west Cape activity area includes major nesting areas that support globally significant breeding populations of two marine turtle species, representing two discreet genetic stocks:

- the green turtle, NWS genetic stock
- the loggerhead turtle, Western Australia genetic stock.

Locations of habitat critical for each of the two species are outlined in Table 6-2, Figure 6-2 and Figure 6-3.

A 2018 survey, including on-beach monitoring of the Muiron Islands and Ningaloo Coast from North-west Cape to Bungelup (Rob et al., 2019), supports the concept that North-west Cape and the Muiron Islands are major important nesting areas for green and loggerhead turtles, as identified in the Recovery Plan (Commonwealth of Australia, 2017).

Table 6-6: Marine turtle key information for North-west Cape activity area

Species / Genetic Stock	Key Information
Green Turtle	
NWS Stock (G-NWS)	The G-NWS stock is one of the largest green turtle stocks in the world and the largest in the Indian Ocean. The G-NWS stock is estimated at approximately 20,000 individuals (DSEWPAC, 2012a) and the trend for the stock is reported as stable (Commonwealth of Australia, 2017). There is one major rookery of the G-NWS stock located within the North-west Cape activity area. Located on the mainland coast of the North-west Cape, this area is designated habitat critical for the stock and includes an internesting buffer of 20 km radius around the rookery from November to March. For the 2022–23 Ningaloo Turtle Program season, green turtles were the most active species in the NW Cape division, with 91.2% of total turtle activity (DBCA, 2023a). The number of green turtle nests has varied largely among years since commencement of the program in 2002 (range of 1.06 to 18.13 nests per subsection per day) with an average of 5.69. The average number of green turtle nests in the 2022–23 peak season were below average, with 4.07 nests per subsection per day (DBCA, 2023a). There have been two clear peaks (2011–12 and 2020–21) in activity since the beginning of the Ningaloo Turtle Program, where activity has been approximately 2.5 to 11 times greater than other seasons (DBCA, 2023a). Both seasons coincided with La Niña weather patterns (DBCA, 2021a).
Loggerhead Turtle	
Western Australia Stock (LH-WA)	The LH-WA stock is one of the largest in the world (Limpus, 2009). The trend for the stock is reported as stable (Commonwealth of Australia, 2017). Major rookeries of the LH-WA stock are located at Dirk Hartog Island, Muiron Islands and Gnaraloo Bay. These areas are designated habitat critical for the stock and include an internesting buffer of 20 km radius around these rookeries from November to May. Dirk Hartog Island in the Shark Bay Marine Park, with an average of 122 nests per day over 2.1 km (Reinhold and Whiting, 2014), is recognised as the most important loggerhead turtle rookery in WA (Commonwealth of Australia, 2016; as cited in Rob et al., 2019). The standardised level of loggerhead turtle nesting along the North-west Cape was above the long-term average (0.36) for the 2022–23 season and the third highest since the Ningaloo Turtle Program began (2002), with 0.46 nests per subsection per day (DBCA, 2021a).

6.5 Sea Snakes

Sea snakes are commonly found in the NWMR and NMR, but less so in the SWMR, and occupy three broad habitat types: shallow water coral reef and seagrass habitats, deepwater soft bottom habitats away from reefs, and surface water pelagic habitats (Guinea, 2007a).

There are 25 listed species of sea snake reported within or adjacent to the NWMR (Guinea, 2007a; Udyawer et al., 2016), of which four are endemic to reef habitats in the remote parts of the region:

- dusky sea snake (*Aipysurus fuscus*)
- large headed sea snake (*Hydrophis pacificus*)
- short-nosed sea snake (*Aipysurus apraefrontalis*)
- leaf-scaled sea snake (*Aipysurus foliosquama*).

The short-nosed sea snake, the leaf-scaled sea snake, and the dusky sea snake are listed threatened species (Critically Endangered or Endangered) under the EPBC Act (Table 6-7).

The Kimberley coast has the world's highest diversity of sea snakes, supporting over one third of all known species (Somaweera and Saunders, 2015). There is currently limited knowledge about the ranges and distribution patterns of sea snake species in the NWMR, in addition to a lack of understanding of population status and threats. Recent findings of *A. apraefrontalis* and *A. foliosquama* in locations outside of their previously defined ranges have highlighted the lack of information on species distributions in the NWMR (Udyawer et al., 2016). Udyawer et al. (2020) used a correlative modelling approach to understand habitat associations and identify suitable habitats for five sea snake species (*A. apraefrontalis*, *A. foliosquama*, *A. fuscus*, *A. l. pooleorum* and *A. tenuis*). Species-specific habitat suitability was modelled across 804,244 km² of coastal waters along the NWS, and the resulting habitat suitability maps enabled the identification of key locations of suitable habitat for these five species (refer Table 6-6).

No habitat critical to survival or BIAs for sea snake species have been identified in the NWMR. While the Ashmore Reef and Cartier Island AMPs have been recognised for their high diversity and density of sea snakes (DSEWPAC, 2012a), surveys have revealed a steep decline in sea snake numbers at Ashmore Reef (Guinea, 2007b; Lukoschek et al., 2013). Leaf-scaled and short-nosed sea snakes have been absent from surveys at Ashmore Reef since 2001, despite an increase in survey intensity (Guinea, 2006, 2007b; Guinea and Whiting, 2005; Lukoschek et al., 2013). The reason for the decline is unknown.

Table 6-7: Information on threatened sea snake species within the NWMR

Species	Preferred Habitat and Diet	Habitat Location
Short-nosed sea snake	Preferred habitat: Primarily on reef flats or in shallow waters of outer reef edges to depths of 10 m (Minton et al., 1975). Typically, movement is restricted to within 50 m of reef flat habitat (Guinea and Whiting, 2005). Diet: Primarily fishes and eels.	The short-nosed sea snake has been recorded from Exmouth Gulf to the reefs of the Sahul Shelf, although most records come from Ashmore and Hibernia reefs (Guinea and Whiting, 2005). Key locations of suitable habitat: Ashmore Reef, Exmouth Gulf and coral habitat fringing the Muiron Islands and the Montebello Islands (Udyawer et al., 2020).
Leaf-scaled sea snake	Preferred habitat: The leaf-scaled sea snake occurs in shallow protected areas of reef flats, typically in water depth less than 10 m. Diet: Primarily shallow water coral-associated wrasse, gudgeons, clinids and eels (McCosker, 1975; Voris, 1972; Voris and Voris, 1983).	The leaf-scaled sea snake has only been recorded at Ashmore and Hibernia reefs (Guinea and Whiting, 2005), indicating it has a very limited distribution. Key locations of suitable habitat: Ashmore Reef, Shark Bay, Exmouth Gulf, Barrow Island and Montebello Islands (Udyawer et al., 2020).
Dusky sea snake	Preferred habitat: The dusky sea snake is a reef specialist that is only known to occur on complex hard coral reefs and shoals – both emergent and subsurface. Has only been recorded at depths of 0–20 m however may occur in deeper areas with less survey effort (DCCEEW, 2024o). Diet: Stomach content analyses have identified benthic gobies, wrasses and occasionally fish eggs (DCCEEW, 2024o).	The dusky sea snake has been recorded sparsely and patchily from reefs and shoals at the outer margin and mid-shelf of the Australian continental shelf, specifically at the Scott Reef complex (Scott Reef, North Scott Reef and Sandy Islet) and nearby Seringapatam Reef, Heywood Shoal, and at Ashmore Reef, Cartier Island and Hibernia Reef. The dusky sea snake has not been detected at Ashmore Reef, Cartier Island or Hibernia Reef since the early 2000s. The species may occur undetected at mid-shelf shoals which comprise the shallowest of sea mounts and banks that occur along a north-easterly crescent from south of Heywood Shoal, past Cartier Island, to Ashmore Reef (DCCEEW, 2024o).

6.6 Crocodiles

The salt-water crocodile (*Crocodylus porosus*) is a listed migratory species under the EPBC Act known to occur within the NWMR. The species is found in most major river systems of the Kimberley, including the Ord, Patrick, Forrest, Durack, King, Pentecost, Prince Regent, Lawley, Mitchell, Hunter, Roe and Glenelg rivers. The largest populations occur in the rivers draining into the Cambridge Gulf and the Prince Regent River and Roe River systems. There have also been isolated records in rivers of the Pilbara region, around Derby near Broome and as far south as Carnarvon on the mid-west coast. No BIAs for salt-water crocodile have been identified in the NWMR.

6.7 Water Monitor

Mitchell's water monitor (*Varanus mitchelli*) is listed as critically endangered under the EPBC Act. The species is known to occur in wetlands and coastal floodplains in the northern extent of the NWMR, with distribution from Yampi Sound Training Area, across the Kimberley and into the Top End of the Northern Territory and far northwest Queensland (DCCEEW, 2023c). The species inhabits freshwater and saline wetlands that range from seasonal gorges in upper catchments to large rivers and coastal floodplains. It has been recorded in rivers, creeks, riffle zones, gorges, springs, lagoons, swamps, mangroves, and foreshores (DCCEEW, 2023c).

Habitat critical to the survival of the species has not been mapped however includes all areas where the species persists following the establishment of cane toads and areas within known distribution where habitat occurs or can be restored (terrestrial) (DCCEEW, 2023c). No BIAs for Mitchell's water monitor have been identified in the NWMR.

7. MARINE MAMMALS

7.1 Regional Context

The offshore waters of WA include important habitat for marine mammals, including areas that support key life stages such as breeding, calving, foraging, and migration. Of the 45 species of cetacean occurring in Australian waters, 27 species occur regularly in the waters of the NWMR, nine species in the waters of the NMR and 33 species in the SWMR. The waters of the NWMR and the NMR support globally significant dugong populations (DSEWPAC, 2012a, 2012c).

The NWMR is an important migratory pathway between feeding grounds in the Southern Ocean and breeding grounds in tropical waters of the NWMR for several cetacean species (DSEWPAC, 2012a). Numerous large mysticetes (baleen whale) species, in particular the humpback whale, are known to utilise the region for migration and calving, and the pygmy blue whale is known to utilise the region for foraging and as a migration pathway between southern feeding and northern breeding/feeding areas north of the equator.

The SWMR is an important area for numerous marine mammal species including pinniped species, large, migratory whale species and resident coastal whale and dolphin species (DSEWPAC, 2012b).

The NMR and adjacent areas are important for several species of cetacean, particularly inshore dolphin species. These species, and other marine mammals, rely on the waters of the NMR and adjacent coastal areas for breeding and foraging (DSEWPAC, 2012c).

Table 7-1 outlines the threatened and migratory marine mammal species that may occur within the NWMR, with their conservation status and relevant recovery plans and/or conservation advice.

Table 7-1: Marine mammal species identified by the EPBC Act PMST that may occur within the NWMR

Species Name	Common Name	Environment Protection and Biodiversity Conservation Act 1999 (Cth) (as per PMST report in Appendix A)			*Biodiversity Conservation Act 2016* (WA)[11]	IUCN Red List of Threatened Species (non-statutory)[12]	EPBC Act Part 13 Statutory Instrument
		Threatened Status	Migratory Status	Listed	Conservation Status	Global Status	
Cetaceans – Mysticeti							
Balaenoptera musculus	Blue whale	Endangered	Migratory	Cetacean	Endangered	Endangered	Conservation Management Plan for the Blue Whale – A Recovery Plan under the *Environment Protection and Biodiversity Conservation Act 1999* 2015–2025 (Commonwealth of Australia, 2015a)
Eubalaena australis	Southern right whale	Endangered	Migratory	Cetacean	Vulnerable	Least Concern	National Recovery Plan for the Southern Right Whale *Eubalaena australis* (DCCEEW, 2024a)
Balaenoptera borealis	Sei whale	Vulnerable	Migratory	Cetacean	Endangered	Endangered	Conservation Advice *Balaenoptera borealis* sei whale (Threatened Species Scientific Committee, 2015a)
Megaptera novaeangliae	Humpback whale	N/A	Migratory	Cetacean	Conservation dependent	Least Concern	Listing Advice *Megaptera novaeangliae* Humpback Whale (DAWE, 2022)

[11] Threatened and Priority Fauna List – April 2024 - https://www.dbca.wa.gov.au/management/threatened-species-and-communities (accessed on 13/08/2024)
[12] IUCN, 2024. The IUCN Red List of Threatened Species. Version 2024-1. https://www.iucnredlist.org (accessed on 13/08/2024)

Species Name	Common Name	Environment Protection and Biodiversity Conservation Act 1999 (Cth) (as per PMST report in Appendix A)			*Biodiversity Conservation Act 2016* (WA)[11]	IUCN Red List of Threatened Species (non-statutory)[12]	EPBC Act Part 13 Statutory Instrument
		Threatened Status	Migratory Status	Listed	Conservation Status	Global Status	
Balaenoptera physalus	Fin whale	Vulnerable	Migratory	Cetacean	Endangered	Vulnerable	Conservation Advice *Balaenoptera physalus* fin whale (Threatened Species Scientific Committee, 2015c)
Balaenoptera edeni	Bryde's whale	N/A	Migratory	Cetacean	Migratory	Least Concern	N/A
Balaenoptera bonaerensis	Antarctic minke whale	N/A	Migratory	Cetacean	Migratory	Near Threatened	N/A
Balaenoptera omurai	Omura's whale	N/A	Migratory	Cetacean	N/A	Data Deficient	N/A
Cetaceans – Odontoceti							
Physeter macrocephalus	Sperm whale	N/A	Migratory	Cetacean	Vulnerable	Vulnerable	N/A
Orcinus orca	Killer whale	N/A	Migratory	Cetacean	Migratory	Data Deficient	N/A
Orcaella heinsohni	Australian snubfin dolphin	N/A	Migratory	Cetacean	Priority	Vulnerable	N/A
Sousa chinensis	Indo-Pacific humpback dolphin (Australian humpback dolphin)	N/A	Migratory	Cetacean	Priority	Vulnerable	N/A

Species Name	Common Name	Environment Protection and Biodiversity Conservation Act 1999 (Cth) (as per PMST report in Appendix A)			*Biodiversity Conservation Act 2016* (WA)[11]	IUCN Red List of Threatened Species (non-statutory)[12]	EPBC Act Part 13 Statutory Instrument
		Threatened Status	Migratory Status	Listed	Conservation Status	Global Status	
Tursiops aduncus	Spotted bottlenose dolphin (Arafura/ Timor Sea populations)	N/A	Migratory	Cetacean	N/A	N/A	N/A
Sirenians and Pinnipeds							
Dugong dugon	Dugong	N/A	Migratory	Marine	Migratory	Vulnerable	N/A
Neophoca cinerea	Australian sea lion	Endangered	N/A	Marine	Endangered	Endangered	Recovery Plan for the Australian Sea Lion (*Neophoca cinerea*) 2013 (DSEWPAC, 2013a) Conservation Advice *Neophoca cinerea* Australian Sea Lion (Threatened Species Scientific Committee, 2020a) (in effect under the EPBC Act from 23-Dec-2020)

7.2 Cetaceans in the NWMR

Cetaceans are generally widely distributed and highly mobile. In general, distribution patterns reflect seasonal feeding and breeding areas, characterised by high productivity, and migration routes associated with reproductive patterns. The NWMR is an important migratory pathway between feeding grounds in the Southern Ocean and breeding grounds in tropical waters for several cetacean species (DSEWPAC, 2012a).

From the Protected Matters search, 34 EPBC Act listed species were recorded as potentially occurring or having habitat within the NWMR (Appendix A). Of those, 12 cetacean species are listed as threatened and/or migratory, including baleen whales, toothed whales and dolphins that occur within the NWMR (Table 7-2).

7.3 Dugongs in the NWMR

The dugong is listed as migratory under the EPBC Act. Dugongs inhabit seagrass meadows in coastal waters, estuarine creeks and streams, and reef systems (DSEWPAC, 2012a).

Some of the coastal waters adjacent to the NWMR support significant populations of dugongs, including Shark Bay, Exmouth Gulf, in and adjacent to Ningaloo Reef, in coastal waters along the Kimberley coast, and on the edge of the continental shelf at Ashmore Reef (DEWHA, 2008).

Although the patterns of dugong movement in WA are not well understood, it is thought that dugongs move in response to availability of seagrass (Marsh et al., 1994; Preen et al., 1997) and water temperature. Cleguer and Marsh (2023) present the most contemporary data on dugongs and population estimates via an inventory of dugong aerial surveys of Australia, including northwest Australia (Shark Bay, Ningaloo, Exmouth Gulf and Pilbara, the Kimberley Region).

There are a number of BIAs for dugong within and adjacent to waters of the NWMR (refer Section 7.5).

7.4 Pinnipeds in the NWMR

The Australian sea lion is listed as a species that may occur or may have habitat within the NWMR (Protected Matters search – Appendix A).

It is included here as the Australian sea lion is the only pinniped endemic to Australia (Strahan, 1983) and has been recorded within the southern extent of the NWMR at Shark Bay, WA (Kirkwood et al., 1992). The most northern known breeding colony is at the Houtman Abrolhos Islands in the SWMR. The Australian sea lion's breeding range extends from the Houtman Abrolhos Islands, WA to The Pages Island, east of Kangaroo Island, SA. The Australian sea lion was listed as endangered in 2020 (Threatened Species Scientific Committee, 2020a). An assessment of the status and trends in abundance of this endemic, coastal pinniped species (Goldsworthy et al., 2021) documented an overall reduction in pup abundance over three generations, providing strong evidence that the species meets IUCN endangered criteria.

There are no BIAs for the Australian sea lion in the NWMR.

7.5 Marine Mammals in the NWMR

Marine mammal descriptions within the NWMR including baleen whales, toothed whales and dolphins and dugongs are presented in Table 7-2.

Table 7-2: Information on the threatened/migratory marine mammal species within the NWMR

Species	Key Information
Baleen whales (Mysticeti) – Low Frequency hearing	
Humpback whale	In Australian waters, there are two genetically distinct populations of humpback whales that migrate annually along the west (Group IV/ Group D) and east (Group V) coasts between May and November (Jenner et al., 2001), The population of humpback whales (*Megaptera novaeangliae*) known as Group IV/D migrate annually from Antarctic feeding grounds passing along the coast of Western Australia to warm tropical waters including the Kimberley, North West Cape, and Exmouth Gulf for breeding and calving (Russell et al., 2024). The biannual migration of humpback whales through the NWMR occurs in winter (June to August) for northbound migrating whales and southbound in early spring (September to November). Population data for the West Australian sub-population is considerably variable (DAWE, 2022). The population has been increasing in size at a rate of approximately 10% per annum since the cessation of whaling in Western Australian waters by 1963 (Thums et al., 2018) and population numbers have increased from approximately 2000 to 3000 individuals in 1991 to between 19,200–33,850 individuals in 2008 (Bannister and Hedley, 2001; Bejder et al., 2019; Hedley et al., 2011). Aerial surveys off the WA coast undertaken between 2000 and 2008 produced a population estimate for the Group IV population of 26,100 individuals (Salgado Kent et al., 2012) and the predicted increasing trend in abundance predicted by modelling (Thums et al., 2018). The International Whaling Commission (IWC) estimated that in 2012 the Western Australian subpopulation had recovered to 90% (74–98% 90% PI) of its pre-whaling levels and projected that by 2020 it would have reached 98% (88–100% PI) (IWC 2015 cited in (DAWE, 2022)). Due to the unprecedented population recovery the humpback whale was removed from the EPBC Act threatened species list as it was deemed no longer eligible for inclusion (DAWE, 2022) after a previous listing as Vulnerable for many decades. The Group IV population migrates northward from their Antarctic feeding grounds around May each year, reaching the NWMR around early June. The southward migration subsequently starts in mid-September, after time for breeding and calving (typically within August and September) (Threatened Species Scientific Committee, 2015b). Within the NWMR there are key calving areas between Broome and the northern end of Camden Sound, and resting areas in the southern Kimberley region, Exmouth Gulf and Shark Bay. In particular, high numbers of humpback whales are observed in Camden Sound and Pender Bay from June to September each year (Threatened Species Scientific Committee, 2015b) and as far south as Gourdon Bay in the Kimberley (Thums et al., 2018). There are reports of neonates present further south, suggesting that the calving areas may be poorly defined, expanding or returning to pre-whaling patterns as the population recovers. Aerial photogrammetric surveys in 2013 and 2015 recorded large numbers of humpback whale calves along the North-west Cape, with estimated minimum relative calf abundance of 463–603 in 2013 and 557–725 in 2015 (Irvine et al., 2018). The majority of calves sighted in both years (85% in 2013; 94% in 2015) were neonates, and these observations indicate that a minimum of approximately 20% of the expected number of calves of this population are born near, or south of the North-west Cape. Thus, the calving grounds for the Group IV population extend south from Camden Sound to at least North-west Cape, 1000 km South-west of the currently recognized calving area (Irvine et al., 2017) and further south, as reported for Geographe Bay and Flinders Bay (in July and August) in south-west, Western Australia (Jolliffe et al., 2024). The seasonal presence of humpback whales is presented in Table 9-1. Migration, breeding and calving BIAs for the humpback whale within the NWMR are presented in Table 7-3 and Figure 7-2.
Blue whale	There are two recognised sub-species of blue whale in the Southern Hemisphere, both of which are recorded in Australian waters. These are the southern (or 'true') blue whale (*Balaenoptera musculus*) and the 'pygmy' blue whale (*Balaenoptera musculus brevicauda*) (Commonwealth of Australia, 2015a). In general, southern blue whales occur in waters south of 60°S and pygmy blue whales occur in waters north of 55°S (i.e. not in the Antarctic). On this basis, it is reasonably assumed all blue whales sighted in the NWMR are likely to be pygmy blue whales.

Species	Key Information
	The migratory population, known as the East Indian Ocean (EIO) pygmy blue whale population, migrate biannually through the NWMR. This population is seasonally distributed from Indonesia (a potential breeding ground) to south-west of Australia and east across the Great Australian Bight and Bonney Upwelling to beyond the Bass Strait (Blue Planet Marine, 2020; McCauley et al., 2018). Migration seems to be variable, with some individuals appearing as resident to areas of high productivity and others undertaking migrations across long distances (Commonwealth of Australia, 2015a). McCauley et al. (2018) describe three migratory stages around Australia for the EIO pygmy blue whale population, based on collated passive acoustic data: a 'southbound migratory stage' where whales travel southwards from Indonesian waters offshore from the WA coastline, mostly from October to December but possibly into January of the following year; a protracted 'southern Australian stage' (January to June) where animals spread across southern waters of the Indian Ocean and south of Australia (with movement as far south as the Southern Subtropical Convergence Zone); and a 'northbound migratory stage' (April to August) where animals travel north back to Indonesia again. Extensive passive acoustic monitoring throughout the NWMR indicates migratory timing and distribution of pygmy blue whales (noting this survey method detects vocalising whales): • Acoustic monitoring conducted by McCauley and Jenner (2010) in the Exmouth and northern Montebello Islands region identified a peak period in the northern migration of pygmy blue whales from April to August, and from November through to late December during the southern migration. • Northbound migration between mid-April and early August and southbound migration between October to December and possibly into January for the Scott Reef area 2006-2009 (McCauley, 2011) (noting the absence of any southbound detection in 2007). • Noise loggers deployed for a full year period in 2019 detected pygmy blue whales on their northern and southern migration. The noise loggers were located at various locations ~40–50 km west of the project area, and in ~1300 m water depth. The majority of pygmy blue whales detected on their northern migration occurred from mid-April to the end July, then again on their southern migration in November through to early December (Chevron Australia, 2019) • Gavrilov et al. (2018) analysed acoustic data from an array of ocean bottom seismographs (recorded in December 2014) to detect pygmy blue whales and showed the southbound migration was over an extended offshore corridor traversing an area up to 400 km to the northwest of the North-west Cape. • A targeted passive acoustic monitoring program to detect southbound migratory pygmy blue whales ran from late October 2021 to March 2022 with a deepwater ALTO lander (900 m depth) to the west of the Montebello Trough and C-lander (190 m depth) at the outer edge of the NWS (Warren et al., 2023). Despite vessel noise dominating low frequencies throughout the recording periods at both recording locations, pygmy blue whale song vocalisations and D-calls were detected from the start of the recording period through November and early December 2021. • An offshore trial of Distributed Acoustic Sensing (DAS) using fibre optic cables (submarine telecommunications cable) to detect low-frequency whales recorded vocalising pygmy blue whales within 12 km detection range within a 50 km long area on the outer edge of NWS (Debens et al. 2024). Pygmy blue whale detections were made from mid-November (commencement of the trial) through to mid-December 2023 and a couple of detections in early January 2024. The first satellite tracks of pygmy blue whales for this population documented northbound migration between Western Australia and Indonesia (Double et al., 2014) and identified areas where whales had highest occupancy, such as Perth Canyon, Naturalist Plateau, North-west Cape region and the Banda Sea. Pygmy blue whales tagged in the Bonney Upwelling region of South Australia in 2015 showed that most of the tagged whales remained in South Australian waters during the tracking period but one documented the migration to Indonesia via Western Australian waters and a return journey (albeit via intermittent data) of the southbound migration to the southern coast of Western Australia (Möller et al., 2020). Thums et.al. (2022) used passive acoustic monitoring and satellite telemetry data (a combination of existing data and tag tracking data collected for Western Australia 2019–2022) to assess the spatial extent of the distribution, migration and foraging areas for pygmy blue whales in the South-east

Species	Key Information
	Indian Ocean associated with the northbound migration. The tag tracking results highlighted extensive use of slope habitat off Western Australia and minimal use of shelf habitat by pygmy blue whales. Additionally, pygmy blue whales off Western Australia were mostly engaged in migration, with short periods of foraging. Whale density was highest in the southern part of the North-west Australian coast and whales were there between April–June, and November-December. This study also compared foraging and migration areas to described areas of importance (BIAs), some aligned such as migratory BIA for northbound pygmy blue whales whilst some had less than 10% overlap (Thums et al*.,* 2022). The timing, distribution and behaviour of southbound pygmy blue whales is less well documented with reference to satellite tagging. Limited tagged whale data from Double et al. (2014), Möller et al. (2020) and Thums et al. (2022) indicated connectivity of migrating pygmy blue whales from South Australia through Western Australia to and back from Indonesia. Mustika et al. (2024), satellite tag tracking data for two southbound pygmy blue whales (tagged in Indonesia) suggest varying migratory pathways from the Savu Sea to subantarctic waters as well as extended time in the Southern Subtropical Convergence Zone. One tagged whale traversed a migratory path through offshore waters of Western Australia towards Heard and McDonalds islands covering a distance of almost 6000 km and travelling at 100 km per day. In contrast a second tagged whale took a migratory journey similar to the documented northbound route to the North-west Cape before heading out into offshore waters and spending time in the Subantarctic Front before looping back up through the Perth Canyon, North-west Cape and towards Savu Sea (Mustika et al., 2024). There is currently insufficient data to accurately estimate population numbers of the pygmy blue whale in Australian waters (Blue Planet Marine, 2020; Commonwealth of Australia, 2015a). There are, however, two estimates of population size of the EIO pygmy blue whale for WA. McCauley and Jenner (2010) calculated the population to be between 662 and 1559 individuals in 2004 based on passive acoustics (whale vocalisations), and Jenner et al. (2008) (based on photographic mark and recapture) calculated between 712 and 1754 individuals, but both estimates did not account for animals travelling further west into the Indian Ocean (McCauley et al., 2018). More recent passive acoustic data estimates a 4.3% growth rate that applies to the proportion of EIO pygmy blue whales seasonally present in offshore water off south-eastern Australia and may not reflect the full population but does imply an increasing population (McCauley et al., 2018). Thums et al., (2022) identified the most important foraging (and/ or resting/ breeding) areas from south to north as: (1) the Perth Canyon and vicinity; (2) the shelf edge off Geraldton; (3) the shelf edge from Ningaloo Reef to the Rowley Shoals (not continuous) and including a couple of small areas near the shelf edge off approx. 25ºS; and (4) the Banda Sea. The Foraging BIA off the South-west of Western Australia encompassed 83% of the most important areas in that region (Thums et al., 2022). The pygmy blue whale is typically present in the Perth Canyon from November to June, with an observed peak between March and May (Commonwealth of Australia, 2015a; Blue Planet Marine, 2020). The pygmy blue whale feeds in the Perth Canyon at depths of 200 to 300 m, which overlaps the typical distribution of krill (200–500 m water depth (day) to surface (night)) (McCauley et al., 2004; Commonwealth of Australia, 2015a). Other possible feeding grounds off the WA coast include the wider area around the Perth Canyon, and possible foraging areas off the Ningaloo Coast and at Scott Reef (Commonwealth of Australia, 2015a). The seasonal presence of pygmy blue whales is presented in Table 9-1. Refer Table 7-3 and Figure 7-4 for the location and type of BIAs for blue whales in the NWMR. There is a migratory BIA for the pygmy blue whale within WA waters, which extends for most of the length of the NWMR within offshore waters.

Species	Key Information
Bryde's whale	The Bryde's whale is the least migratory of its genus and is restricted geographically from the equator to approximately 40°N and S, or the 20° isotherm (Bannister et al., 1996). The species is known to exhibit inshore and offshore forms varying in morphology and migratory behaviours in other international locations (Bannister et al., 1996). This appears to also be the case within Australian waters. Bryde's whales have been identified as occurring in both oceanic and inshore waters, with the only key localities recognised in WA being in the Houtman Abrolhos Islands and north of Shark Bay (Bannister et al., 1996). Data suggests offshore whales migrate seasonally, heading towards warmer tropical waters during the winter; however, information about migration within the NWMR is not well known (McCauley and Duncan, 2011). McCauley (2011b) detected Bryde's whales using acoustic loggers deployed in and around Scott Reef from 2006 to 2009. Other acoustic logger data of Bryde's whale vocalisations recorded between Ningaloo and north of Darwin showed no apparent trends or seasonality (McCauley, 2011a). There are no identified BIAs for this species in the NWMR.
Southern right whale	The southern right whale occurs primarily in waters between about 20°S and 60°S and moves from high latitude feeding grounds in summer to warmer, low latitude, coastal locations in winter (Bannister et al., 1996). Two populations of southern right whale occur in Australian waters: the western and eastern (DCCEEW, 2024a). Southern right whales in Australian waters predominantly occur in aggregations in coastal water reproductive areas where they calve and nurse their young from May to October, primarily occupying shallow waters (< 10m depth) within 1 km of the coastline (Charlton et al., 2019; Smith et al., 2022, cited in DCCEEW, 2024a). Peak period of abundance is late July to August, with seasonal variability. Females accompanied by a calf generally occupy the calving ground for two to three months between June and September (DCCEEW, 2024a). For the western population, breeding occurs in Exmouth Gulf and in calving areas along the south coast of WA outside of the NWMR (DCCEEW, 2023). A stranding record exists for the far north Kimberley coast (ALA, 2006). Known females have rarely been observed on the Australian coastline in the year prior to calving, suggesting mating and conception may predominantly occur away from calving grounds, potentially on feeding grounds (Watson et al., 2021 cited in DCCEEW, 2024a). There is a significant energetic cost to the mother in the late stages of gestation (i.e. last trimester) and calf growth rate has been found to be dependent on the maternal body size and condition of the mother (Christiansen et al. 2018 and Christiansen et al. 2022 cited in DCCEEW, 2024a). Foraging ecology of southern right whales is poorly understood and observations of foraging whales are rare (DCCEEW, 2024a). There is evidence of a population increase of the western population, whereas there is greater uncertainty of the population status and trends of the eastern population (DCCEEW, 2024a). Southern right whale abundance in Australian waters is still far below estimated historic abundance (>20%) (DCCEEW, 2024a). There is a reproduction BIA and habitat critical to survival (HCTS) for the southern right whale located within Exmouth Gulf (DCCEEW, 2024a). A migration BIA extends 3 NM out from the coastline from Ningaloo and spans down the Western Australian coastline and across the south and south-east coast of Australia (DCCEEW, 2024a). Nursing and calving behaviours are known to occur within reproductive BIAs. HCTS for the southern right whale has been identified as all reproductive BIAs across the species range (DCCEEW, 2024a). Refer Figure 7-1 and Section 7.6 for HCTS for southern right whale in the NWMR. Refer to Table 7-3 and Figure 7-5 for BIAs for southern right whales in the NWMR

Species	Key Information
Antarctic minke whale	The Antarctic minke whale have a circumpolar distribution south of 60°S during summer (Risch et al., 2019) and has been recorded off all Australian States (apart from the NT) in winter (refer to DCCEWE SPRAT profile). Their seasonal distribution and migration patterns are poorly understood (Risch et al., 2019). The species is highly associated with sea ice and feeds in cold Antarctic waters over the summer. It is thought that the Antarctic minke whale migrates through offshore waters of Western Australia to about 20°S to feed and possibly breed (Bannister et al., 1996). Information about timing and distribution, behaviour (migration and breeding) within the NWMR, however, is presently not known. In the high latitudinal winter breeding grounds in other regions, the species appears to be distributed off the continental shelf edge. No population estimates are available for Antarctic minke whales in Australian waters. Acoustic detection has been recorded for the Perth Canyon and Exmouth Plateau (McCauley, 2011) and more recently acoustic detection indicated presence in offshore waters of NWS in late October and all of November and was absent (based on no vocalisation and detection) in December 2021 to March 2022 (over a monitoring period from October 2021 to March 2022) (Warren et al., 2023). There are no identified BIAs for this species in the NWMR.
Sei whale	The sei whale is a baleen whale with a worldwide oceanic distribution and is expected to seasonally migrate between low latitude wintering areas and high latitude summer feeding grounds (Bannister et al., 1996; Prieto et al., 2012). There are no known mating or calving areas in Australian waters. The species has a preference for deep waters, typically occurs in oceanic basins and continental slopes (Prieto et al., 2012), and exhibits a migration pathway influenced by seasonal feeding and breeding patterns. Sei whales have been infrequently recorded in Australian waters (Bannister et al., 1996). Reliable estimates of the sei whale population size in Australian waters are currently not possible due to a lack of dedicated surveys and their elusive characteristics. Similarly, the extent of occurrence and area of occupancy of sei whales in Australian waters cannot be calculated due to the rarity of sighting records. They will typically travel in small pods of three to five individuals, with some segregation by age, sex and reproductive status. Calving grounds are presumed to exist in low latitudes with mating and calving potentially occurring during winter months (Threatened Species Scientific Committee, 2015a). There are no known mating or calving areas in Australian waters, and there are no identified BIAs for this species in the NWMR.
Fin whale	The fin whale is a large baleen whale distributed worldwide. Fin whales migrate annually between high latitude summer feeding grounds and lower latitude over-wintering areas (Bannister et al., 1996) and follow oceanic migration paths. The species is uncommonly encountered in coastal or continental shelf waters. Australian Antarctic waters are important feeding grounds for fin whales but there are no known mating or calving areas in Australian waters (Morrice et al., 2004). The species has been observed in groups of six to 10 individuals, as well as in pairs and alone (Threatened Species Scientific Committee, 2015c). Accurate distribution patterns are not known within Australian waters and the majority of data is from stranding events. Fin whales have been recorded vocalising off the Perth Canyon, WA, between January and April 2000 (McCauley et al., 2000). It is currently not possible to accurately estimate the population size of fin whales in Australian waters predominantly due to the species' behaviour and local ecology, as the proportion of time they spend at the surface varies greatly depending on these factors. In addition, natural fluctuations of fin whales in Australian waters are unknown; however, long-range movements do appear to be prey-related (Aulich et al., 2022). A recent study by Aulich et al. (2022) used passive acoustic monitoring as a tool to identify the migratory movements of fin whales in Australian waters. On the west coast, the earliest arrival of these animals from Antarctica occurred at Cape Leeuwin in April, and between May and October they migrated along the WA coastline to the Perth Canyon, which likely acts as a feeding zone for migratory whales (Aulich et al., 2022). Some whales were found to continue migrating northwards along the WA coastline with vocalisation presence recorded as far north as Dampier between August and late October (Aulich et al., 2022). There are no identified BIAs for this species in the NWMR.

Species	Key Information
Omura's whale	Omura's whale is a species of baleen whale that was first described in 2003. Previously specimens of Omura's whale were identified as pygmy/dwarf Bryde's whales, however morphological and molecular evidence identified Omura's whale as a distinct species not closely related to Bryde's whale in 2003 (Ottewell et al., 2016). It was believed that the range of Omura's whale was restricted to the eastern Indo-Pacific, however recent discoveries suggest the species may have a more widespread distribution (Ottewell et al., 2016; Cerchio et al., 2019). In Australia, presence of this species was confirmed in 2015 when, what was later determined to be an Omura's whale, was stranded on the northwest coast of Australia, near Exmouth (Ottewell et al., 2016). An in-depth review conducted by Cerchio et al. (2019) concluded that Omura's whale can primarily be found in tropical and warm-temperate waters and is currently known from all ocean basins excluding the central and eastern Pacific. Further, a strong tendency toward a coastal and neritic water distribution was found, although there were several pelagic water records, the majority of which were on the continental shelf and within shallow seas throughout the documented range (Cerchio et al., 2019). Omura's whales were detected by passive acoustic monitoring: Warren et al. (2023) targeted passive acoustic monitoring program to detect southbound migratory pygmy blue whales ran from late October 2021 to March 2022 with a deepwater ALTO lander (900 m depth) to the west of the Montebello Trough and C-lander (190 m depth) at the outer edge of the NWS. Calls of the Omura's whales were detected at both recording locations throughout the recording period. Detections were, however, more common at the deeper water location, in terms of both number of detection days and number of detection hours per day (Warren et al., 2023). The shelf edge location showed Omura's present primary in December, however this lander malfunctioned and stopped recording in mid-January 2022. An offshore trial of distributed acoustic sensing (DAS) using fibre optic cables (submarine telecommunications cable) to detect low-frequency whales recorded vocalising Omura's whales within 12 km detection range along a 50 km long area on the outer edge of NWS (Debens et al., 2024). Omura's whale detections were made from at the beginning of December 2023 through to mid-January 2024 (and the end of the trial). Currently little is known about the ecology and life history characteristics of Omura's whale resulting in an IUCN listing of Data Deficient. There are no identified BIAs for this species in the NWMR.

Species	Key Information
Toothed whales (Odontoceti) – High Frequency hearing	
Sperm whale	Sperm whales are the largest of the toothed whales and are distributed worldwide in deep waters (greater than 200 m) off continental shelves and sometimes near shelf edges (Bannister et al., 1996). The species tends to inhabit offshore areas at depths of 600 m or more and is uncommon in waters less than 300 m deep (Ceccarelli et al., 2011). There is limited information about sperm whale distribution in Australian waters, however, they are usually found in deep offshore waters, with more dense populations close to continental shelves and canyons. In the open ocean, there is a generalised movement of sperm whales southwards in summer, and corresponding movement northwards in winter, particularly for males. Detailed information about the distribution and migration patterns of sperm whales off the WA coast is not available. Females with young may reside within the NWMR all year round, males may migrate through the region and the species may be associated with canyon habitats (Ceccarelli et al., 2011). Sperm whales have been recorded in deep waters off North-west Cape and appear to occasionally venture into shallower waters in other areas. Twenty-three sightings of sperm whales (variable pod sizes, ranging from one to six animals) were recorded by marine mammal observers (MMOs) during the North- west Cape MC3D marine seismic survey (December 2016 to April 2017) (Woodside, 2020). These animals were observed in deep, continental slope waters of the Montebello Saddle (maximum distance of approximately 90 km from North-west Cape), and the waters overlying the Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula KEF. The deep waters above the gully/saddle on the inner edge of the plateau (the Montebello Saddle) are thought to be important for sperm whales that may feed in the region (based on 19th Century whaling records; Townsend, 1935). Recent studies such as acoustic detection indicated sperm whale presence in deep, offshore waters but not at the edge of the NWS (over a monitoring period of October 2021 to March 2022, for the deepwater location). However, while sperm whales were detected every month, occurring in bouts, there was no evidence for lasting use of the area around this recording location (Warren et al., 2023), Ferriera et al. (2024) reported sperm whale sightings off the North-west Cape in May 2023. A total of 26 individual sperm whales were sighted about 30 km offshore in groups up to ten individuals. The sperm whales were observed displaying surface logging behaviour with frequent and numerous blows prior to flukes up dives (indicative of deep feeding behaviour). Such aggregations appear to be an annual occurrence and at the same time as migratory pygmy blue whale feed and move through the same area, to the west and offshore of Ningaloo and North-west Cape. There are no identified BIAs for this species in the NWMR.
Orca (killer whale)	The preferred habitat of killer whales includes oceanic, pelagic and neritic (relatively shallow waters over the continental shelf) regions, in both warm and cold waters. Killer whales appear to be more common in cold, deep waters; however, they have been observed along the continental slope and shelf, particularly near seal colonies, as well as in shallow coastal areas of WA (Bannister et al., 1996; Thiele and Gill, 1999). The total number of killer whales in Australian waters is unknown, however, it may be that the total number of mature animals within waters around the continent is less than 10,000. Killer whales are known to make seasonal movements, and probably follow regular migratory routes, but no information is available for the species in Australian waters. Killer whales are top-level carnivores, and there are reports from around Australia of attacks on dolphins, juvenile humpback whales, blue whales, sperm whales, dugongs and Australian sea lions (Bannister et al., 1996). Killer whales are known to target humpback whales, particularly calves, off Ningaloo Reef during the humpback southern migration season (Pitman et al., 2015). Overall, observations suggest that humpback calves are a predictable, plentiful, and readily taken prey source for killer whales off Ningaloo Reef for at least five months of the year. Additionally, there are records of killer whales attacking dugongs in Shark Bay (Anderson and Prince, 1985). However, there are no recognised key localities or important habitats for killer whales within the NWMR (DSEWPAC, 2012a). There are no identified BIAs for this species in the NWMR.

Species	Key Information
Australian snubfin dolphin	Stranding and museum specimen records indicate that Australian snubfin dolphins occur only in waters off northern Australia, from approximately Broome on the west coast to the Brisbane River on the east coast (Parra et al., 2002). Aerial and boat-based surveys indicate that Australian snubfin dolphins occur mostly in protected shallow waters close to the coast, and close to river and creek mouths (Parra, 2006; Parra et al., 2006; Parra et al., 2002). Within the NWMR, this species has been found in the shallow coastal waters and estuaries along the Kimberley coast. Beagle and Pender bays on the Dampier Peninsula, and tidal creeks around Yampi Sound and between Kuri Bay and Cape Londonderry are important areas for Australian snubfin dolphins (DEWHA, 2008). Roebuck Bay has generally been considered the south-western limit of snubfin dolphin distribution across northern Australia, but the species has been recorded in Port Hedland harbour, the Dampier Archipelago, Montebello Islands, Exmouth Gulf and off North-west Cape (Allen et al., 2012). Roebuck Bay supports one of the largest known populations of Australian snubfin dolphins (D'Cruz et al., 2022). A first comprehensive catalogue of snubfin dolphin sightings has been compiled for the Kimberley, north-west Western Australia (Bouchet et al. 2021) and documented that snubfin dolphins are consistently encountered in shallow water (<21 m depth) close to (<15 km) freshwater inputs with high detection rates in known hotspots such as Roebuck Bay and Cygnet Bay as well as suitable coastal habitat in the wider Kimberley region. Refer Table 7-3 and Figure 7-6 for the location and type of BIAs for Australian snubfin dolphins in the NWMR.
Indo-Pacific humpback dolphin (Australian humpback dolphin)	Previously included with *Sousa chinensis*, the Australian humpback dolphin (*S. sahulensis*) was elevated to a species in 2014. *S. chinensis* is now applied for humpback dolphins in the eastern Indian and western Pacific Oceans and *S. sahulensis* for humpback dolphins in the waters of the Sahul Shelf from northern Australia to southern New Guinea (Jefferson and Rosenbaum, 2014). The Australian humpback dolphin is listed as *S. chinensis* under the EPBC Act. The Australian humpback dolphin (referred to as 'humpback dolphin' hereafter) inhabits the tropical/subtropical waters of the Sahul Shelf across northern Australia and southern Papua New Guinea (Jefferson and Rosenbaum, 2014). Based on historical stranding data, museum specimens and opportunistic sightings collected during aerial and boat-based surveys for other fauna, it has been inferred that humpback dolphins occur from the WA/NT border south-west to Shark Bay (Hanf et al., 2016). Allen et al. (2012) suggested that humpback dolphins use a range of inshore habitats, including both clear and turbid coastal waters across northern WA. The waters surrounding North-west Cape are an important area for the species. Boat-based surveys up to 5 km out from the coast (Brown et al., 2012) recorded humpback dolphins from 0.3 to 4.5 km away from shore and in depths ranging from 1.2 to 20 m, with a mean of ~8 m. Other studies around North-west Cape, surveying waters up to 5 km from the coast, recorded humpback dolphins in water depths of up to 40 m (Hanf et al., 2016). Based on density, site fidelity and residence patterns, North-west Cape is clearly an important habitat toward the south-western limit of this species' range (Hunt et al., 2017). Humpback dolphins do not appear to undergo large-scale seasonal migrations, although seasonal shifts in abundance have been observed (Parra & Cagnazzi, 2016 cited in DCCEEW, 2023a). Aerial transect surveys conducted in the Kimberley region show the abundance for humpback dolphins was estimated to be 1546 in 2016 and 2690 in 2017 (Raudino et al., 2023). Dolphin densities were greatest in inshore waters, with greatest densities in Exmouth Gulf, Dampier Archipelago, and Great Sandy Islets (Raudino et al., 2023). Aerial surveys targeting dugongs over the western Pilbara have recorded humpback dolphins more than 60 km from the mainland in shallow shelf waters (i.e. <30 m deep) near Barrow Island and the western Lowendal Islands (Hanf, 2015). The species has also been recorded in fringing coral reef and shallow, sheltered sandy lagoons at the Montebello Islands (Raudino et al., 2018). Over the past ten years a number of studies have focused on populations of humpback dolphins along the Kimberley coast, including Roebuck Bay, the Dampier Peninsula, Cone Bay, Yampi Sound, Prince Regent River and the Cambridge Gulf (Brown et al., 2016). Refer Table 7-3 and Figure 7-7 for the location and type of BIAs for Indo-Pacific humpback dolphins in the NWMR. It is also noted that findings reported by Brown et al., (2014) indicated there was evidence of hybridisation of the Australian snubfin and humpback dolphin populations in north-western Australia.

Species	Key Information
Indo-Pacific bottlenose dolphin (Spotted bottlenose dolphin)	There are four known sub-populations of spotted bottlenose dolphins, of which the Arafura/Timor Sea populations were identified as potentially occurring within the NWMR. The species is restricted to inshore areas such as bays and estuaries, nearshore waters, open coast environments, and shallow offshore waters including coastal areas around oceanic islands, from Shark Bay to the western edge of the Gulf of Carpentaria. The species forages in a range of habitats but is generally restricted to water depths of less than 200 m (DSEWPAC, 2012a). Important foraging/breeding areas include the shallow coastal waters and estuaries along the Kimberley coast and Roebuck Bay. Aerial transect surveys conducted in the Kimberley region showed the abundance for the bottlenose dolphins has been declining with estimated abundance of 3713 in 2015, 2638 in 2016 and 1635 in 2017. Dolphin densities were greatest in inshore waters, with greatest densities in Exmouth Gulf, Dampier Archipelago, and Great Sandy Islets (Raudino et al., 2023). A study at North-west Cape found that during winter months, presence in coastal lagoons west of the North-west Cape was more likely than other seasons. In spring, probability of spotted bottlenose dolphin occurrence was higher outside of the Ningaloo Marine Park (noting summer data was not included in this study) (Haughey et al., 2021). Refer Table 7-3 and Figure 7-8 the location and type of BIAs for spotted bottlenose dolphins in the NWMR.
Sirenians	
Dugong	Dugongs are distributed along the WA coast throughout the Gascoyne, Pilbara and Kimberley. Specific areas supporting dugong populations include: Shark Bay; Ningaloo and Exmouth Gulf; the Pilbara coast (Exmouth Gulf to De Grey River [Marsh et al., 2002]); and Eighty Mile Beach and the Kimberley coast, including Roebuck Bay (Bayliss and Hutton, 2017). Dugong distribution is correlated with the seagrass habitats upon which it feeds, although water temperature has also been correlated with dugong movements and distribution (Preen et al., 1997; Preen, 2004). Dugongs are known to migrate between seagrass habitats (hundreds of kilometres) (Sheppard et al., 2006), and in Shark Bay they exhibit seasonal movements as a behavioural thermoregulatory response to winter water temperatures (Holley et al., 2006; Marsh et al., 2011). Abundance aerial surveys have been conducted in Australian dugong habitat areas since the early 1980s. These surveys indicate that dugong populations are now stable at a regional scale in Shark Bay and in the Exmouth and Ningaloo Reef area. The entire Kimberley region has only been surveyed in 2015 and 2017, so only baseline information on dugong distribution and abundance is available for Ningaloo and Shark Bay areas (Cleguer and Marsh, 2023). Refer Table 7-3 and Figure 7-9 for the location and type of BIAs for dugong in the NWMR.

Species	Key Information
	Pinnipeds
Australian sea lion	The Australian sea lion is the only endemic pinniped (true seals, fur seals and sea lions) in Australian waters. It is a member of the Otariidae (eared seals) family. The birth interval in Australian sea lions is around 17–18 months. The Australian sea lion is unique among pinnipeds in being the only species that has a non-annual breeding cycle that is also temporally asynchronous across its range (DSEWPAC, 2013a; Threatened Species Scientific Committee, 2020a). This means the breeding period (copulation and birthing) in one colony will occur at different times to breeding in another colony. The Australian sea lion is a specialised benthic forager—that is, it feeds primarily on the sea floor. Studies have shown that the species will eat a range of prey, including fish, cephalopods (squid, cuttlefish and octopus), sharks, rays, rock lobsters and penguins (DSEWPAC, 2013a; Threatened Species Scientific Committee, 2020a). The Australian sea lion feeds on the continental shelf, most commonly in depths of 20–100 m, and they typically travel up to about 60 km from their colony on each foraging trip, with a maximum distance of around 190 km when over shelf waters. The current breeding distribution of the Australian sea lion extends from the Houtman Abrolhos Islands on the west coast of WA to the Pages Islands in SA. Sites for the 58 breeding colonies occurring in WA and SA are designated as habitat critical to the survival of the species under the Recovery Plan for the Australian sea lion (DSEWPAC, 2013a). Of these, four are located in the SWMR along the west coast of WA: Abrolhos Islands (Easter Group), Beagle Island, North Fisherman Island and Buller Island. There are also a number of foraging BIAs for both males and females along the west coast, extending from the Abrolhos Islands south to Rockingham. There is no designated habitat critical to survival or identified BIAs for this species in the NWMR. Figure 7-9 shows the foraging BIAs for the Australian sea lion to the south of the NWMR in the northern extent of the SWMR.

7.6 Habitat Critical to the Survival for Marine Mammals in the NWMR

The southern right whale is the only marine mammal which has habitat critical to the survival (HCTS) of a species defined.

The National Recovery Plan for the Southern Right Whale (DCCEEW, 2024a) identifies HCTS under the EPBC Act. The *EPBC Act Significant Impact Guidelines 1.1 – Matters of National Environmental Significance 2013* state that "An action is likely to have a significant impact on a threatened species if there is a real chance or possibility that it will: adversely affect habitat critical to the survival of a species." The definition of HCTS for a species are areas necessary:

- for activities such as foraging, breeding, roosting, or dispersal
- for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators)
- to maintain genetic diversity and long-term evolutionary development, or
- for the reintroduction of populations or recovery of the species or ecological community.

HCTS for the southern right whale has been identified as all reproductive BIAs across the species range (Figure 7-1). The identification of HCTS reflects that southern right whales display strong site fidelity to calving areas in Australian coastal waters, within and between years, over decadal time spans (Bannister, 2001; Charlton et al., 2021; Watson et al,. 2021 cited in DCCEEW, 2024a). Reproductive areas have been identified as HCTS for the species, because:

- they meet the species' essential life cycle requirements for reproduction (e.g., mating, calving, and nursing) and reproduction is known to occur at that location
- there is a level of occupancy by individual breeding females at these locations of multiple days in any given year, and across multiple years, for long-term maintenance of the species
- they are critical for recovery of the southern right whale in terms of expanding habitat occupancy and contributing to the maintenance of genetic diversity as site fidelity may lead to small-scale genetic differences.

No 'Critical Habitat' as defined under section 207A of the EPBC Act has been identified for the southern right whale (DCCEEW, 2024a).

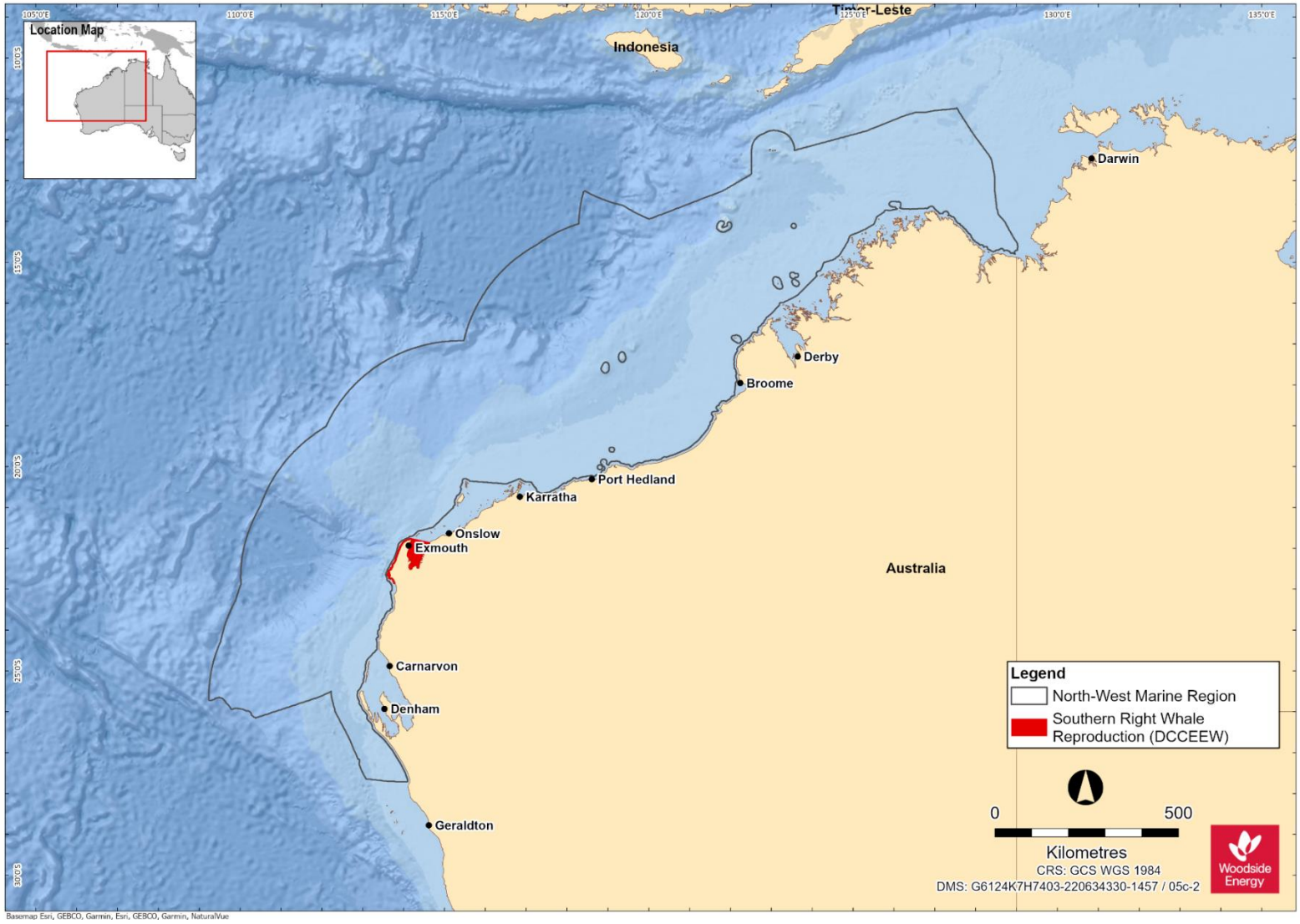


Figure 7-1: Habitat critical to the survival for the southern right whale in the NWMR (DCCEEW, 2024a)

7.7 Biological Important Areas in the NWMR

A review of the Australian Marine Spatial Information System (GA, 2024) identified BIAs representing important life cycle stages and behaviours for six species of marine mammal in the NWMR: the humpback whale, the pygmy blue whale, Australian snubfin dolphin, Australian humpback dolphin, spotted bottlenose dolphin and dugong, are presented in Table 7-3.

Table 7-3: Marine mammal BIAs within the NWMR

Species	Woodside Activity Area			BIAs				
	Browse	NWS/S	NWC	Resting	Foraging[13]	Reproduction		Migration
						Breeding	Calving	
Humpback whale[11]	✓	✓	✓	Shark Bay Exmouth Gulf (north migration – early June) (south migration – late Aug to Oct) Southern Kimberley region	No foraging BIA identified within the NWMR	Nursing Kimberley coast from the Lacepede Islands to north of Camden Sound (mid Aug–early Sept)	Core calving in waters off the Kimberley coast from the Lacepede Islands to north of Camden Sound (mid Aug–early Sept)	Southern border of the NWMR to north of the Kimberley (arrive June).
Blue whale and pygmy blue whale[14] [15]	✓	✓	✓	No resting BIA identified within the NWMR	Possible foraging areas off Ningaloo and Scott Reef	No breeding BIA identified within the NWMR	No calving BIA identified within the NWMR	Augusta to Derby. Along the shelf edge at depths of 500 m to 1000 m; appear close to Ningaloo Coast Montebello Islands area on southern migration (north: April–Aug) (south: Oct–late Dec). Potentially still present January (McCauley et al., 2018).
Southern right whale[16]	-	-	✓	No resting BIA identified within the NWMR	No foraging BIA identified within the NWMR	Exmouth Gulf	No calving BIA identified within the NWMR	Migration along Australian coastline between April to October extending up to the Exmouth Gulf breeding BIA.

[13] Includes areas defined as 'foraging', 'foraging likely' and 'foraging (high density prey) as per AMSIS (GA, 2024). These areas are shown in the BIA figures.
[14] DSEWPAC (2012a).
[15] Commonwealth of Australia (2015a).
[16] Revised BIAs (October 2023) - https://www.dcceew.gov.au/environment/marine/bias.

Species	Woodside Activity Area			BIAs				
	Browse	NWS/S	NWC	Resting	Foraging[13]	Reproduction		Migration
						Breeding	Calving	
Australian snubfin dolphin [11]	✓	✓	-	Cambridge Gulf Camden Sound area Prince Regent River Admiralty Gulf Parry Harbour Bougainville Peninsula Vansittart Bay Anjo Peninsula Napier Broome Bay Deep Bay King George River Cape Londonderry Ord River	Roebuck Bay Cambridge Gulf Camden Sound area King Sound (south) King Sound (north) Yampi Sound Talbot Bay Maret Islands Bigge Island Admiralty Gulf Parry Harbour Bougainville Peninsula Vansittart Bay, Anjo Peninsula Napier Broome Bay Deep Bay Prince Regent River King George River Cape Londonderry Ord River	Roebuck Bay Cambridge Gulf Camden Sound area King Sound (south) King Sound (north) Yampi Sound Talbot Bay Maret Islands Bigge Island Admiralty Gulf Parry Harbour Bougainville Peninsula Vansittart Bay, Anjo Peninsula Napier Broome Bay Deep Bay Prince Regent River King George River Cape Londonderry Ord River	Roebuck Bay Cambridge Gulf Camden Sound area King Sound (south) King Sound (north) Yampi Sound Talbot Bay Maret Islands Bigge Island Admiralty Gulf Parry Harbour Bougainville Peninsula Vansittart Bay, Anjo Peninsula Napier Broome Bay Deep Bay Prince Regent River King George River Cape Londonderry Ord River	No migration BIA identified within the NWMR.

Species	Woodside Activity Area			BIAs				
	Browse	NWS/S	NWC	Resting	Foraging[13]	Reproduction		Migration
						Breeding	Calving	
Indo-Pacific humpback dolphin	✓	✓	-	No resting BIA identified within the NWMR	Roebuck Bay Willie Creek Prince Regent River King Sound (north) Yampi Sound Talbot Bay Walcott Inlet Doubtful Bay Deception Bay Augustus Island Maret Islands Bigge Island King Sound, southern sector Vansittart Bay, Anjo Peninsula	Roebuck Bay Willie Creek Prince Regent River King Sound (north) Yampi Sound Talbot Bay Walcott Inlet Doubtful Bay Deception Bay Augustus Island	Roebuck Bay Willie Creek Prince Regent River	No migration BIA identified within the NWMR.
Spotted bottlenose dolphin	✓	✓	✓	No resting BIA identified within the NWMR	Roebuck Bay Camden Sound area King Sound (south) King Sound (north) Yampi Sound	Roebuck Bay King Sound (south) King Sound (north) Yampi Sound	Roebuck Bay Camden Sound area King Sound (south) King Sound (north) Yampi Sound	Dampier Peninsula.
Dugong[11]	✓	✓	✓	No resting BIA identified within the NWMR	Exmouth Gulf Ningaloo Reef Shark Bay Roebuck Bay Dampier Peninsula	Eastern side of Dirk Hartog Island May–September Exmouth Gulf and Ningaloo year-round	Exmouth Gulf Ningaloo Reef Shark Bay	Within Shark Bay June–November and within Roebuck Bay year-round.

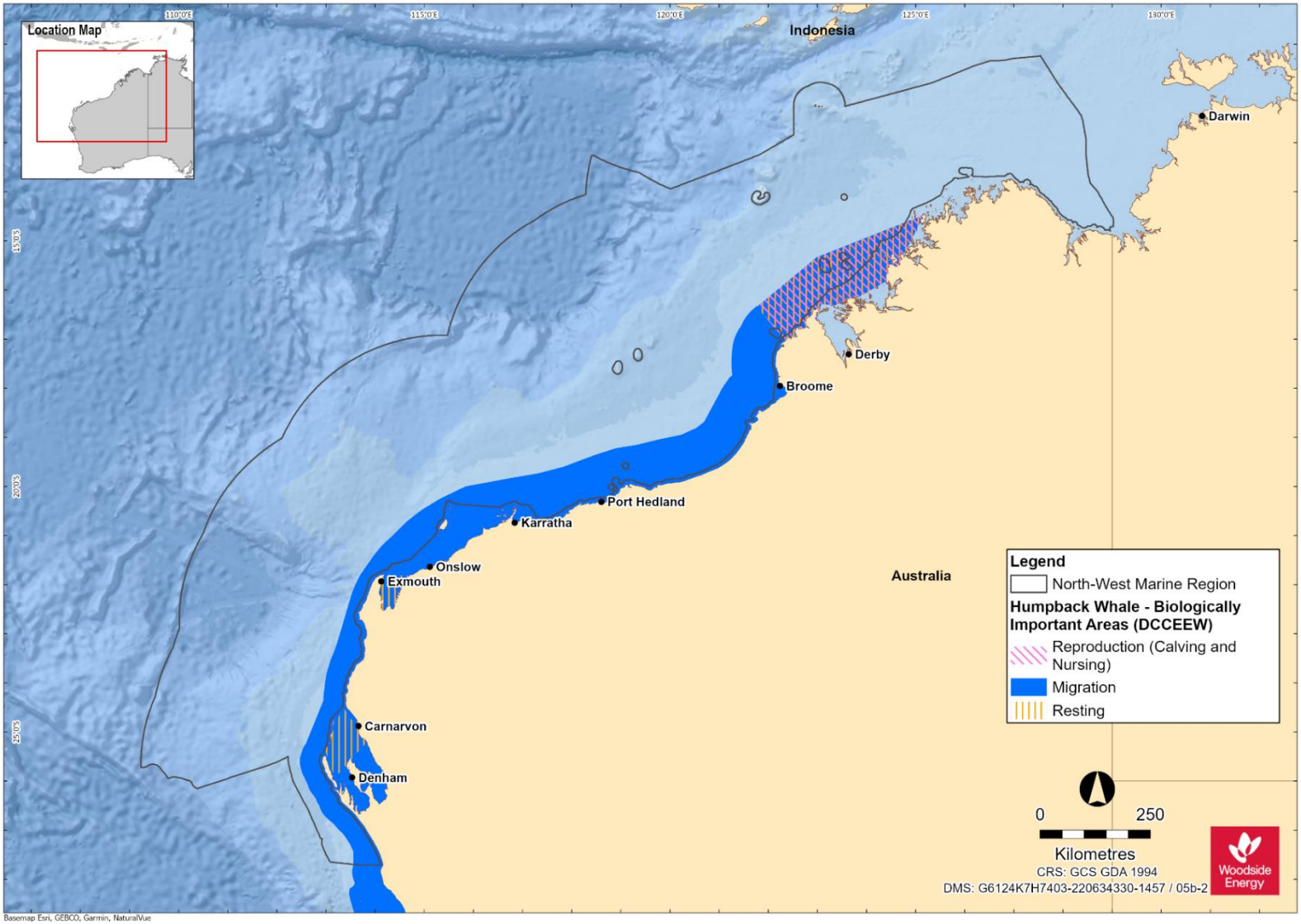


Figure 7-2: Humpback whale BIAs for the NWMR (data source: DCCEEW, 2024b)

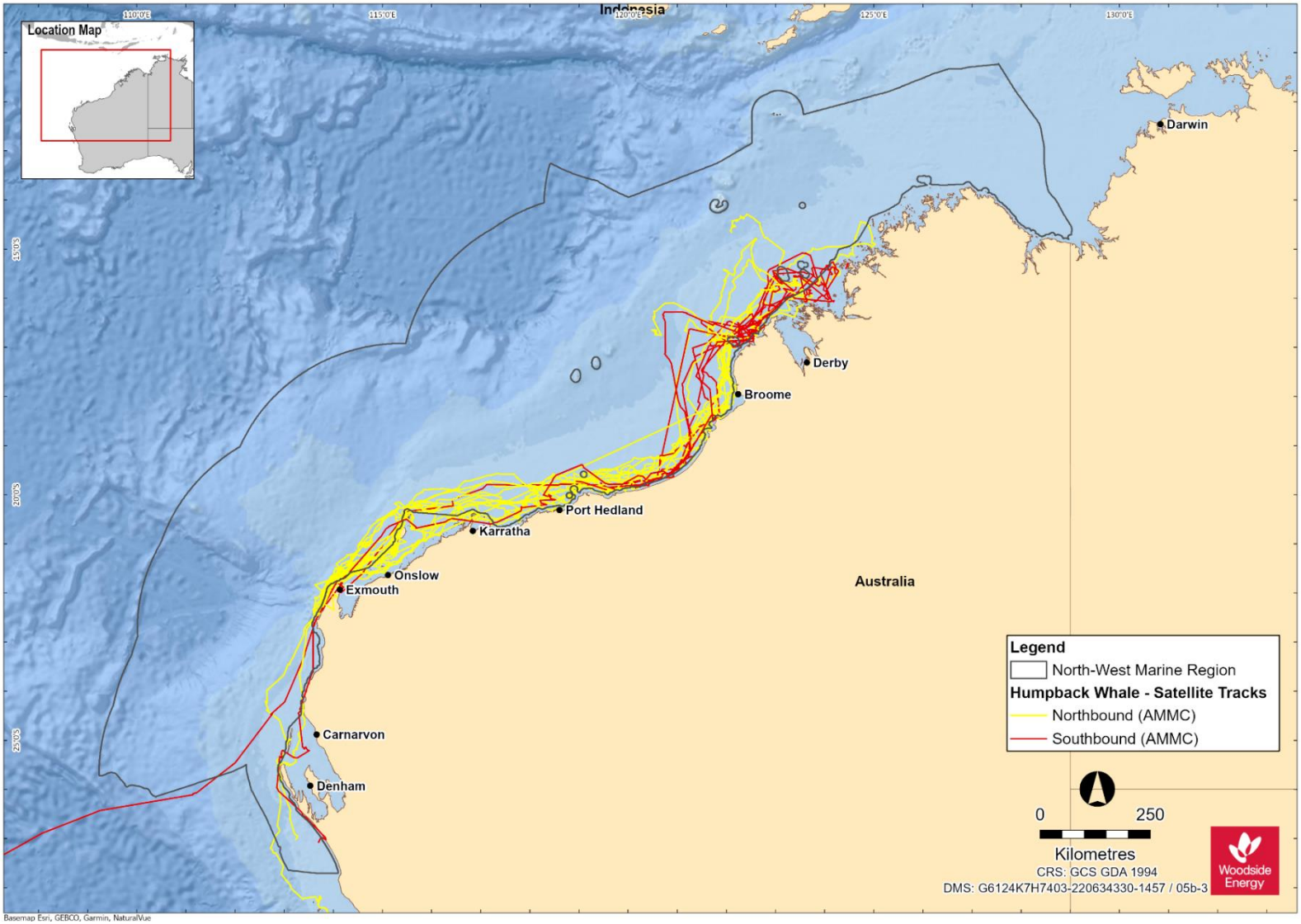


Figure 7-3: Humpback whale tagged tracks for north and south bound migrations (AMMC as published in Double et al. 2010 and 2012)

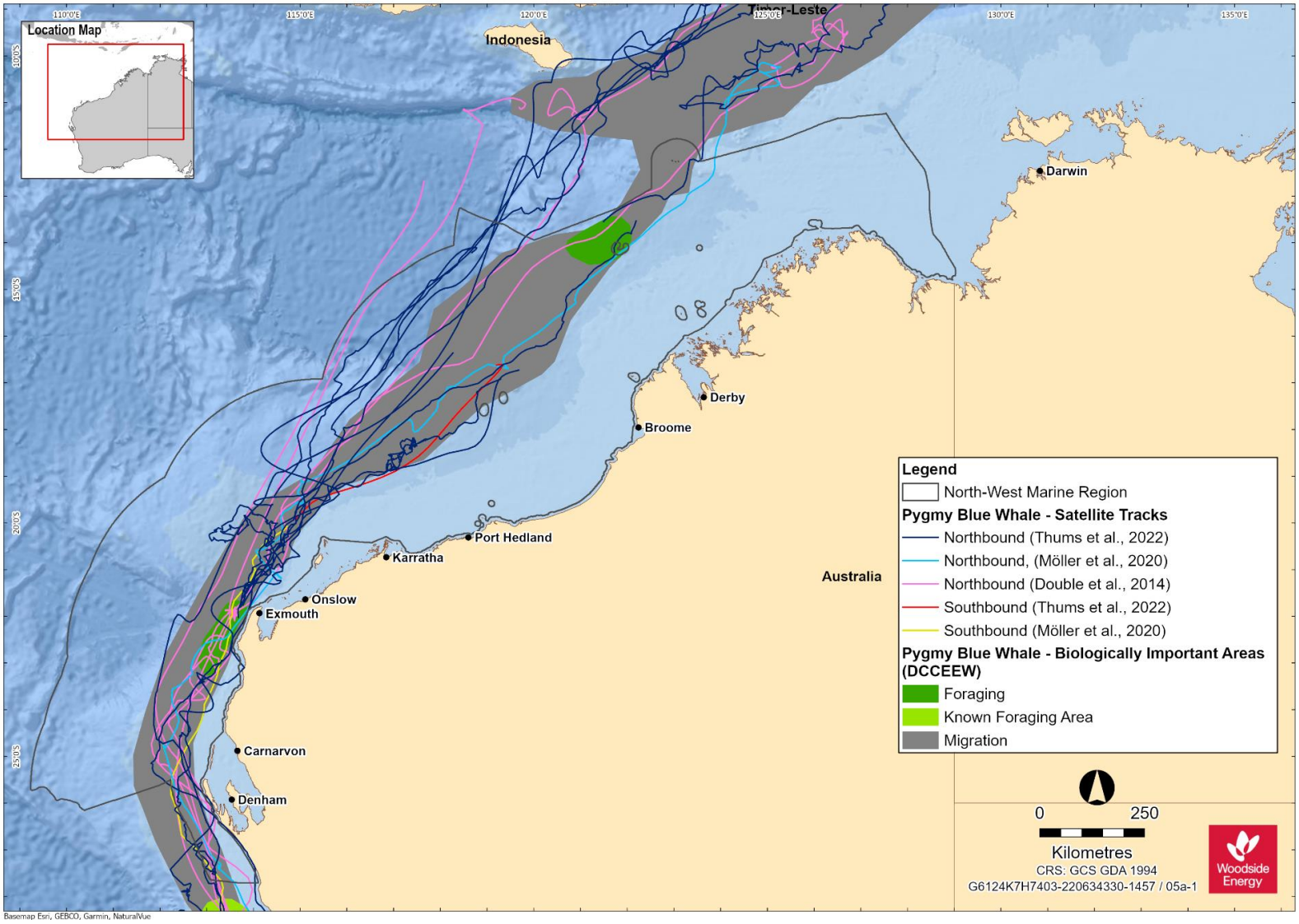


Figure 7-4: Pygmy blue whale BIAs for the NWMR and tagged whale tracks for northbound migration (data source for BIAs: DCCEEW, 2024b)

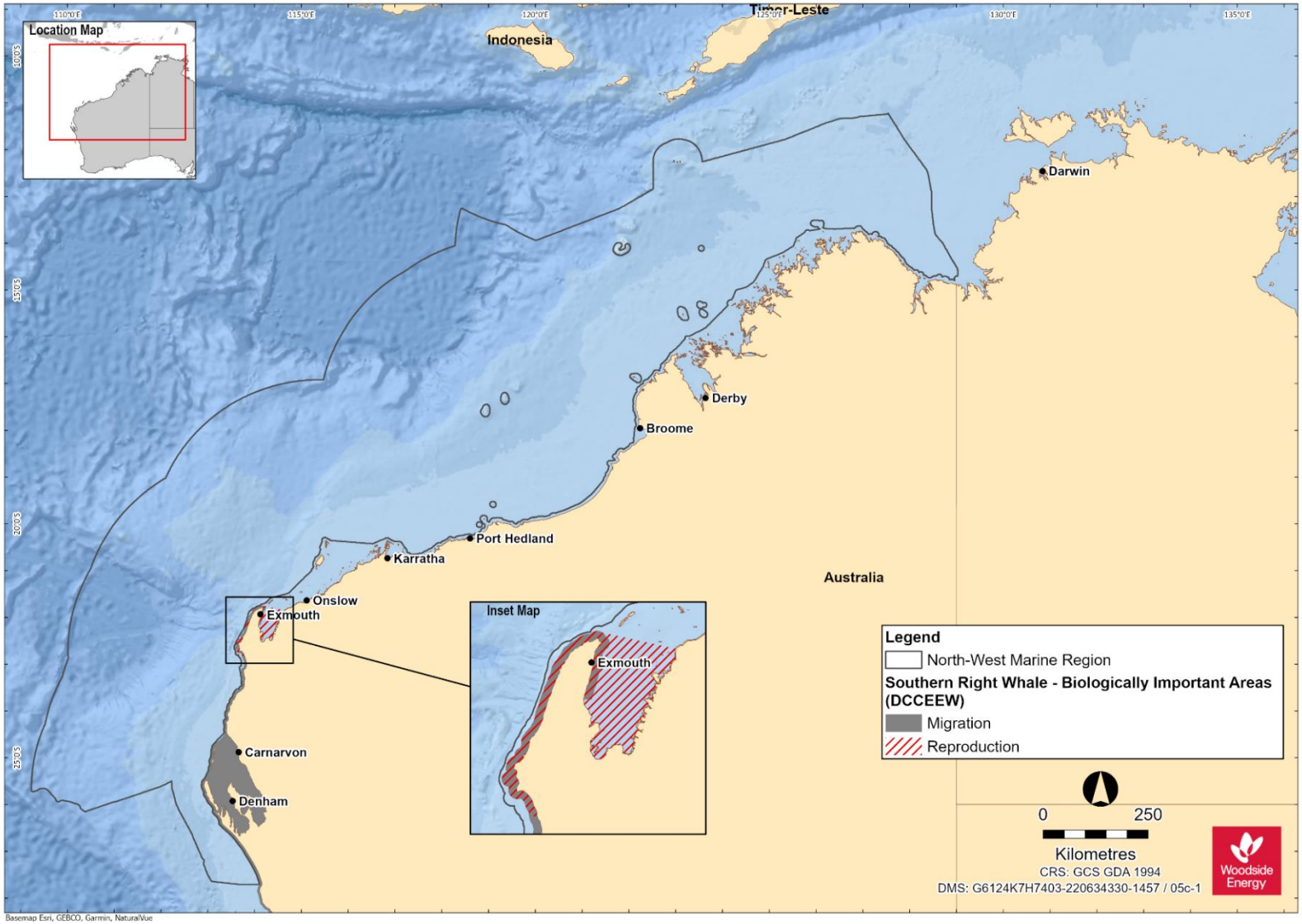


Figure 7-5: Southern right whale BIAs for the NWMR; migration and reproduction BIAs along the coast extend to 3 NM (data source: DCCEEW, 2024b)

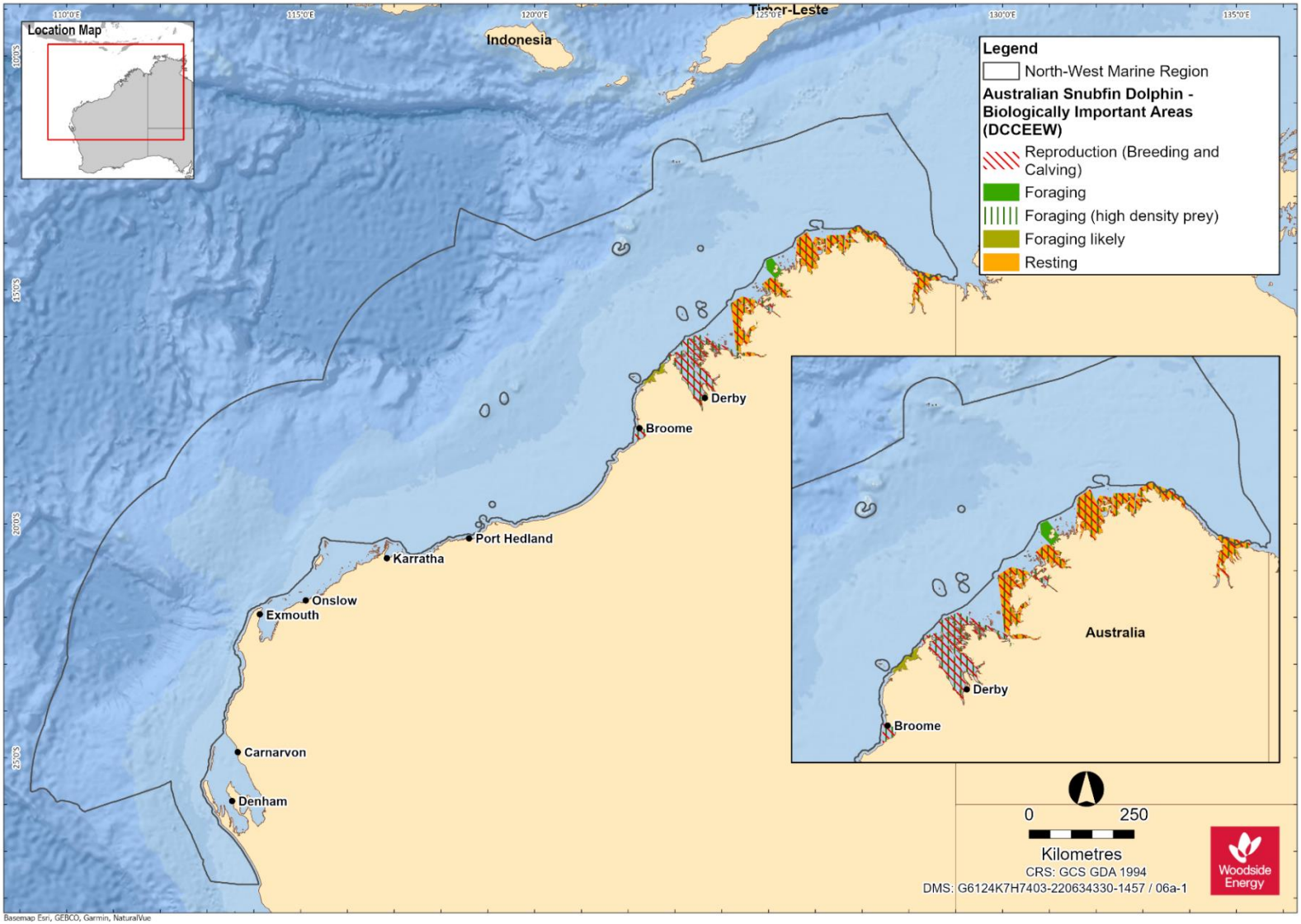


Figure 7-6: Australian snubfin dolphin BIAs for the NWMR (data source: DCCEEW, 2024b)

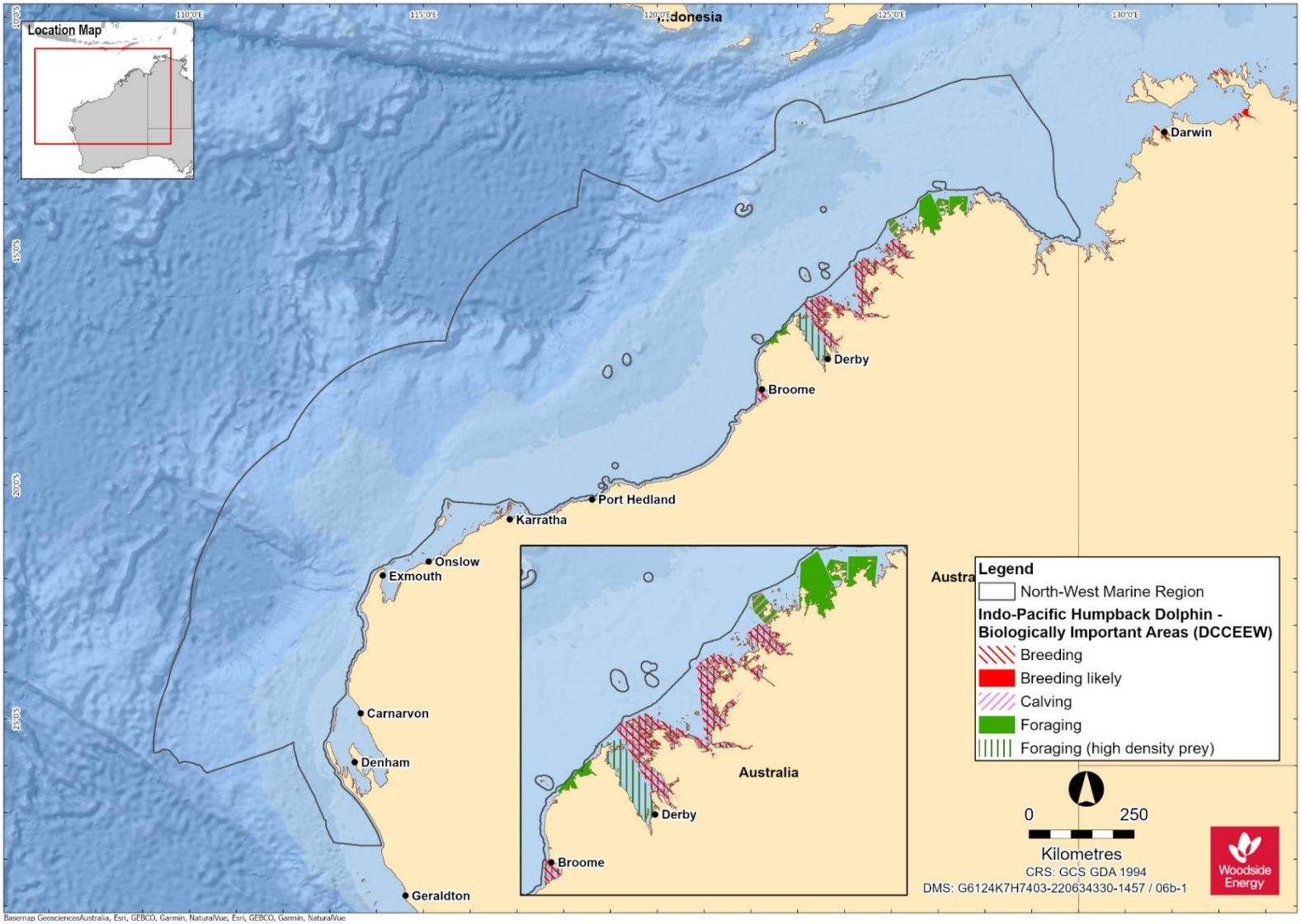


Figure 7-7: Indo-Pacific humpback dolphin BIAs for the NWMR (data source: DCCEEW, 2024b)

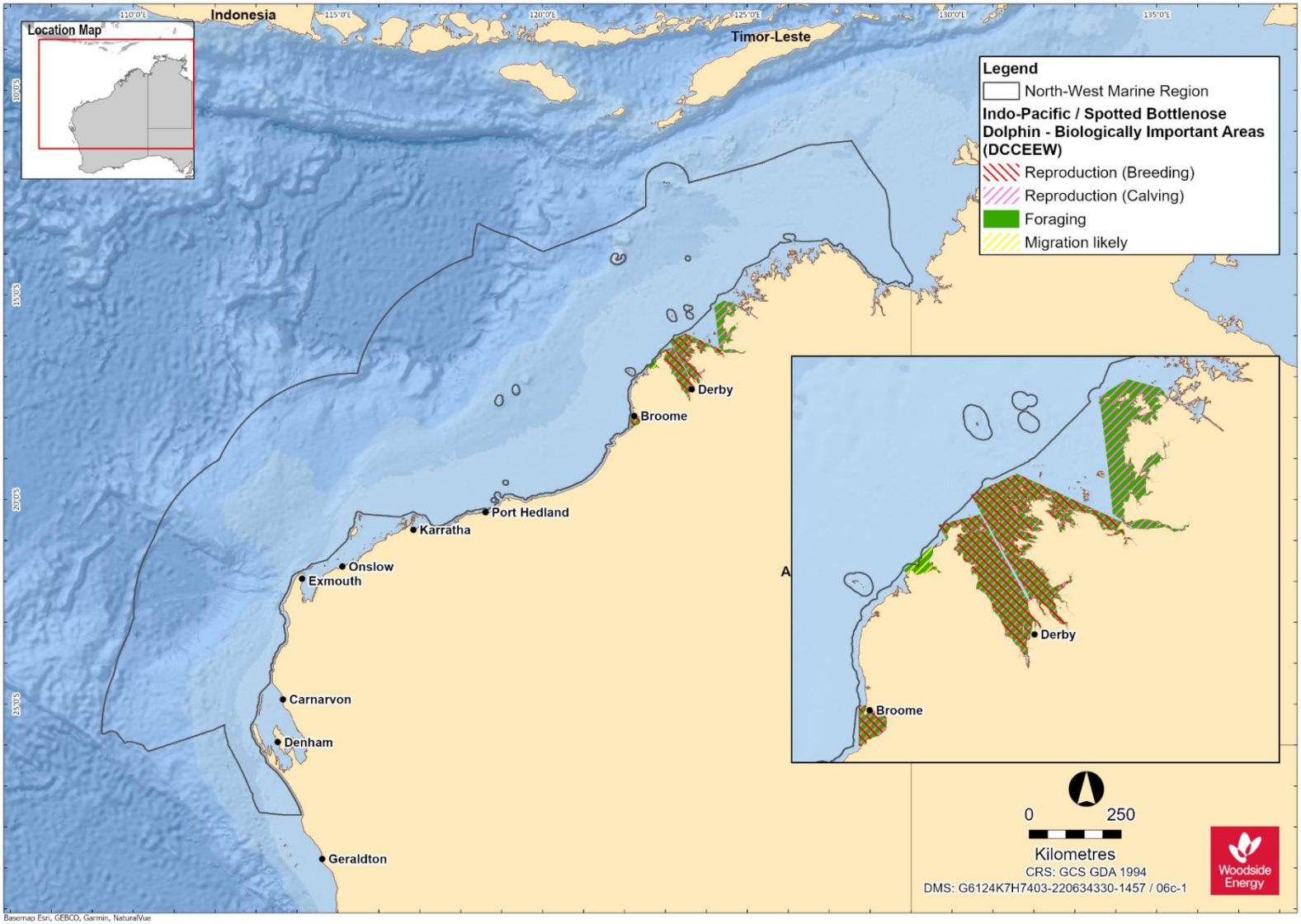


Figure 7-8: Indo-Pacific spotted bottlenose dolphin BIAs for the NWMR (data source: DCCEEW, 2024b)

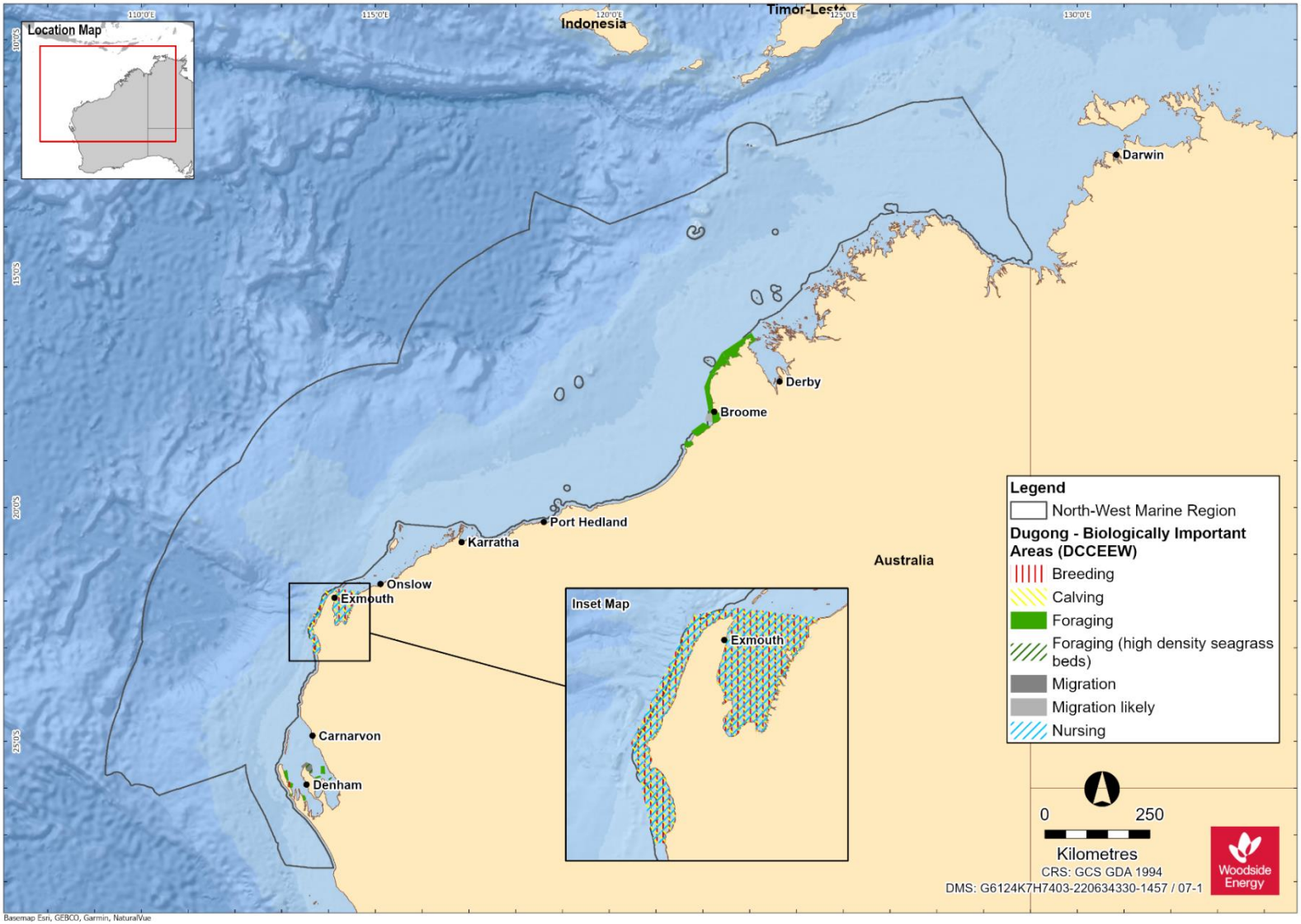


Figure 7-9: Dugong BIAs for the NWMR (data source: DCCEEW, 2024b)

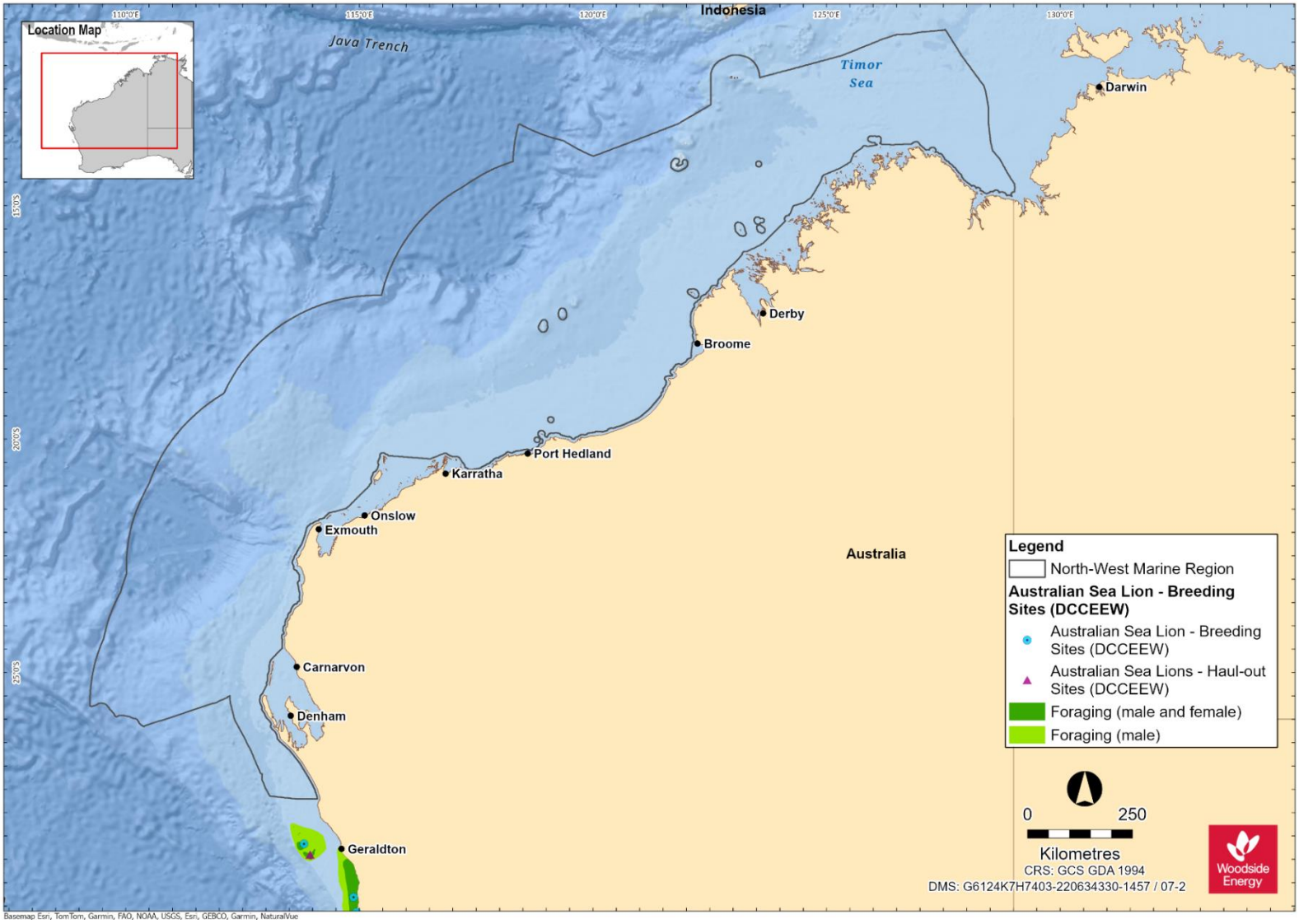


Figure 7-10: Australian sea lion BIAs in the northern extent of the SWMR closest to the NWMR (data source: DCCEEW, 2024b)

7.8 Marine Mammal Summary for the NWMR

7.8.1 Browse

The Browse activity area includes biologically important habitat for six threatened and/or migratory marine mammal species:

- blue whale and pygmy blue whale (foraging and migration areas)
- humpback whale (breeding, calving and migration areas)
- Indo-Pacific humpback dolphin (foraging, breeding and calving areas)
- Australian snubfin dolphin (foraging, breeding and calving areas)
- spotted bottlenose dolphin (foraging, breeding and calving areas)
- dugong (foraging).

BIAs for the marine mammal species are outlined in Table 7-3.

7.8.2 North West Shelf / Scarborough

The NWS / Scarborough activity area includes biologically important habitat for six threatened and/or migratory marine mammal species:

- blue whale and pygmy blue whale (foraging and migration areas)
- humpback whale (resting and migration areas)
- Indo-Pacific humpback dolphin (foraging, breeding and calving areas)
- Australian snubfin dolphin (foraging, breeding and calving areas)
- spotted bottlenose dolphin (present but no BIAs)
- dugong (foraging and calving areas).

BIAs for the marine mammal species are outlined in Table 7-3.

7.8.3 North-west Cape

The North-west Cape activity area includes biologically important habitat for four threatened and/or migratory marine mammal species:

- blue whale and pygmy blue whale (foraging and migration areas)
- southern right whale (reproduction area)
- humpback whale (resting and migration areas)
- spotted bottlenose dolphin (present but no BIAs)
- dugong (foraging and breeding/ calving areas).

BIAs for the marine mammal species are outlined in Table 7-3.

8. SEABIRDS AND MIGRATORY SHOREBIRDS OF THE NWMR

8.1 Regional Context

The NWMR supports high numbers and species diversity of seabirds and migratory shorebirds including many that are EPBC Act listed, threatened and migratory. The NWMR marine bioregional plan reported 34 seabird species (listed as threatened, migratory and/or marine) that are known to occur, and 30 of 37 species of migratory shorebird species that regularly occur in Australia, are recorded at Ashmore Reef in the NWMR (DSEWPAC, 2012d). The NWMR marine bioregional plan also noted that Roebuck Bay and Eighty Mile Beach are internationally significant and recognised migratory shorebird locations.

A 'Seabird and Shorebird Existing Knowledge and Threats' report was prepared (2022) and updated in 2024 (Worley, 2024) to identify key bird species (categorised: pelagic seabirds, nearshore seabirds, shorebirds and others) and their threats in the NWMR (Advisian, 2024). The high and moderate occurrence species for the NWMR were informed from this report, as well as from PMST results. The report identified 92 species.

Each species was assigned to one of three frequency of occurrence levels:

- high – breeding and foraging aggregations known to occur
- moderate – known or likely presence
- low – may occur, or at limits of species range.

Table 8-1 includes those considered key species, i.e. high or moderate occurrence (Worley, 2024), and listed threatened and/or migratory under the EPBC Act with a total of 56 key species identified (comprising 22 seabirds and 34 shorebirds).

Many migratory seabirds and shorebirds are protected through bilateral agreements between Australia and Japan (JAMBA), China (CAMBA) and the Republic of Korea (ROKAMBA), recognising the migratory route and important stopover and resting habitats of the East Asian-Australasian Flyway (EAAF). Important migratory bird habitats are also recognised as part of protected wetlands of international significance under the Ramsar Convention. Important Bird Areas (IBAs) for the NWMR, which are also recognised as global Key Biodiversity Areas (KBAs) (BirdLife Australia[17]), include:

- Roebuck Bay KBA (and Ramsar site): internationally significant migratory shorebird species
- Mandora Marsh and Anna Plains KBA (adjacent to Eighty Mile Beach, Ramsar site): internationally significant migratory shorebird species
- Dampier Saltworks KBA: internationally significant migratory shorebird species
- Montebello Islands KBA: shorebird and seabird species
- Barrow Island KBA: shorebird and seabird species
- Exmouth Gulf Mangroves KBA: internationally significant migratory shorebird species.

Table 8-1 presents a list of the high and moderate occurrence threatened and migratory seabird and shorebird species (as per subject matter expert review, Worley (2024)) that occur within the NWMR, with their conservation/protected status, relevant recovery plans and/or conservation advice.

[17] https://www.birdlife.org.au/projects/KBA#:~:text=The%20Key%20Biodiversity%20Areas%20(KBAs,of%20advocacy%20for%20protected%20areas. [Accessed April, 2021]

Table 8-1: High and moderate occurrence seabird and migratory shorebird species (threatened/migratory/marine) identified by the EPBC Act PMST and NWMR Seabird and Shorebird Existing Knowledge and Threats report as potentially occurring within the NWMR

Species Name	Common Name	Environment Protection and Biodiversity Conservation Act 1999 (Cth) (as per PMST report in Appendix A)			Biodiversity Conservation Act 2016 (WA)[18]	IUCN Red List of Threatened Species (non-statutory)[19]	EPBC Act Part 13 Statutory Instrument
		Threatened Status	Migratory Status	Listed	Conservation Status	Global Status	
Seabirds							
Diomedea amsterdamensis	Amsterdam Albatross	Endangered	Migratory	Marine	Critically Endangered	Endangered	National Recovery Plan for albatrosses and petrels (DCCEEW, 2022)
Sternula nereis nereis	Australian fairy tern	Vulnerable	N/A	N/A	Vulnerable	Vulnerable	National Recovery Plan for the Australian Fairy Tern *Sternula nereis nereis* (Commonwealth of Australia, 2020b) EPBC Act Threat Abatement Plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans (DoEE, 2018)
Anous tenuirostris melanops	Australian lesser noddy	Vulnerable	N/A	Marine	Endangered	Least Concern	Conservation Advice *Anous tenuirostris melanops* Australian lesser noddy (Threatened Species Scientific Committee, 2015e) EPBC Act Threat Abatement Plan to reduce the impacts of exotic rodents on biodiversity on Australian offshore islands of less than 100,000 hectares (DEWHA, 2009)
Pterodroma mollis	Soft-plumaged petrel	Vulnerable	N/A	Marine	N/A	Least Concern	Conservation Advice *Pterodroma mollis* soft-plumaged petrel (Threatened Species Scientific Committee, 2015f)
Sula leucogaster	Brown booby	N/A	Migratory	Marine	Migratory	Least Concern	EPBC Act Threat Abatement Plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans (DoEE, 2018)
Ardenna pacifica	Wedge-tailed shearwater	N/A	Migratory	Marine	Migratory	Least Concern	

[18] Threatened and Priority Fauna List – April 2024 - https://www.dbca.wa.gov.au/management/threatened-species-and-communities (accessed on 13/08/2024)
[19] IUCN, 2024. The IUCN Red List of Threatened Species. Version 2024-1. https://www.iucnredlist.org (accessed on 13/08/2024)

Species Name	Common Name	Environment Protection and Biodiversity Conservation Act 1999 (Cth) (as per PMST report in Appendix A)			Biodiversity Conservation Act 2016 (WA)[18]	IUCN Red List of Threatened Species (non-statutory)[19]	EPBC Act Part 13 Statutory Instrument
		Threatened Status	Migratory Status	Listed	Conservation Status	Global Status	
Ardenna carneipes	Flesh-footed shearwater	N/A	Migratory	Marine	Vulnerable	Near Threatened	
Oceanites oceanicus	Wilson's storm petrel	N/A	Migratory	Marine	Migratory	Least Concern	
Anous stolidus	Common noddy	N/A	Migratory	Marine	Migratory	Least Concern	EPBC Act Threat Abatement Plan for predation by feral cats (DoE, 2015c)
Fregata ariel	Lesser frigatebird	N/A	Migratory	Marine	Migratory	Least Concern	
Fregata minor	Great frigatebird	N/A	Migratory	Marine	Migratory	Least Concern	
Sula sula	Red-footed booby	N/A	Migratory	Marine	Migratory	Least Concern	
Phaethon rubricauda	Red-tailed tropicbird	N/A	Migratory	Marine	Migratory	Least Concern	
Onychiprion anaethetus (listed as Sterna anaethetus)	Bridled tern	N/A	Migratory	Marine	Migratory	Least Concern	
Thalasseus bergii	Greater crested tern	N/A	Migratory	Marine	Migratory	Least Concern	
Sternula albifrons	Little tern	N/A	Migratory	Marine	Migratory	Least Concern	
Sterna dougallii	Roseate tern	N/A	Migratory	Marine	Migratory	Least Concern	
Sterna hirundo	Common tern	N/A	Migratory	Marine	Migratory	Least Concern	
Hydroprogne caspia	Caspian tern	N/A	Migratory	Marine	Migratory	Least Concern	

Species Name	Common Name	Environment Protection and Biodiversity Conservation Act 1999 (Cth) (as per PMST report in Appendix A)			Biodiversity Conservation Act 2016 (WA)[18]	IUCN Red List of Threatened Species (non-statutory)[19]	EPBC Act Part 13 Statutory Instrument
		Threatened Status	Migratory Status	Listed	Conservation Status	Global Status	
Calonectris leucomelas	Streaked shearwater	N/A	Migratory	Marine	Migratory	Near Threatened	
Sula dactylatra	Masked booby	N/A	Migratory	Marine	Migratory	Least Concern	
Phaethon lepturus	White-tailed tropicbird	N/A	Migratory	Marine	Migratory	Least Concern	
All seabird species							Wildlife Conservation Plan for Seabirds (Commonwealth of Australia, 2020a) National Light Pollution Guidelines for Wildlife (DCCEEW, 2023d)
Migratory shorebirds							
Numenius madagascariensis	Eastern curlew, far eastern curlew	Critically Endangered	Migratory	Marine	Critically Endangered	Endangered	Conservation Advice *Numenius madagascariensis* Far eastern curlew (DCCEW, 2023e)
Calidris ferruginea	Curlew sandpiper	Critically Endangered	Migratory	Marine	Critically Endangered	Near Threatened	Conservation Advice *Calidris ferruginea* Curlew sandpiper (DCCEEW, 2023f)
Limosa lapponica menzbieri	Bar-tailed godwit (menzbieri)	Endangered	Migratory	Marine	Critically Endangered	Near Threatened	Conservation Advice *Limosa lapponica menzbieri* Bar-tailed godwit (northern Siberia) (DCCEEW, 2024e)
Charadrius mongolus	Lesser sand plover	Endangered	Migratory	Marine	Endangered	Endangered	Conservation Advice *Charadrius mongolus* Lesser sand plover (Threated Species Scientific Committee, 2016)
Rostratula australis	Australian painted snipe	Endangered	N/A	Marine	Endangered	Endangered	Conservation Advice *Rostratula australis* Australian painted snipe (Threatened Species Scientific Committee, 2013a)
Calidris canutus	Red knot	Vulnerable	Migratory	Marine	Endangered	Near Threatened	Conservation Advice *Calidris canutus* Red knot (DCCEEW, 2024f)

Species Name	Common Name	Environment Protection and Biodiversity Conservation Act 1999 (Cth) (as per PMST report in Appendix A)			Biodiversity Conservation Act 2016 (WA)[18]	IUCN Red List of Threatened Species (non-statutory)[19]	EPBC Act Part 13 Statutory Instrument
		Threatened Status	Migratory Status	Listed	Conservation Status	Global Status	
Calidris tenuirostris	Great knot	Vulnerable	Migratory	Marine	Critically Endangered	Endangered	Conservation Advice *Calidris tenuirostris* Great knot (DCCEEW, 2024g)
Charadrius leschenaultii	Greater sand plover	Vulnerable	Migratory	Marine	Vulnerable	Least Concern	Conservation Advice *Charadrius leschenaultia* Greater sand plover (DCCEEW, 2023g)
Limosa limosa	Black-tailed godwit	Endangered	Migratory	Marine	Migratory	Near Threatened	Conservation Advice for *Limosa limosa* black-tailed godwit (DCCEEW, 2024h)
Limnodromus semipalmatus	Asian dowitcher	Vulnerable	Migratory	Marine	Migratory	Near Threatened	Conservation Advice for *Limnodromus semipalmatus* Asian dowitcher (DCCEEW, 2024j)
Tringa nebularia	Common greenshank	Endangered	Migratory	Marine	Migratory	Least Concern	Conservation Advice for *Tringa nebularia* Common greenshank (DCCEEW, 2024i)
Arenaria interpres	Ruddy turnstone	Vulnerable	Migratory	Marine	Migratory	Least Concern	Conservation Advice for *Arenaria interpres* Ruddy turnstone (DCCEEW, 2024k)
Calidris acuminata	Sharp-tailed sandpiper	Vulnerable	Migratory	Marine	Migratory	Vulnerable	Conservation Advice for *Calidris acuminata* Sharp- tailed sandpiper (DCCEEW, 2024l)
Xenus cinereus	Terek sandpiper	Vulnerable	Migratory	Marine	Migratory	Least Concern	Conservation Advice for *Xenus cinereus* Terek sandpiper (DCCEEW, 2024m)
Pluvialis squatarola	Grey plover	Vulnerable	Migratory	Marine	Migratory	Least Concern	Conservation Advice for *Pluvialis squatarola* Grey plover (DCCEEW, 2024n)
Pluvialis fulva	Pacific golden plover	N/A	Migratory	Marine	Migratory	Least Concern	
Tringa totanus	Common redshank	N/A	Migratory	Marine	Migratory	Least Concern	
Actitis hypoleucos	Common sandpiper	N/A	Migratory	Marine	Migratory	Least Concern	

Species Name	Common Name	Environment Protection and Biodiversity Conservation Act 1999 (Cth) (as per PMST report in Appendix A)			Biodiversity Conservation Act 2016 (WA)[18]	IUCN Red List of Threatened Species (non-statutory)[19]	EPBC Act Part 13 Statutory Instrument
		Threatened Status	Migratory Status	Listed	Conservation Status	Global Status	
Tringa stagnatilis	Marsh sandpiper	N/A	Migratory	Marine	Migratory	Least Concern	
Calidris melanotos	Pectoral sandpiper	N/A	Migratory	Marine	Migratory	Least Concern	
Tringa glareola	Wood sandpiper	N/A	Migratory	Marine	Migratory	Least Concern	
Limicola falcinellus	Broad billed sand piper	N/A	Migratory	Marine	Migratory	Least Concern	
Limosa lapponica	Bar-tailed godwit	N/A	Migratory	Marine	Migratory	Near Threatened	
Calidris ruficollis	Red-necked stint	N/A	Migratory	Marine	Migratory	Near Threatened	
Calidris pugnax	Ruff	N/A	Migratory	Marine	Migratory	Least Concern	
Xenus cinereus	Terek sandpiper	N/A	Migratory	Marine	Migratory	Least Concern	
Numenius phaeopus	Whimbrel	N/A	Migratory	Marine	Migratory	Least Concern	
Numenius minutus	Little curlew	N/A	Migratory	Marine	Migratory	Least Concern	
Calidris alba	Sanderling	N/A	Migratory	Marine	Migratory	Least Concern	
Calidris subminuta	Long-toed stint	N/A	Migratory	Marine	Migratory	Least Concern	
Gallinago stenura	Pin-tailed snipe	N/A	Migratory	Marine	Migratory	Least Concern	
Gallinago megala	Swinhoe's snipe	N/A	Migratory	Marine	Migratory	Least Concern	
Glareola maldivarum	Oriental pratincole	N/A	Migratory	Marine	Migratory	Least Concern	

Species Name	Common Name	Environment Protection and Biodiversity Conservation Act 1999 (Cth) (as per PMST report in Appendix A)			Biodiversity Conservation Act 2016 (WA)[18]	IUCN Red List of Threatened Species (non-statutory)[19]	EPBC Act Part 13 Statutory Instrument
		Threatened Status	Migratory Status	Listed	Conservation Status	Global Status	
Charadrius veredus	Oriental plover	N/A	Migratory	Marine	Migratory	Least Concern	
Tringa brevipes	Grey-tailed tattler	N/A	Migratory	Marine	Migratory and Priority species	Near Threatened	
All migratory shorebird species							Wildlife Conservation Plan for Migratory Shorebirds (Commonwealth of Australia, 2015c) EPBC Act Policy Statement 3.21—Industry guidelines for avoiding, assessing, and mitigating impacts on EPBC Act listed migratory shorebird species (DoEE, 2017) National Light Pollution Guidelines for Wildlife (DCCEEW, 2023)
Other marine birds							
Apus pacificus	Fork-tailed swift		Migratory	Marine	N/A	Least Concern	None
Pandion haliaetus	Osprey		Migratory	Marine	N/A	Least Concern	None

8.2 Seabirds in the NWMR

Seabirds are birds that are adapted to life within the marine environment (oceanic and coastal) and are generally long-lived, have delayed breeding and have fewer young than other bird species (Commonwealth of Australia, 2020a).

At least 22 key seabird species (high and moderate occurrence, listed as threatened and/ or migratory under the EPBC Act) are known to occur in the NWMR. These include a variety of species of terns, noddies, petrels, shearwaters, frigatebirds, and boobies.

Seabird species can be grouped into pelagic and nearshore seabirds, based on lifecycle behaviour, distributions and key habitats (Worley, 2024). Pelagic species spend most of their life at sea, ranging over large distances to forage. These pelagic species only come onshore to breed and raise chicks at natal or high-fidelity breeding colonies on remote, offshore island locations in and adjacent to the NWMR. Many species are ecologically significant to the NWMR, as they are endemic to the region, can be present in large numbers in breeding seasons and non-breeding seasons, and many exhibit extensive annual migrations that include marine areas outside the Australian EEZ (DSEWPAC, 2012d). Nearshore seabirds are confined to nearshore areas (unless migrating), have shorter foraging trips during breeding and may rest on land/shoreline habitats outside of breeding periods (Worley, 2024).

The presence of seabirds within the NWMR is influenced by seabird species that migrate and forage in the area during the non-breeding season and this includes many seabird species that breed on the Houtman Abrolhos in the SWMR. Pelagic seabirds have been documented foraging at current boundaries and seasonal upwellings within the NWMR (refer to Sutton et al., 2019). The Houtman Abrolhos Islands National Park located in the SWMR is one of the most significant seabird breeding locations in the eastern Indian Ocean. 16 species of seabirds breed there. 80% of common (brown) noddies, 40% of sooty terns and all the lesser noddies found in Australia nest at the Houtman Abrolhos (Surman, 2019). Important seabird areas in the NWMR are as identified by the KBAs (refer to Section 8.1), EPBC Act Bioregional Biologically Important Areas and subject matter expert review, as presented in Worley (2024).

8.2.1 High-occurrence Key Seabird Species

Species descriptions for high occurrence key seabird species are provided below. High occurrence seabird species were defined as those with breeding and foraging aggregations within NWMR (Worley, 2024).

8.2.1.1 Wedge-tailed Shearwater (Pelagic Seabird)

The wedge-tailed shearwater (*Ardenna pacifica*) is listed migratory under the EPBC Act and Biodiversity Conservation Act 2016 (WA) (BC Act). It is a pelagic, marine seabird known from tropical and subtropical waters. Its distribution is widespread across the Indian and Pacific oceans with a global population of 2.6 million pairs. Of this, approximately one million pairs breed in Australia, most of which do so on islands in Western Australia between Rottnest Island in the south to Ashmore Reef in the north. The largest breeding populations are at the Houtman Abrolhos (600,000 pairs – Surman and Nicholson, 2009), and throughout the NWS region of the NWMR, where large populations on Muiron Islands (300,000 pairs) and Serrurier Island (60,000 pairs) exist (Surman and Nicholson, 2009, 2015).

Adults are absent from their breeding colonies during the interbreeding period and return from their tropical Indian Ocean over-wintering grounds from late-June onwards to re-excavate their burrows. This species is highly synchronous in timing of breeding; all eggs within a colony are laid within a ten-day period. They lay their single egg during early-November, which is then incubated until the chick hatches (after 53 days) in early-January. Once hatched, adults leave the burrows to forage locally during the day returning at night to feed chicks until they are ready to fledge (Nicholson, 2002).

Due to the high synchronicity in egg laying, fledging is restricted to the first two weeks of April (Nicholson, 2002).

Breeding behaviours are nocturnal in wedge-tailed shearwaters. Adults return to and depart the colony at night and fledglings depart the colony at night. In the lead up to fledging, chicks also leave their burrows to exercise their wings outside burrows. Adults may not return to feed chicks each night; wedge-tailed shearwaters breeding on the Muiron Island (north) undertook extensive foraging trips during the incubation period (1200–1400 km) and shorter trips during chick rearing (<300 km, Cannell et al., 2019). Longer foraging trips took individuals in a north-west direction offshore towards oceanic seamounts. Conversely, the shorter tended to include waters to the west and north-west of the Muiron Islands (Cannell et al., 2019). In addition to the Muiron Islands, this dual foraging strategy, whereby parents alternate or mix short and long trips, have been recorded in wedge-tailed shearwaters breeding at Heron Island, Queensland, Lord Howe Island, Tasmania (Peck and Congdon, 2005), and New Caledonia (Weimerskirch et al., 2020). However, divergent foraging strategies have been detected between colonies, which is linked to the proximity of colonies to high productivity waters (Peck and Congdon, 2005; Weimerskirch et al., 2020). While the presence of squid and lanternfish in their diet (Surman and Nicholson, 2009) suggests nocturnal foraging occurs in this species, GPS tracking studies found that foraging activities at sea were more frequent during the day compared with at night (Weimerskirch et al., 2020; Catry et al., 2009). During the day, resting periods on the sea surface were short whereas at night individuals spent a large proportion of their time resting at the surface (Weimerskirch et al*.,* 2020). Other prey species include schooling bait fishes and cephalopods, often feeding in association with other pelagic seabird species such as sooty terns and common noddies, and pelagic fishes such as tunas and mackerels. Diet composition is likely to vary between colonies, depending upon the prey available, and thus determining both the foraging strategy, as described above, and also the division of nocturnal and diurnal foraging. Wedge-tailed shearwaters dive between 3 and 66 m, actively pursuing prey by feeding at the surface or by actively swimming below bait schools.

Post-breeding, wedge-tailed shearwaters breeding on the Houtman Abrolhos Islands and Varanus Island migrated 4500 km north-west to equatorial waters of the Indian Ocean around 90°E (Surman et al*.,* 2018), traversing the NWMR, and those from the Great Barrier Reef migrated to the northern hemisphere, approximately 6000 km northwards to Micronesia (McDuie and Congdon, 2016).

Wedge-tailed shearwaters are observed during breeding across all shelf waters and are the most frequently encountered seabird at sea. Large numbers of wedge-tailed shearwaters have been observed foraging off the NWS between May–August (Surman pers obs.).

Foraging and breeding BIAs are located for the wedge-tailed shearwater across the NWMR (Figure 8-1). It is noted that both breeding and foraging BIAs represent foraging habitat utilised by adult (chick-rearing) wedge-tailed shearwaters during the breeding season.

8.2.1.2 Australian Lesser Noddy (Pelagic Seabird)

The Australian lesser noddy (*Anous tenuirostris melanops*), which is endemic to Australia, is listed vulnerable under the EBPC Act and endangered under the BC Act. The largest breeding colonies are found on the Houtman Abrolhos Islands with fewer records of breeding on Ashmore Reef (Clark et al*.,* 2011; Cannell and Surman, 2021). Possible colonisation of Cocos (Keeling) Island is reported; however, it is unconfirmed if this is the Australian subspecies (Stokes and Hinchey, 1990).

At the Houtman Abrolhos Islands, the breeding population has been estimated at ~50,000 breeding pairs (Surman et al*.,* 2016). At this location, studies indicate that breeding is not highly synchronised; the single egg clutches were laid over a 102-day period from late August to early December, peaking in September (Surman and Wooller, 1995). The incubation period averaged 34 days and the fledging period 40 days. (Surman and Wooller, 1995).

Studies of foraging ecology of breeding Australian lesser noddies at the Houtman Abrolhos Islands found that they are largely diurnal, foraging between 04h00 and 20h40 and returning to their colony

at night (Surman et al., 2017). From this study, the GPS tracks of 17 adults during incubation or chick provisioning revealed that most foraging trips lasted for between two and four hours with a total trip distance of less than 40 km. However, some trips lasted up to 16 hours covering distances of up to 112 km (Surman et al*.,* 2017). During non-breeding, birds appear to remain near the breeding islands year-round (Higgins and Davies, 1996).

Due to differences in climate and seasonality experienced at the Houtman Abrolhos Islands and Ashmore Reef, timing of breeding differs. The Ashmore Reef population has been recorded breeding in the Austral autumn/winter (Clarke and Herrod, 2016), while the Houtman Abrolhos Islands populations breed during the Austral spring/summer (Surman and Wooller, 1995).

No BIAs for the Australian lesser noddy overlap the NWMR and tracking data suggests that individuals breeding at the Houtman Abrolhos Islands foraged predominantly in a south-westerly direction, remaining within waters of the SWMR (Surman et al*.,* 2017). Several individuals were observed roosting with common noddies on Bernier Island, near Carnarvon in 2022 (Nicholson pers obs.). However, it is unlikely that waters of the NWMR provide significant habitat for individuals breeding at the Houtman Abrolhos Islands. The small population of this subspecies breeding on Ashmore Reef may show similar foraging ecology during breeding and remain in the vicinity of the islands, utilising habitats of the NWMR.

8.2.1.3 Brown Booby (Pelagic Seabird)

The brown booby (*Sula leucogaster*) is listed migratory under the EPBC Act and BC Act. It is a cosmopolitan species with a pan-tropical distribution. Within the NWMR, large colonies occur at offshore islands including the Lacepede Islands (17,000 pairs, Mustoe and Edmunds, 2008), Ashmore Reef (5000 pairs at Middle Island and 3000 pairs at East Island in 2007, Swann, 2005a; Swann, 2005b; Swann, 2005c; Milton, 2005; Clarke, 2010), Bedout Island (1000 pairs) and Adele Island (7500 pairs, Burbidge et al., 1987). Small colonies of up to 10 pairs have been recorded at Overhanging Rock, within the Lowendal Islands (Nicholson, pers obs.). The total breeding population in the Australian region in 1996–97 was estimated at 59,940 to 73,900 pairs (WBM Oceanics and Claridge, 1997).

Brown boobies do not migrate far from their breeding islands, rarely dispersing more than 240 km from their natal colony (Dunlop et al., 2001). Brown boobies forage within 50 km of their colony where they plunge dive, reaching up to 15 m depth and pursuing their prey when ascending after the dive (Austin et al*.,* 2021). Brown booby diet is principally medium to large surface schooling prey (northern pilchard, Indian anchovy, flying fish and cephalopods), often associated with feeding tunas and mackerels (Cannell et al. 2022; Austin et al*.,* 2021).

Brown boobies are not prone to waterlogging and will roost on the seas surface and are known to form large aggregations on oil and gas platforms throughout the NWMR (Surman pers obs.), Woodside facilities indicating wider distribution of non-breeding individuals across the NWMR.

Breeding/foraging BIAs for the brown booby in the NWMR are associated with breeding colonies on Ashmore Reef, Adele Island, White Island, Lacepede Islands and Bedout Island (Figure 8-3). Breeding is reported as occurring between January and March, however this becomes protracted through to October at Ashmore Reef (Clarke et al., 2016). Brown Boobies are resident in the NWMR throughout the year, although they may forage long distances over the open ocean (Surman and Nicholson. 2011).

Breeding/foraging BIAs for the brown booby in the NWMR are associated with breeding colonies on Ashmore Reef, Adele Island, White Island, Lacepede Islands and Bedout Island (Figure 8-3).

8.2.1.4 Red-Footed Booby (Pelagic Seabird)

The red-footed booby (*Sula sula*) is listed migratory under the EPBC Act and BC Act. Compared to brown boobies, the red-footed booby occurs in fewer numbers across the NWMR. Within the NWMR they breed at Ashmore Reef (up to 100 pairs, Clarke and Herrod, 2016) and Adele Island (14 pairs,

Botle et al., 2004). At Ashmore Reef they have been recorded breeding year-round (Clarke and Herrod, 2016).

The red-footed booby is one of the most widely distributed of the boobies across oceanic waters in the tropical Indian Ocean; during non-breeding, individuals have been observed up to 800 km from their natal colony (Dunlop et al., 2001). However, individuals are limited to a range of 150 km from the breeding colony when breeding (Wiemerskirsch et al., 2005). In the Ashmore area, adults have been detected up to 125 km from the nearest breeding islands during October (unpubl. data, referenced in Clarke and Herrod, 2016).

Red-footed boobies are diurnal foragers, plunge diving for flying fishes (predominately) across their range (Commonwealth of Australia, 2020a). Breeding/foraging BIAs for the red-footed booby are associated with breeding colonies at Ashmore Reef and Adele Island (Figure 8-3).

8.2.1.5 Masked Booby (Pelagic Seabird)

The masked booby (*Sula dactylatra*) is listed as migratory under the EBPC Act. Within the NWMR, the sub-species *Sula dactylatra bedouti* ranges from the Dampier Archipelago, along the entire coast into the NMR and across to Queensland (Merchant and Higgins, 1990). Individuals have also been recorded at Barrow Island.

Within the NWMR, Bedout and Adele Island represent the main breeding locations with 400 and 320 breeding pairs estimated at each respectively (Marchant and Higgins, 1990; Swann et al., 2002). Breeding is also reported at the Ashmore Reef group with up to 30 breeding pairs recorded on Middle Island and 15 pairs on East Island (Burbidge and Fuller, 1996; Hassell et al., 2003; Swann, 2005a; Swann, 2005b; Swann, 2005c; Milton, 2005; Clarke, 2010; Clarke et al., 2016). Up to two pairs have also been recorded breeding in the Lacapede Group (Hassell et al., 2003).

A recent study of individuals from Bedout Island indicated low genetic exchanges (mitochondrial genes) with other masked booby colonies currently studied, suggesting a dependence on local recruitment for population persistence (Kingsley et al., 2019). Further, the low exchange of mitochondrial genes may reflect high breeding site fidelity and limited foraging distances during the breeding season. Due to the concentration in a relatively small number of areas to breed, any catastrophe at these sites (e.g. oil spills, or disturbance/vandalism of nests) could have a substantial impact on the population (Birds Australia, August 2005).

Studies of foraging behaviour of individuals breeding within the NWMR are lacking, however studies at other locations indicate that foraging is diurnal and ranges vary between 100 and 200 km of the breeding colony (Weimerskirch et al., 2008).

There are no BIAs for this species in the NWMR.

8.2.1.6 Common Noddy (Pelagic Seabird)

The common (or brown) noddy (*Anous stolidus*) is listed as migratory under the EPBC Act and BC Act. The species is widespread in tropical and subtropical areas within and beyond Australia. This seabird species is gregarious and normally occurs in flocks, up to hundreds of individuals, when feeding or roosting.

The Houtman Abrolhos is the primary breeding habitat for the common noddy in the Eastern Indian Ocean, although breeding occu rs across offshore islands of the NWMR, albeit in fewer numbers, including Bedout Island, Montebello Islands and Fazer Island (Johnstone et al., 2013), and Ashmore Reef (Clark and Herrod, 2016). Breeding at Ashmore Reef has been recorded as occurring between April and November (Clark and Herrod, 2016).

During breeding, individuals nesting on Lancelin Island in the SWMR were found to forage diurnally (Shephard et al., 2018). Tracked individuals travelled an average of 97 km from the colony with an average trip distance of 141 km, with significantly longer trips during chick rearing compared to incubation (Shephard et al., 2018).

The species is highly pelagic outside breeding (March to August), with breeding individuals of the Houtman Abrolhos Islands travelling ~950 km north to the NWMR (Surman et al*.,* 2017). The species is often reported roosting on unmanned oil and gas platforms within the NWS and Timor Sea (Surman pers comm, 2021).

Although widespread across the NWMR during breeding and non-breeding, no BIAs for this species are located in the NWMR.

8.2.1.7 Bridled Tern (Pelagic Seabird)

The bridled tern (*Onychiprion anaethetus*, listed as *Sterna anaethetus*) is listed migratory under the EPBC Act and BC Act. It is a common summer breeding visitor to the NWMR between September and April, especially around Dampier Archipelago and the Montebello Islands (Johnstone et al., 2013). Breeding has also been reported on the Lowendal Islands (Nicholson, 2002), Passage Islands and islands off Onslow from November–March (Johnstone et al., 2013). Small breeding populations have also been recorded on East Island at Ashmore Reef between April–November and the Lacapede Islands (Clarke and Herrod, 2016; Johnstone and Storr, 1998).

The migration and local movements of breeding birds within the NWMR are poorly defined; two individuals were tracked departing the Houtman Abrolhos islands in April/May, transiting along the continental shelf waters before departing Australian waters and migrating towards the Western Celebes Sea, east of Borneo (Surman et al., 2018). These individuals departed the Western Celebes Sea in August/September returning to the Houtman Abrolhos islands around 14 days later (Surman et al., 2018). This species has been regularly recorded on the continental shelf up to 70 km away from breeding locations during oceanic surveys (Surman and Nicholson, 2011; Dunlop et al., 2001).

Bridled terns feed diurnally on a range of species of fish, crustaceans, cephalopods and insects. In Australia, they feed almost entirely on fish, though they also take crustaceans and aquatic insects. They often feed on schools of fish forced to the surface by other predators (Dunlop, 1997). Bridled Terns forage mainly by contact dipping, with birds hovering or gliding close to the surface of the sea and swooping down and immersing only the head and breast when attacking prey, which are usually taken from the top few centimetres of the sea surface (<20 cm) (Dunlop, 1997).

During breeding at Penguin Island, WA, individuals foraged most commonly between 20 km and 40 km from the nearest breeding colony, though some were observed at distances up to 80 km (Dunlop, 1997). This species has also been recorded within 70 km of their breeding colonies within the NWMR, on outer continental shelf waters (Nicholson, 2002; Dunlop et al., 2001).

Although foraging may be concentrated around breeding colonies during the breeding season, no BIAs in the NWMR have been identified for this species.

8.2.1.8 Frigate Birds (Pelagic Seabirds)

The lesser (*Fregata ariel*) and great frigatebirds (*Fregata minor*) are both listed migratory under the EBPC Act and BC Act. They are the most widely distributed of the frigatebirds, with a pan-tropical distribution.

In the NWMR, the great frigatebird nests at Ashmore Reef and Adele Island. At Ashmore Reef they are found to breed year-round (Clark and Herrod, 2016). In addition to the Ashmore Reef and Adele Island, the lesser frigatebird also nests at Cartier Island, the Lacepede Islands and Bedout Island, which is thought to support more than 1% of the world's breeding population (BirdLife International, 2021). On Ashmore Reef, the species breed in the Austral winter (Clark and Herrod, 2016).

During breeding, great frigatebirds breeding in the South China Sea on average foraged 75 km (maximum 150 km) from their breeding colony and lesser frigatebirds 123 km (maximum 300 km) (Mott et al*.,* 2017).

Outside of breeding, frigatebirds may disperse significant distances from their breeding colonies (Mott et al*.,* 2017). Great frigatebirds are wide ranging, being recorded between 900–1400 km from

their natal colonies (Dunlop et al*.,* 2001). Tracking studies of non-breeding lesser and great frigatebirds roosting on Ashmore Reef and Adele Island demonstrated that individuals have large distributions including Australian coastal waters and in addition to the South China, Java and Sulu Seas and the Gulf of Thailand (Mott et al*.,* 2021). During the wet season in particular, Australian waters provided optimal habitat for non-breeding individuals of both species. (Mott et al*.,* 2021).

Both frigatebirds forage by snatching prey from the surface waters, or when prey break the surface. They also rely heavily upon kleptoparasitism, harrying other seabirds returning to their colonies with food until it is regurgitated. Frigatebirds are susceptible to waterlogging, so do not plunge or splash dive for prey nor do they roost on the seas surface. Across the NWMR they forage on flying fish, cephalopods, anchovies, northern pilchards and other medium sized prey (8–30 cm, Surman pers. obs.).

Breeding/foraging BIAs for the great frigatebird in the NWMR are associated with breeding colonies on Ashmore Reef and Adele Island. For the lesser frigatebird, breeding/foraging BIAs are associated with breeding colonies on Ashmore Reef, Adele Island, White Island, Lacepede Islands and Bedout Island (Figure 8-4).

8.2.1.9 White-tailed Tropicbird (Pelagic Seabird)

The white-tailed tropicbird (*Phaethon lepturus*) is listed migratory under the EBC Act and BC Act. The species breeds across many sites, but in low numbers (Commonwealth of Australia, 2020). In Australia, between 6000 and 12,000 pairs nest on Christmas Island, with smaller fragmented populations at North Keeling Island (40 pairs). These individuals are expected to be members of the Christmas Island white-tailed tropicbird sub species *Phaethon lepturus fulvus*. While individuals of this subspecies can forage at great distances from colonies (see below), the numbers occurring in the NWMR are expected to be low.

In the NWMR, the white-tailed tropicbird is known to nest on Ashmore Reef and the Rowley Shoals, (10 breeding pairs and up to three nesting pairs; Clark, 2010; Burbidge et al., 1996, respectively). Breeding can occur year-round (Clarke and Herrod, 2016).

Pennycuick et al. (1990) demonstrated that the white-tailed tropicbirds breeding in Puerto Rico foraged up to 89 km from the nest site when breeding and moved considerably larger distances when not breeding. Dunlop et al. (2001) observed birds from Christmas Island foraging singly between 1400–1600 km south-east of Christmas Island.

This species regularly roosts on the seas surface, in between bouts of foraging. It is a solitary forager, rarely feeding in association with other seabird species and always in waters favourable for its principal prey, flying fish (Santos et al*.,* 2018). The species is a surface forager that occasionally undertakes shallow dives (Marchant and Higgins, 1990).

There are breeding BIAs associated with nesting occurring at the Rowley Shoals and Ashmore Reef within the NWMR (Figure 8-5).

8.2.1.10 Red-tailed Tropicbird (Pelagic Seabird)

The red-tailed tropic bird is listed as Endangered (since December 2023) under the EPBC Act and ‘Priority 4’ under the BC Act.

Across the NWMR, the largest population breeds on Christmas Island (1400–2000 pairs, references within Sommerfeld et al., 2015) with additional key breeding locations on Cocos (Keeling) Group and islands of Ashmore Reef Marine Park (17–24 breeding pairs, Clarke et al., 2011; Clarke and Herrod, 2016). At Ashmore Reef, breeding pairs were observed year-round, with no discernible peak in breeding activity (Clarke et al., 2011).

The red-tailed tropicbird is a shallow diving species typically foraging diurnally within the first 4 m of the water column (LeCorre, 1997). There is limited information concerning foraging range when breeding in Australia, but observations at sea in the Ashmore Reef region demonstrate they are

capable of foraging considerable distances from land (unpubl. data, Clarke, 2010). This corroborates data from elsewhere in their global range which reported foraging distances of 240 km during incubation, 109 km during chick rearing and maximum distances of 380 km (Fayat et al., 2023). This species has been observed during boat surveys of the outer shelf of the NWMR year-round (Surman and Nicholson, 2011).

There are no BIAs for this species within the NWMR.

8.2.1.11 Australian Fairy Tern (Nearshore Seabird)

The Australian fairy tern (*Sternula nereis nereis*) is listed vulnerable under the EPBC Act. The WA breeding population (approximately 5000–6000 mature individuals) is dispersed over approximately 2500 km of coastline (Greenwell, 2021). Within Western Australia, the subspecies comprises a sedentary Pilbara population and a partially-migratory population extending from Exmouth to Point Malcolm. Individuals of the partially-migratory population may occasionally migrate into the southern region of the NWMR during the winter months.

Within the NWMR breeding occurs in small colonies between June-September on offshore islands, including Simpson Island, Barrow Island, the Montebello Islands, the Lowendal Islands, Thevenard Island, Serrurier Island, the islands in the Dampier Archipelago, Maryanne Shoals and Egret Island (Dunlop, 2018; Johnstone et al., 2013; Surman pers. obs.). Colonies tend to occupy areas rather than fixed sites, and nest sites can be abandoned after one or more years, even if they have been successful (Saunders and de Rebeira, 1985).

While information regarding foraging ecology of this species within the NWMR is lacking, the Australian fairy tern has been studied in South Australia. Here, species typically forages in inshore waters and has been reported to rarely travel beyond 2 km during the breeding season in South Australia (Paton and Rogers, 2009).

Australian fairy terns are diurnal plunge diving seabirds, feeding exclusively on small (<60 mm) surface schooling bait fishes throughout their range. Prey include species of sprats, hardy heads and larval prey of some demersal fish species. Unlike many other terns, fairy terns are not dependent upon large pelagic fishes to drive their prey to the surface.

Breeding and foraging BIAs are identified for the fairy tern in the NWMR, as presented in Figure 8-2.

8.2.1.12 Little Tern (Nearshore Seabird)

The little tern (*Sternula albifrons*) is listed migratory under the EPBC Act and BC Act. There are three sub-populations of little tern in Australia and two of these occurring in the NWMR: the northern Australian breeding subpopulation occurring around Broome and extending across the NWMR to Cape York, and an east Asian breeding subpopulation, with the terns present from Shark Bay to south-eastern Queensland during the Austral summer.

Recent surveys have found that little terns breed across the NWMR in small colonies (Surman pers. obs.). However, identification between subpopulations is difficult, and population estimates have high error due to the overlapping range and remote breeding sites of the northern populations. A southwards movement of breeding distribution has been noted at three key locations; Lowendal Islands (Surman pers comm.), Burrup Peninsula (Nicholson pers comm.), and North-west Cape (Greenwell and Dunlop, 2021). Little terns usually forage close to their breeding colonies, typically within 5 km (Bertolero et al*.,* 2005) mainly on small fish (<10 cm in length), but they also eat crustaceans, insects, annelids and molluscs.

Little is known about the breeding and foraging ecology of little terns, however BIAs for foraging and resting have been identified across the NWMR (Figure 8-2), with a peak in breeding activity between June and October.

8.2.1.13 Roseate Tern (Nearshore Seabird)

The roseate tern (*Sterna dougallii*) is listed migratory under the EPBC Act and BC Act. This species is generally sub-tropical in distribution and there are many breeding populations in the NWMR, including Ashmore Reef, Bonaparte Archipelago, Lacepede Islands, Dampier Archipelago and the Lowendal Islands.

The largest roseate tern breeding colony in Western Australia is in the Houtman Abrolhos Islands (Surman and Nicholson, 2009). Large colonies breed within the Lowendal Island and Montebello Island region where there is a stronghold for this species (Higgins and Davies, 1996). A large breeding colony has also been recorded on Goodwyn Island on the Dampier Archipelago (Higgins and Davies, 1996). Peak breeding times across the NWMR are between May to August.

Birds are known to usually move away from breeding colonies following breeding, but their non-breeding range is not well defined (Higgins and Davies, 1996). Many non-breeding roseate terns have been observed at several remote locations in the Kimberley and there are high numbers also recorded at the Eighty Mile Beach Ramsar site (Surman pers obs).

Roseate terns will forage diurnally, up to 60 km from their colonies and always over deeper shelf waters, rather than shallow coastal areas (Surman and Wooller, 2003). Roseate terns will also readily raft (roost in flocks on the sea surface) after foraging episodes (Commonwealth of Australia, 2020).

Roseate terns predominately eat small pelagic fish taken by plunge diving or surface dipping, typically foraging in dense flocks overflying predatory fishes that push their prey to the surface. Roseate terns may plunge to 20 cm depth.

Breeding BIAs across the NWMR are associated with known breeding colonies on islands, while a resting BIA encompasses Eighty Mile Beach (Figure 8-2).

8.2.1.14 Caspian Tern

The Caspian tern (*Hydroprogne caspia*) is listed migratory under the EPBC Act and BC Act. It is moderately common across coastlines of the NWMR and offshore islands (Johnstone et al*.,* 2013).

Breeding occurs as solitary nests or in colonies of up to 52 breeding pairs mainly on islands, including North Turtle Island, Dampier Archipelago including Enderby Island, and Frazer Island, and occasionally on mainland coasts, such as Cape Preston and the Northwest Cape, from late March to early November (Johnstone et al*.,* 2013).

During breeding, adults can forage up to 60 km from the colony during this period to catch fish and meet their elevated energetic requirements at this time (Burger et al., 1996; Balance et al*.,* 2008). The Caspian tern is a diurnal forager, with the length and frequency of foraging trips, as well as relative time spent foraging or attending chicks, changing with food resource availability (Dunlop and McNeill, 2017).

Caspian tern usually forage in shallow, sheltered waters, by plunge-diving for various prey species (Serventy et al*.,* 1971).

Although foraging BIAs occur in the SWMR, no BIAs for this species have been identified in the NWMR.

8.2.1.15 Greater Crested Tern

The greater crested tern (*Thalasseus bergii*) is listed migratory under the EPBC Act and BC Act. The species is widespread along coastlines of the NWMR and offshore islands (Johnstone et al*.,* 2013).

Many populations remain sedentary in their breeding areas or disperse locally (del Hoyo et al*.,* 1996), although some are more migratory (Urban et al*.,* 1986). The species breeds in large, dense colonies, or in small groups of fewer than ten pairs amidst colonies of other species, such as silver gull (del Hoyo et al., 1996). Colonies are located on islands, including those as far offshore as Bedout,

Legendre and the Montebello and Lowendal Islands (Johnstone et al., 2013). Adult breeders have shown both high site fidelity and also flexibility in their breeding localities depending upon the spatial and temporal reliability of food resources (Crawford et al., 2002).

Breeding occurs from late March to May (Johnstone et al., 2013). During breeding, greater crested terns conduct short, diurnal foraging trips close (<40 km) to the colony (Surman and Wooller, 2003; Rock et al., 2007; McLeay et al., 2010) with most foraging behaviour displayed by individuals at distances >5 km (McLeay et al., 2010).

The chicks are predominantly fed pelagic fish, a diet that varies among colonies and years (Chiaradia et al., 2002; McLeay et al., 2009). Adults may forage more widely on inshore reef fish (Surman and Wooller, 2003), crustaceans and cephalopods using a plunge diving method (Commonwealth of Australia, 2020a).

Although there is known habitat use in the NWMR, there are no designated BIAs for the greater crested tern in the NWMR.

8.2.2 Moderate-occurrence Key Seabird Species

Species descriptions for moderate occurrence key pelagic and nearshore seabird species are summarised in Table 8-2.

Table 8-2: Species summary for moderate occurrence pelagic and nearshore seabird species within the NWMR

Species	NMWR presence	Predominant feeding behaviour	Diet
Amsterdam albatross	Year-round low-density presence associated with foraging breeding and non-breeding individuals	Diurnal and nocturnal Dipping, surface-seizing, diving to depths ≥2 m	Squid, fish and crustaceans
Flesh-footed shearwater	Non-breeding, migration: Jun–Aug	Diurnal and nocturnal Pursuit-plunging, surface-seizing	Fish, cephalopods
Soft-plumaged petrel	Non-breeding, migration: Jan–Jun	Diurnal and nocturnal Dipping, surface-seizing	Crustaceans, fish
Streaked shearwater	Non-breeding: Dec–Apr	Diurnal and nocturnal Surface-seizing	Fish, squid, crustacean
Wilson's storm petrel	Non-breeding: Jun–Dec	Diurnal and nocturnal Dipping, surface-seizing	Crustaceans, fish
Common tern	Non-breeding: Aug–Mar	Diurnal Surface-plunging, dipping	Fish

8.2.3 Biologically Important Areas for Seabirds in the NWMR

A review of the Australian Marine Spatial Information System (GA, 2024) identified BIAs representing important life cycle stages and behaviours for nine species of seabird in the NWMR. These are presented in Table 8-3.

Table 8-3: Seabird BIAs within the NWMR (source: AMSIS, 2024 [accessed on 12/08/24])

Seabird Species	Woodside Activity Area			BIAs			
	Browse	NWS/S	NWC	Breeding/Foraging	Foraging	Breeding	Resting
Australia fairy tern	-	✓	✓	-	No foraging BIAs in the NWMR Foraging in high numbers: the BIA is located in the SWMR including the Houtman Abrolhos Islands	Dampier Archipelago, Montebello, Lowendal and Barrow Island Groups, south Ningaloo and Bernier Island of Shark Bay	-
Wedge-tailed shearwater	✓	✓	✓	Widespread area of the NWMR offshore and inshore waters	Foraging in high numbers: the BIA is located in the SWMR including the Houtman Abrolhos Islands	-	-
Great frigatebird	✓	-	-	Ashmore Reef, Adele Island	-	-	-
Lesser frigatebird	✓	✓	-	Off Eighty Mile Beach, Lacepedes, Adele Island, North Kimberley and Ashmore Reef	-	-	-
Brown booby	✓	✓	-	Off Eighty Mile Beach, Lacepedes, Adele Island, North Kimberley and Ashmore Reef	-	-	-
Red-footed booby	✓	-	-	Adele Island, Ashmore Reef	-	-	-
Little tern	✓	✓	-	Rowley Shoals, Adele Island	-	-	-
Roseate tern	✓	✓	✓	-	No foraging BIAs in the NWMR Foraging (provisioning young) and foraging BIAs located in the SWMR – Houtman Abrolhos Islands, the nearest BIA to the NWMR	Dampier Archipelago, Montebello, Lowendal and Barrow Island Groups, south Ningaloo and barrier island of Shark Bay	Eighty Mile Beach
White-tailed tropicbird	✓	✓	-	-	-	Rowley Shoals Ashmore Reef	-

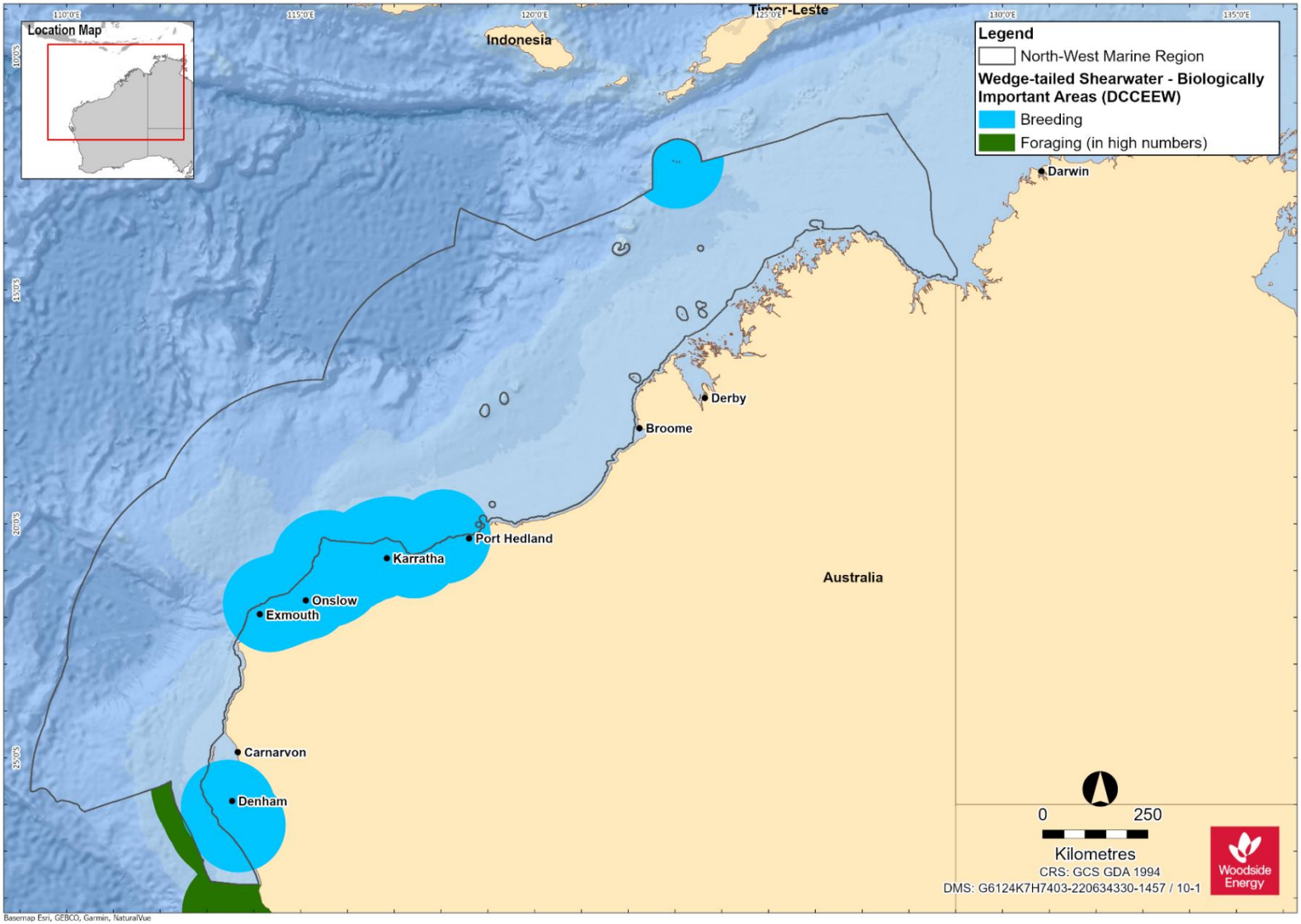


Figure 8-1: Wedge-tailed shearwater BIAs for the NWMR (data source: DCCEEW, 2024b)

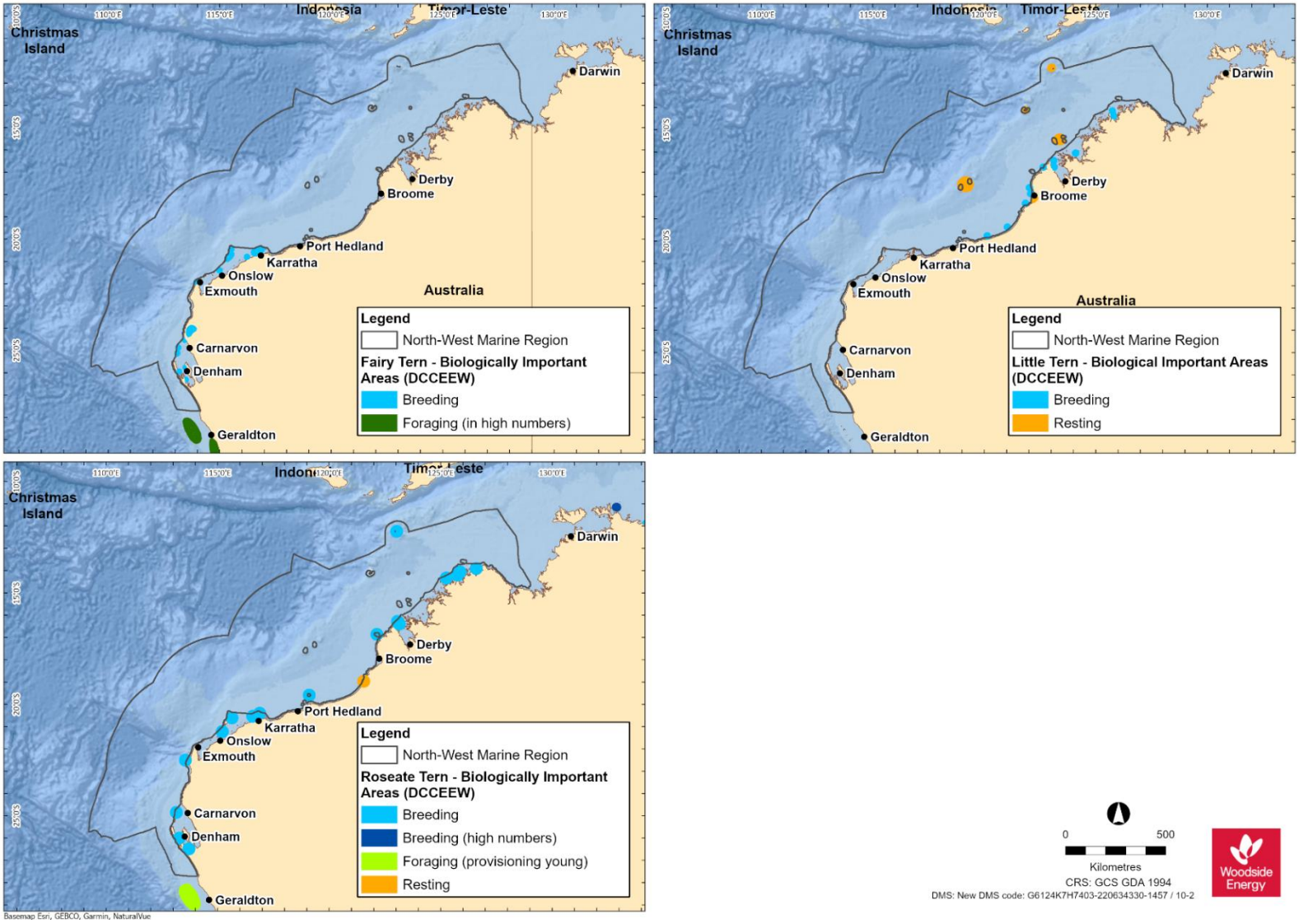


Figure 8-2: Tern species BIAs for the NWMR (data source: DCCEEW, 2024b)

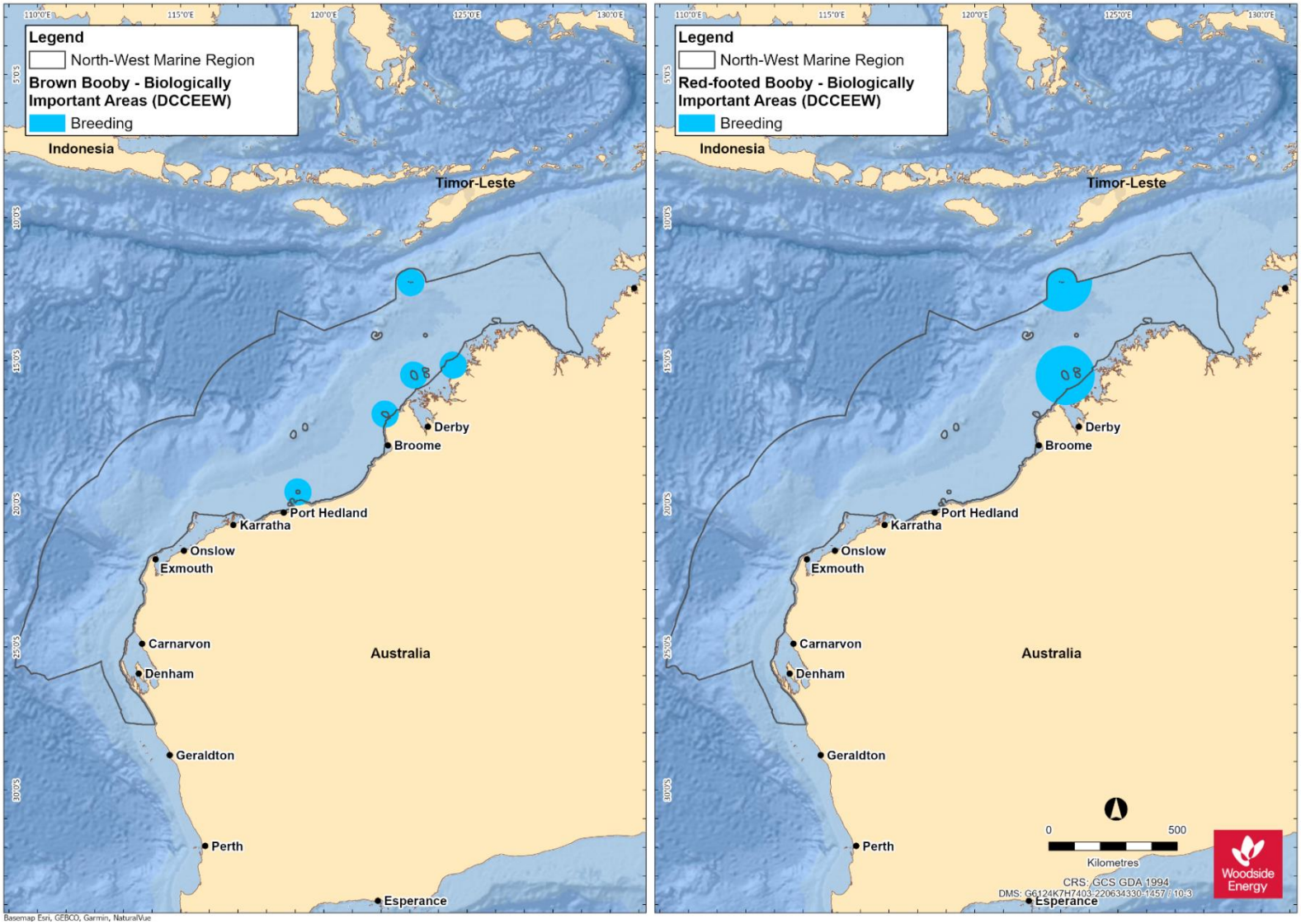


Figure 8-3: Red-footed and brown booby BIAs for the NWMR (data source: DCCEEW, 2024b)

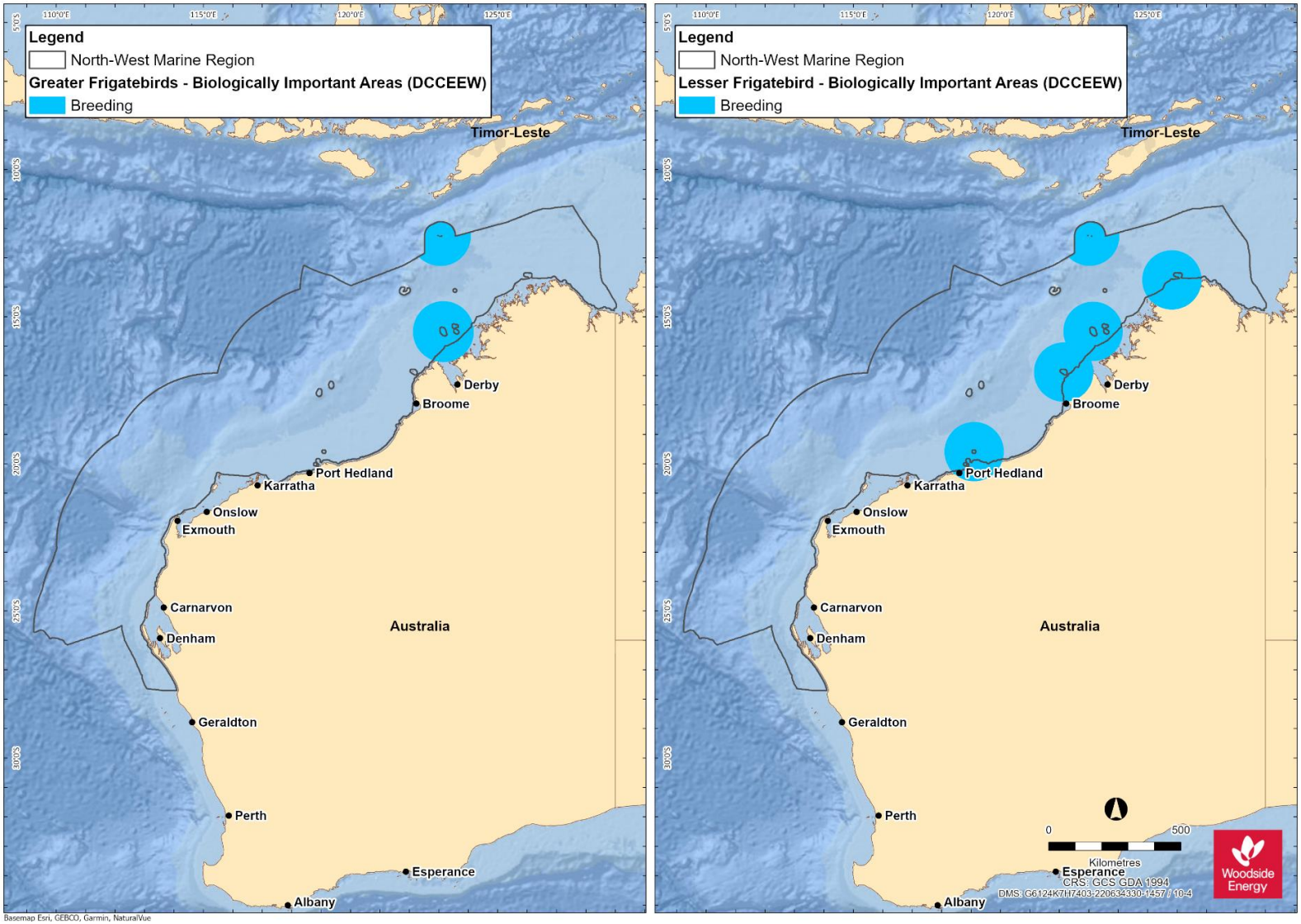


Figure 8-4: Greater and lesser frigatebird BIAs for the NWMR (data source: DCCEEW, 2024b)

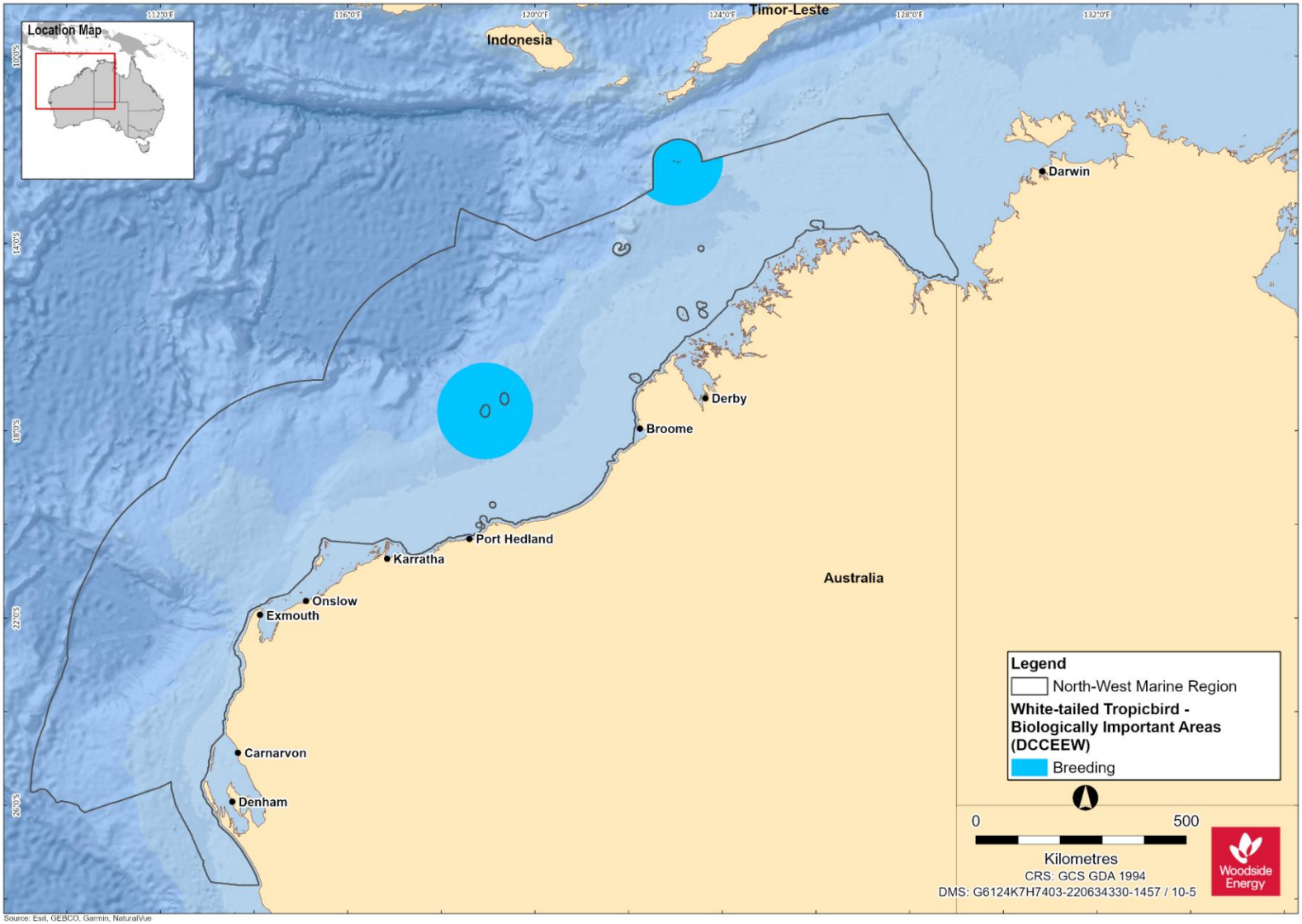


Figure 8-5: White-tailed tropicbird BIAs for the NWMR (data source: DCCEEW, 2024b)

8.2.4 Seabird Summary for NWMR

8.2.4.1 Browse

The Browse activity area includes biologically important habitat for seven threatened and/or migratory seabird species:

- wedge-tailed shearwater (breeding/foraging)
- great and lesser frigatebirds (breeding/foraging)
- brown booby (breeding/foraging)
- red-footed booby (breeding/foraging)
- little tern (breeding/foraging)
- roseate tern (breeding and resting)
- white-tailed tropicbird (breeding).

BIAs for the seabird species are outlined in Table 8-3.

8.2.4.2 North West Shelf / Scarborough

The NWS / Scarborough activity area includes biologically important habitat for seven threatened and/or migratory seabird species:

- Australian fairy tern (breeding)
- wedge-tailed shearwater (breeding/foraging)
- lesser frigatebird (breeding/foraging)
- brown booby (breeding/foraging)
- white-tailed tropicbird (breeding)
- little tern (breeding/foraging)
- roseate tern (breeding and resting).

BIAs for the seabird species are outlined in Table 8-3.

8.2.4.3 North-west Cape

The North-west Cape activity area includes biologically important habitat for three threatened and/or migratory seabird species:

- Australian fairy tern (breeding)
- wedge-tailed shearwater (breeding/foraging)
- roseate tern (breeding and resting).

BIAs for the seabird species are listed and described in Table 8-3.

8.3 Shorebirds

Shorebirds (migratory and resident species) are generally associated with wetland or coastal environments, and the NWMR hosts many shorebird species, particularly in the Austral summer (refer to Appendix A for the EPBC Act PMST reports on listed species of shorebirds). Shorebirds may use coastal environments for feeding, nesting or migratory stopovers. In coastal environments, shorebirds generally feed during low tide on exposed intertidal mud and sand flats, and roost in suitable habitat

above the high- water mark.

The NWMR is situated within the East Asian – Australian Flyway (EAAF), a geographic region supporting populations of migratory shorebirds throughout their annual cycle. The EAAF extends from breeding grounds in the Russian tundra, Mongolia and Alaska southwards through east and south-east Asia, to non-breeding areas of Indonesia, Papua New Guinea, Australia and New Zealand (Weller and Lee, 2017). All shorebird species identified undertake annual migrations from breeding sites in the northern hemisphere to more southern non-breeding sites within the EAAF (Bamford et al., 2008).

The EAAF encompasses a large proportion of the NWMR. Migratory shorebirds may migrate through the offshore areas of the NWMR between overwinter grounds in Australia and breeding sites in the northern hemisphere (Bamford et al., 2008). Peak migration occurs between March and May (northern migration) and August and November (southern migration) (Bamford et al., 2008). Migration routes of some migratory shorebird species have been characterised using band recoveries (Minton et al 2006), however the migration pathways taken between sightings are poorly understood.

Migratory shorebird species are present in Australia during the non-breeding period (December to February), in coastal and inland habitats where adult birds build up the energy reserves necessary to support northward migration and subsequent breeding (Commonwealth of Australia, 2015c). During this time, individuals must maintain an energy intake greater than their energy expenditure to recover from the southward migration, to allow moulting, and to build fat reserves in preparation for the northward migration (Commonwealth of Australia, 2015c). The high energy demands of migration means that both foraging and resting during the non-breeding period are vital for individual fitness and survival.

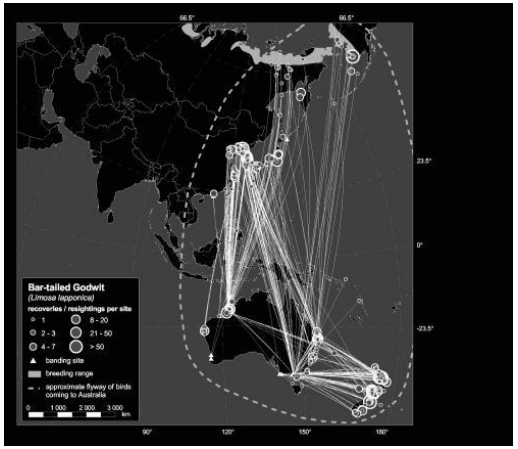
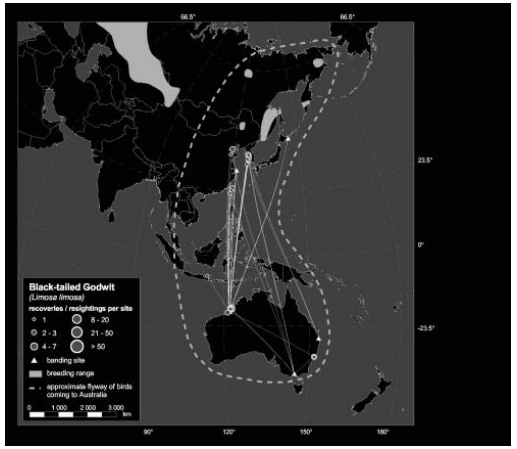
Due to differences in coastal or wetland habitat requirements between roosting and foraging behaviours, areas used most by migratory shorebirds usually comprise networks of foraging and roosting habitats. Shorebirds move between areas of this network depending on the time of day, availability of resources, levels of disturbance and environmental conditions (Commonwealth of Australia, 2015c). Displacement from one habitat or the other may result in utilisation of sub-optimal habitat and/or increase energetic demands via increased distance between habitats.

Within the EAAF, “a wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird” (Ramsar Convention Bureau, 2000). All shorebirds identified as high occurrence key species occur in shoreline habitats within the NWMR for at least part of their non-breeding season in Australia.

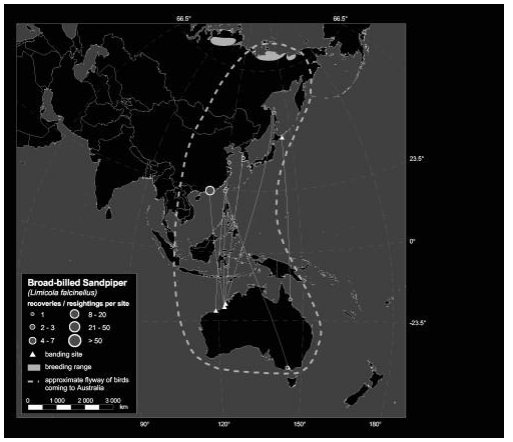
Ashmore Reef is documented as a BIA for migratory shorebirds in the NWMR (DSEWPAC, 2012a).

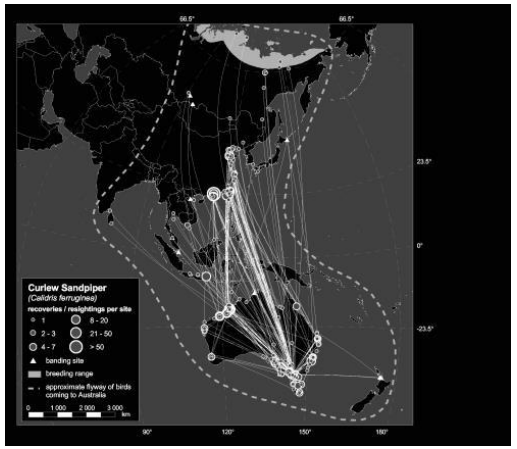
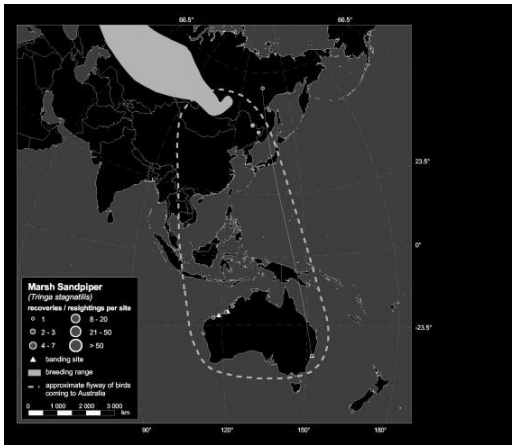
Species descriptions, including information on migration routes where available, for key high and moderate occurrence shorebird species are provided in Table 8-4 and Table 8-5. It should be noted that Minton et al. (2006) did not report on the Pilbara region or Exmouth Gulf, so the migratory pathways may be incompletely depicted.

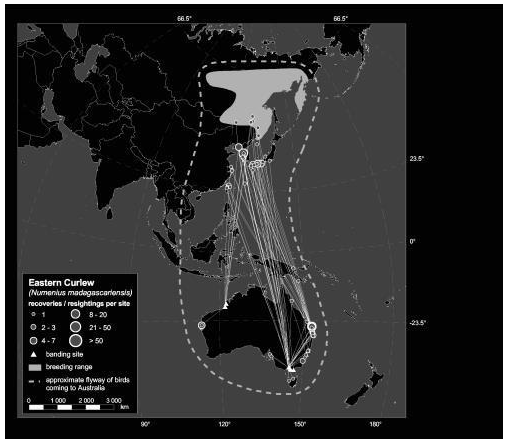
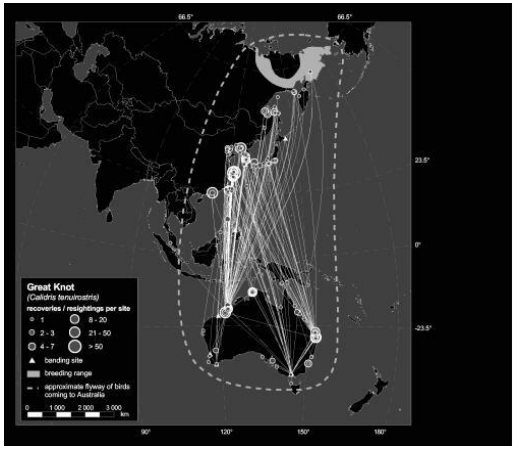
Table 8-4: Species summary for high and selected moderate occurrence key shorebird species

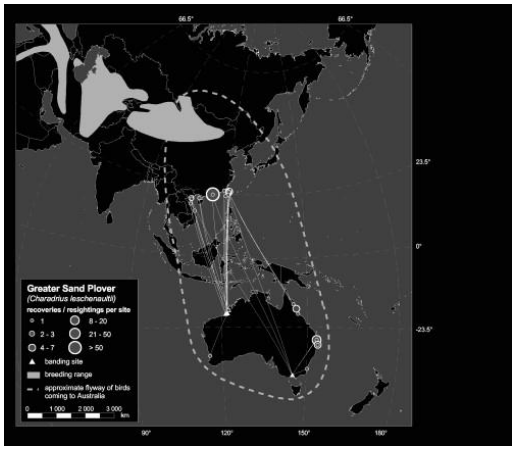
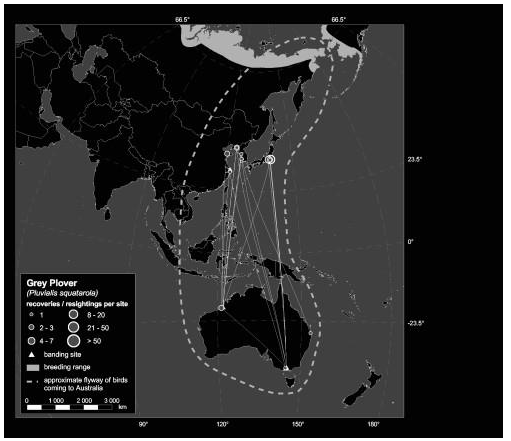
Species	Presence in NWMR	Roosting habitat	Foraging habitat	Diet	Migration From Minton et al (2006)
Bar-tailed godwit[20]	Widespread around the coast as far east as Derby, with a few scattered records elsewhere in the Kimberley *Internationally important site:* • Roebuck Bay • Eighty Mile Beach	Sandy beaches, sandbars, spits and also in near-coastal saltmarsh	Tidal estuaries and harbours	Worms, molluscs, crustaceans, insects and some plant material	
Black-tailed godwit	Found in coastal regions of all States and Territories of Australia *Internationally important site:* • Roebuck Bay	Claypan	Intertidal mudflats or sandflats	Annelids, crustaceans, arachnids, fish eggs and spawn and tadpoles	

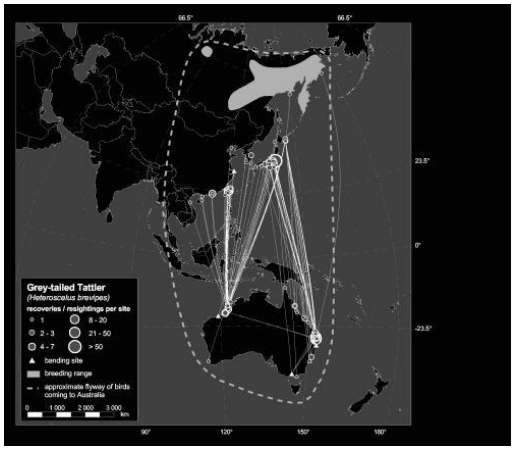
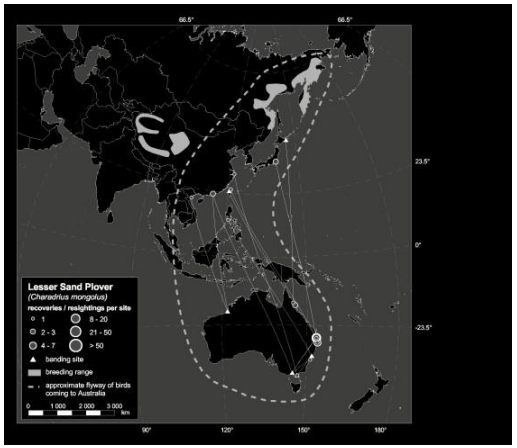
[20] Nominate species Limosa lapponica. Subspecies which may occur includes L. l menzbieri, which is listed Critically Endangered under the EPBC Act. Specific information on L. l menzbieri is lacking, but information regarding habitat use and diet for the nominate species is considered applicable.

Species	Presence in NWMR	Roosting habitat	Foraging habitat	Diet	Migration From Minton et al (2006)
Broad billed sand piper	Regular visitor to coasts of the Pilbara and Kimberley between Onslow and Broome *Internationally important site:* • Port Hedland Saltworks	Sheltered sandy, shelly or shingly beaches	Mudflats, mangroves	Worms, including polychaetes, molluscs, crustaceans, insects and seeds	
Common redshank	Records in the Gascoyne region, Coral Bay and Carnarvon Widespread from the Dampier Saltworks to Roebuck Bay and Broome Ashmore Reef	Sheltered coastal wetlands such as bays, river estuaries, lagoons, inlets and saltmarsh	Bare mud or sand, or on algal deposits, round the edges of wetlands	Worms, molluscs, crustaceans, arachnids and insects	Not available

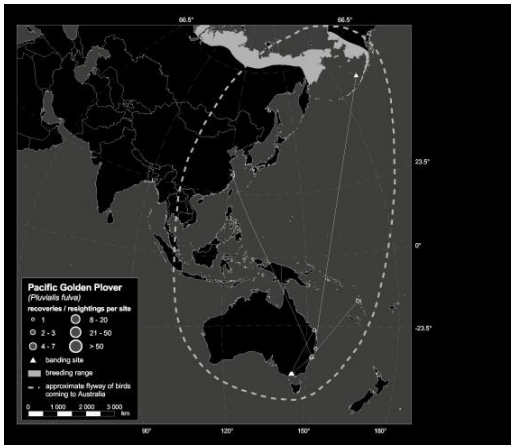
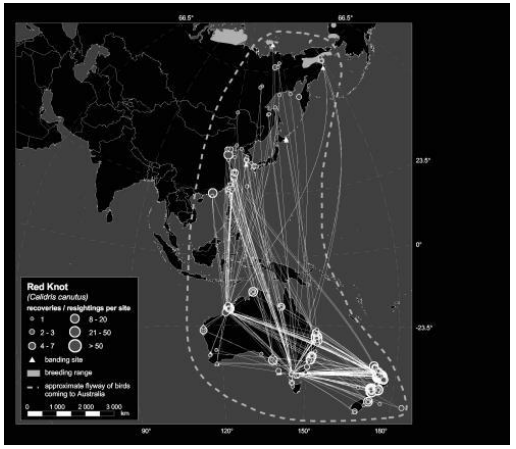
Species	Presence in NWMR	Roosting habitat	Foraging habitat	Diet	Migration From Minton et al (2006)
Curlew sandpiper	Widespread around coastal and subcoastal plains Non-breeding one year old birds may remain in Australia rather than migrating north *Internationally important site:* • Dampier Saltworks • Port Hedland Saltworks • Eighty Mile Beach • Roebuck Bay	Bare dry shingle, shell or sand beaches, sandspits and islets in or around coastal or near-coastal lagoons and other wetlands	Mudflats and nearby shallow water	Worms, molluscs, crustaceans, and insects, as well as seeds	
Marsh sandpiper	Widespread, notable areas include Eighty Mile Beach, Port Hedland Saltworks	Tidal mudflats	Mudflats, marshy vegetation	Molluscs, crustaceans and insects	

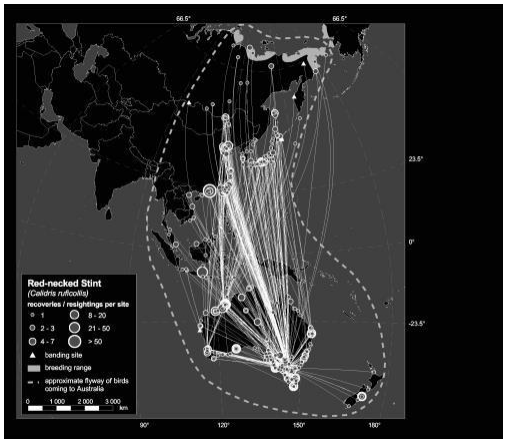
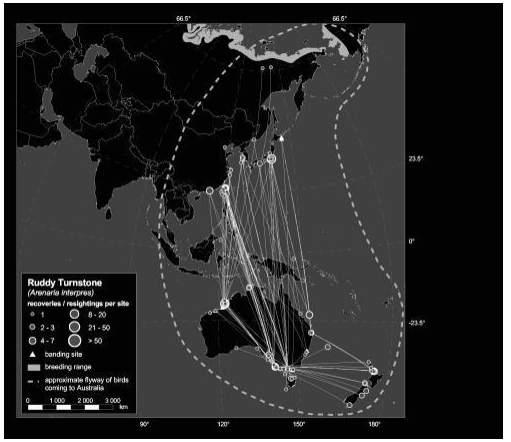
Species	Presence in NWMR	Roosting habitat	Foraging habitat	Diet	Migration From Minton et al (2006)
Eastern curlew	Continuous distribution from Barrow Island and Dampier Archipelago through the Kimberley region *Internationally important site:* • Eighty Mile Beach • Roebuck Bay	Sandy spits, sandbars and islets, beaches near the high-water mark, coastal vegetation including low saltmarsh or mangroves	Soft sheltered intertidal sandflats or mudflats, saltflats and saltmarsh, in proximity to mangroves, among rubble on coral reefs, and beaches near the tideline	Crustaceans small molluscs, insects	
Great knot	Common on the coasts of the Pilbara and Kimberley, from the Dampier Archipelago to the Northern Territory border *Internationally important site:* • Eighty Mile Beach • Roebuck Bay	Roosts in large groups in open areas, often at the water's edge or in shallow water close to feeding grounds	Sheltered coastal habitats with large intertidal mudflats or sandflats	Bivalves, gastropods, crustaceans and other invertebrates	

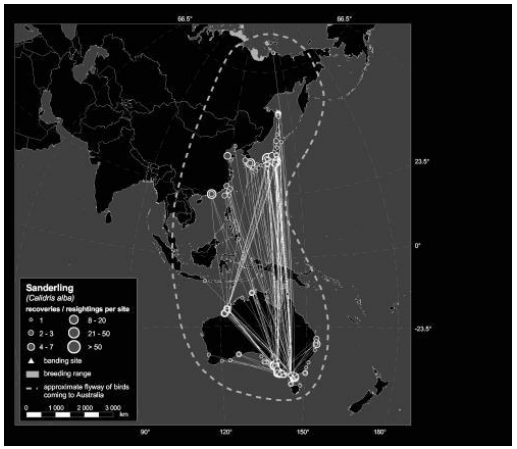
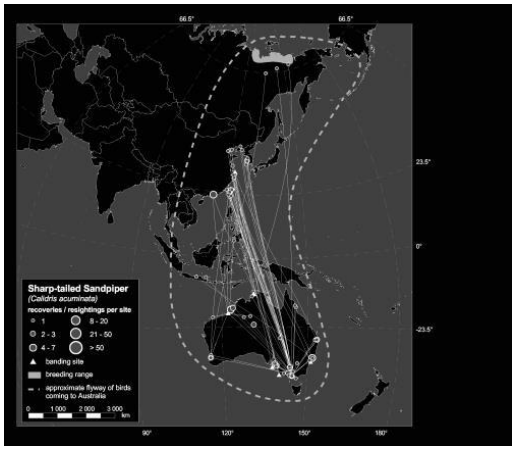
Species	Presence in NWMR	Roosting habitat	Foraging habitat	Diet	**Migration** From Minton et al (2006)
Greater sand plover	Widespread between North-west Cape and Roebuck Bay *Internationally important site:* • Eighty Mile Beach • Roebuck Bay	Sand-spits and banks on beaches or in tidal lagoons	Surface of wet sand or mud on open intertidal flats of sheltered embayments, lagoons or estuaries	Molluscs, worms, crustaceans and insects	
Grey plover	Widespread in coastal areas across Australia *Internationally important site:* • Eighty Mile Beach • Roebuck Bay	Sandy habitats including unvegetated sandbanks or sand-spits, sheltered beaches, estuaries or lagoons	Large areas of exposed mudflats and beaches of sheltered coastal shores	Molluscs, insects and their larvae, crustaceans and polychaete worms	

Species	Presence in NWMR	Roosting habitat	Foraging habitat	Diet	Migration From Minton et al (2006)
Grey-tailed tattler	Widespread from Houtman Abrolhos and the mainland adjacent to the Kimberley *Internationally important site:* • Barrow Island • Roebuck Bay • Eighty Mile Beach • Lacepede Islands	Branches of mangroves, snags or driftwood	Shallow water on hard intertidal substrates, such as reefs and rock platforms, in rock pools and among rocks and coral rubble	Polychaetes, molluscs, crustaceans, insects and, occasionally, fish	
Lesser Sand Plover	*Widespread, internationally important site:* • Eighty Mile Beach • Roebuck Bay • Broome • Port Hedland Saltworks	Beaches, banks, spits of sand or shell, occasionally rocky spits, islets and reefs	Exposed intertidal sandflats and mudflats of beaches or estuaries, occasionally shallow water in saltworks	Molluscs, worms, crustaceans and insects	

Species	Presence in NWMR	Roosting habitat	Foraging habitat	Diet	Migration From Minton et al (2006)
Oriental plover	Most records are along the north- western coast, between Exmouth Gulf and Derby in Western Australia *Internationally important site:* • Dampier Saltworks • Port Hedland Saltworks • Eighty Mile Beach • Roebuck Bay	Soft wet mud or in shallow water of beaches and tidal mudflats	Short grass, hard stony bare ground, mudflats or among beachcast seaweed on beaches	Insects, including termites, beetles, grasshoppers, crickets	Not available
Oriental pratincole	Widespread along the coasts of the Pilbara and Kimberley *Internationally important site:* • Eighty Mile Beach • Roebuck Plains	Bare areas such as claypans or areas with low vegetation, such as saltmarsh	Open plains, floodplains or short grassland, artificial wetlands (saltworks), beaches, mudflats and islands, or around coastal lagoons Usually feeds aerially, at heights varying from just above the ground up to 300 m	Insects, including dragonflies, cicadas, beetles, moths, ants, termites, locusts, grasshoppers, flies, bees and wasps	Not available

Species	Presence in NWMR	Roosting habitat	Foraging habitat	Diet	Migration From Minton et al (2006)
Pacific golden plover	Widespread along the coasts of the Pilbara and Kimberley *Nationally important site:* • Eighty Mile Beach	Sandy beaches and spits, rocky points, islets, exposed reef, occasionally mangrove and saltmarsh vegetation, beachcast seaweed, levee banks and saltwork evaporation ponds	Sandy, muddy and rocky shores, sheltered estuaries and lagoons, occasionally saltmarsh, mangrove or pasture	Molluscs, polychaete worms, insects, insect larvae, spiders, crustaceans, occasionally seeds, leaves, lizards, bird eggs and fish	
Red knot	Large numbers regularly recorded in north-west Australia *Internationally important site:* • Eighty Mile Beach • Roebuck Bay	Sandy beaches, spits and islets, and mudflats close to feeding grounds	Soft substrate near the water edge including intertidal mudflats and sandflats exposed by low tide	Worms, bivalves, gastropods, crustaceans and echinoderms	

Species	Presence in NWMR	Roosting habitat	Foraging habitat	Diet	Migration From Minton et al (2006)
Red-necked stint	Widespread in coastal areas across Australia *Internationally important site:* • Barrow Island • Port Hedland Saltworks • Eighty Mile Beach • Roebuck Bay	Sheltered beaches, spits, banks or islets of sand, mud, coral or shingle, occasionally in saltmarsh or other vegetation	Feed in dense flocks on bare wet mud such as intertidal mudflats or sandflats, or in very shallow water	Marine worms, molluscs, snails and slugs, shrimps, spiders, beetles, flies and ants	
Ruddy turnstone	Found in most coastal regions across Australia *Internationally important site:* • Barrow Island • Eighty Mile Beach • Roebuck Bay • Lacepede Islands	Beaches above the tideline, among rocks, shells, beachcast seaweed or other debris	Between lower supralittoral and lower littoral zones of foreshores. Often forage among banks of stranded seaweed or other tide-wrack. Occasionally forage on exposed rocky platforms, coral reefs and mudflats	Insects, worms, crustaceans, molluscs, and spiders Occasionally been known to eat fish, birds' eggs and carrion and human food scraps	
Ruff	Periodically recorded in Port Hedland, Kununurra and the Argyle Diamond Mine	Wetlands with exposed mudflats and short dense vegetation	Exposed mudflats with shallow water and dry mud	Moss, plant fibre, seeds, annelid worms, molluscs, crustaceans, spiders, insects, fish and amphibians	Not available

Species	Presence in NWMR	Roosting habitat	Foraging habitat	Diet	Migration From Minton et al (2006)
Sanderling	Occur most of the NWMR coast as far east as Derby *Internationally important site:* • Eighty Mile Beach • Roebuck Bay	Bare sand high on the beach clumps of washed-up kelp coastal dunes rocky reefs and ledge	Open sandy beaches exposed to open sea-swell, exposed sandbars and spits and shingle banks, where they forage in the wave-wash zone and amongst rotting seaweed.	Plants, seeds, worms, crustaceans, spiders, insects. Occasionally on medusae, fish, larger molluscs and crustaceans taken as carrion	
Sharp-tailed sandpiper	Widespread from Cape Arid to Carnarvon, around coastal and subcoastal plains of Pilbara to Kimberley *Internationally important site:* • Port Hedland Saltworks • Eighty Mile Beach	Edges of wetlands, on wet open mud or sand, in shallow water, or in short sparse vegetation, such as grass or saltmarsh	Edge of the water of wetlands or intertidal mudflats, either on bare wet mud or sand, or in shallow water. Also forage among inundated vegetation of saltmarsh, grass or sedges	Seeds, worms, molluscs, crustaceans and insects	

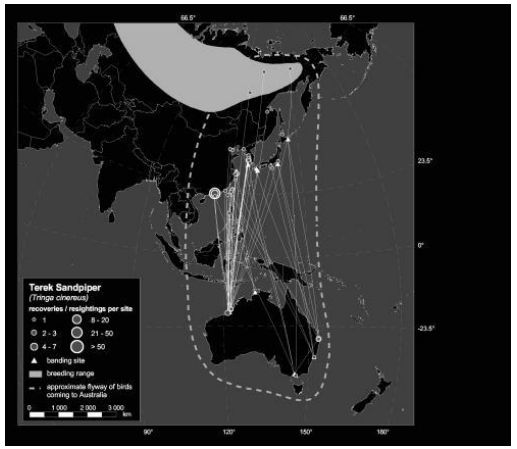
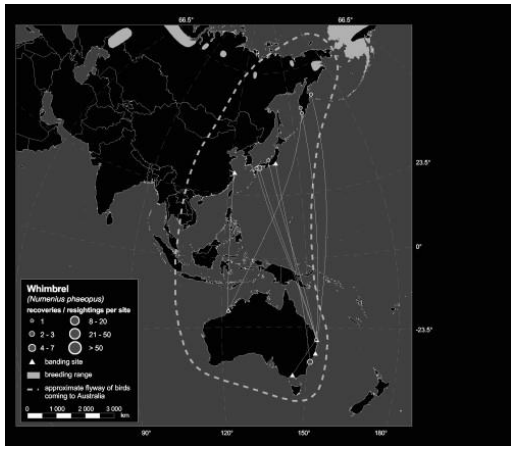
Species	Presence in NWMR	Roosting habitat	Foraging habitat	Diet	Migration From Minton et al (2006)
Terek sandpiper	The species is widespread in the Pilbara and Kimberley, from Dampier to Wyndham, with occasional records around Shark Bay *Internationally important site:* • Eighty Mile Beach • Roebuck Bay	In or among mangroves, may perch in branches or roots up to 2 m from the ground, or in shade beneath	Soft wet intertidal mudflats or in sheltered estuaries, embayments, harbours or lagoons	Crustaceans, insects, seeds, molluscs and arachnids	
Whimbrel	Widespread from Carnarvon to the north-east Kimberley Primarily coastal distribution. There are also scattered inland records of Whimbrels in all regions *Internationally important site:* • Roebuck Bay	Regularly roost in mangroves and other structures flooded at high tide. May also roost on ground of muddy, sandy or rocky beaches; rocky islets and coral cays.	Intertidal mudflats, muddy banks of estuaries and in coastal lagoons, open unvegetated areas or among mangroves. Occasionally on sandy beaches or among rocks	Annelids, crustaceans and, rarely, vertebrates (e.g. small fish, little tern chicks)	

Table 8-5: Species summary for moderate occurrence key shorebird species

Species	NWMR Presence	Roosting Habitat	Foraging Habitat	Diet
Asian dowitcher	Regular visitor to the north-west between Port Hedland and Broome *Internationally important sites:* • Roebuck Bay • Port Hedland saltworks	Coastal lagoons, estuaries and tidal creeks	Intertidal mud flats	Polychaete worms and larvae, also insect larvae and molluscs
Australian painted snipe	Widespread in low numbers	Shallow freshwater wetlands with bare mud and dense canopy cover	Dense vegetation cover, occasionally mudflats and grassland	Vegetation, seeds, insects, worms, molluscs and crustaceans
Little curlew	Widespread with distribution concentrated along the northern coast from Port Hedland during the non-breeding season. *Internationally important sites:* • Roebuck Plains • Roebuck Bay • Anna Plains • Derby Sewage Ponds • Parry Floodplain	Short, dry grassland, and occasionally dry saltmarshes, coastal swamps, mudflats or sandflats in estuaries, or on the beaches of sheltered coasts.	Short, dry grassland and sedgeland with shallow freshwater pools or seasonal inundation	Insects, seeds and berries.
Common greenshank	Occurs in all types of wetlands and has the widest distribution of any shorebird in Australia *Internationally important sites:* • Eighty Mile Beach • Roebuck Bay	Wetlands, shallow pools and puddles, or slightly elevated on rocks, sandbanks or small muddy islets	Edges of wetlands, in soft mud on mudflats, in channels, among pneumatophores of mangroves or other sparse, emergent or fringing vegetation, such as sedges or saltmarsh	Molluscs, crustaceans, insects, and occasionally fish and frogs
Common sandpiper	Widespread in low numbers	Rocks or in roots or branches of vegetation, especially mangroves	Bare soft mud at the edges of wetlands	Molluscs, crustaceans and insects
Pectoral sandpiper	Low numbers recorded across the Gascoyne, Pilbara and Kimberley regions	Coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands	Bare soft mud at the edges of wetlands	Algae, seeds, crustaceans, arachnids and insects

Species	NWMR Presence	Roosting Habitat	Foraging Habitat	Diet
Wood sandpiper	NWMR supports largest numbers in Australia. Notable areas include Parry floodplain, Shark Bay	Low trees, grassy hillocks	Bare soft mud at the edges of wetlands	Insects and molluscs
Long-toed stint	Widespread along the coasts of the Pilbara and Kimberley	Shallow inland wetlands	Wetland or islets with wet mud or shallow water and short vegetation	Seeds, molluscs, crustaceans, insects, occasionally algae
Pin-tailed snipe	Recorded in the Pilbara, Port Hedland, Myaree Pool, Maitland River and near Karratha	Wide variety of wetland habitats including flooded paddy-fields, wet grasslands, seepage swamps and marshland	Muddy shorelines of swamps and along streams	Molluscs, adult and larval insects, earthworms and occasionally crustaceans, seeds and other plant matter
Swinhoe's snipe	Recorded in the Pilbara, Kimberley, Mount Goldsworth, Mount Blaize and near the Mitchell Plateau	Grasses and rushes around the edge of fresh and brackish marshes	Grasses and rushes near the water edge, in addition to hummocks or on mudflats around seepage areas	Earthworms, adult and larval insects

8.4 Other Marine Birds

Species descriptions for high occurrence key other marine bird species are summarised in Table 8-6.

Table 8-6: Species summary for high occurrence key other marine bird species

Species	NWMR presence	Predominant feeding behaviour	Diet
Fork-tailed swift	*Non-breeding:* Oct–Apr Widespread in coastal areas as far north as Carnarvon, including some on nearshore and offshore islands Scattered along the Pilbara coast to the east Kimberley region	Aerial forager, flying anywhere from 1 m to 300 m above the ground to forage Typically feed in flocks ranging from 10 to 1000 birds	Insectivorous
Osprey	*Breeding:* April to February, though depends on latitude. NWMR individuals breeding early in season compared to SWMR *Non-breeding*: remain in breeding territories Continuous distribution of the species around the coast except for a possible gap at Eighty Mile Beach	Hover momentarily and then dive down, sometimes in stages, before snatching prey from near the surface with the feet or by plunging into the water feet first	Fish, especially mullet where available Rarely take molluscs, crustaceans, insects, reptiles, birds and mammals

9. THREATENED AND MIGRATORY SPECIES SEASONAL PRESENCE

Seasonal sensitivity for key threatened and migratory species in the NWMR presented in Table 9-1. The timing presented is displayed as a broad representation for the NWMR, with location specific seasonality presented within Environment Plans (EPs).

Table 9-1: Seasonal sensitivity of key threatened and migratory species in the NWMR

Species	January	February	March	April	May	June	July	August	September	October	November	December
Fishes, Sharks and Rays												
Whale shark – foraging (northward from Ningaloo)[1]												
Whale shark – foraging (high density prey, Ningaloo Reef)[2]												
Dwarf sawfish – reproduction[3]												
Dwarf sawfish – foraging[4]												
Largetooth (freshwater) sawfish – reproduction (pupping)[5]												
Largetooth (freshwater) sawfish – foraging												
Green sawfish (reproduction)												
Green sawfish (foraging)												
Marine Reptiles – MarineTurtle Nesting [note: hatchling emergence is generally 6-8 weeks post-nesting activity]												
Green Turtle												
Ashmore Reef Stock (G-AR)[6]												
Scott Reef-Browse Island Stock (G-ScBr)[7]												
NWS Stock (G-NWS)[8]												
Hawksbill Turtle												
Western Australia Stock (H-WA)[9]												
Flatback Turtle												
Cape Domett Stock (F-CD)[10]												

Species	January	February	March	April	May	June	July	August	September	October	November	December
South-west Kimberley Stock (F-swKim)[11]												
Pilbara Stock (F-Pil)[12]												
Unknown genetic stock Kimberley, Western Australia[13]												
Loggerhead Turtle												
Western Australia Stock (LH-WA)[14]												
Cetaceans												
Fin whale[15]												
Humpback whale – northern migration[16]												
Humpback whale – southern migration[17]												
Humpback whale – reproduction (nursing, Kimberley coast)[18]												
Omura's whale[19]												
Pygmy blue whale – northern migration[20]												
Pygmy blue whale – southern migration[21]												
Southern right whale (calving/presence in NWMR)[22]												
Seabirds (high occurrence seabirds with designated BIAs)												
Wedge-tailed shearwater - breeding / foraging *fledgling emergence (first two weeks of April)				*								
Australian lesser noddy NWMR presence in non-breeding period *breeding – Ashmore Reef and Abrolhos, may forage in NWMR								*	*	*	*	*
Common noddy – breeding												
Bridled tern – breeding and foraging												
Great frigatebird – breeding / foraging *possibly present in NWMR in non-breeding and foraging in breeding season	*	*	*	*	*	*	*	*	*			

Species	January	February	March	April	May	June	July	August	September	October	November	December
Lesser frigatebird – breeding / foraging *possibly present in NWMR in non-breeding and foraging in breeding season	*	*	*	*	*	*	*	*	*			
Brown booby – presence in NWMR (breeding / foraging) Present NWMR year-round (breeding at Ashmore Reef, Adele Island, Lacepedes between Jan-Mar (protracted through to Oct at Ashmore Reef)												
Red-footed booby – presence in NWMR (breeding / foraging) Breed at Ashmore Reef and Adele Island, recorded breeding year-round at Ashmore Reef												
Little tern – breeding / foraging maybe present in NWMR outside breeding season – foraging and resting												
Roseate tern – breeding												
Caspian tern – breeding Dampier Archipelago and North-west Cape												
Greater crested tern												
White-tailed and red-tailed tropicbird – breeding largest breeding populations on Christmas Island												
	Peak period (reliable / predictable)											
	Species present / undertaking biologically important behaviour in the NWMR											
	Species not likely to be present or undertaking biologically important behaviour in NWMR											

[1]Whale shark foraging northward from Ningaloo in Spring (DCCEEW, 2024b[15]). Migration along the north coast of WA also known to occur between July–November (TSSC, 2015d). Potential presence of whale sharks year-round at Ningaloo (Norman et al., 2017).

[2]Whale shark foraging (high density prey) Ningaloo April–June, Autumn (DCCEEW, 2024b[15]). March–July (TSSC, 2015d). Potential presence of whale sharks year-round at Ningaloo (Norman et al., 2017).

[3]Dwarf sawfish reproduction- potential to occur in all seasons (DCCEEW, 2024b[15]).

[4]Dwarf sawfish foraging- potential to occur in all seasons (DCCEEW, 2024b[15]).

[5]Largetooth (freshwater) sawfish pupping occurs from January to May (DCCEEW, 2024b15).

[6]Green turtle nesting Ashmore Reef Stock – year-round (peak: December–January) (CoA, 2017).

[7]*Green turtle nesting Scott Reef-Browse Island Stock November–March (CoA, 2017).*

[8]*Green turtle nesting NWS Stock November–March (CoA, 2017).*

[9]*Hawskbill turtle nesting Western Australia Stock October–February (CoA, 2017).*

[10]*Flatback turtle nesting Cape Domett Stock – year-round (peak July–September) (CoA, 2017).*

[11]*Flatback turtle nesting South-west Kimberley Stock – October–March (CoA, 2017).*

[12] *Flatback turtle nesting Pilbara Stock – October–March (CoA, 2017).*

[13]*Unknown stock nesting Kimberley May–July (CoA, 2017).*

[14]*Loggerhead turtle nesting Western Australia stock November–May.*

[15]*Fin whale presence NWMR May–October (Aulich et al., 2022). Migrating north from Cape Leewuin (SWMR) May–October. Present offshore Dampier August–October (Aulich et al., 2022).*

[16]*Humpback whale northern migration. Range June–September (DCCEEW, 2024b15; TSSC, 2015b; DSEWPaC, 2012a). Peak July–August (Salgado Kent et al., 2012).*

[17]*Humpback whale southern migration. Range July–November. Peak August- October. (TSSC, 2015b; Irvine and Salgado Kent, 2019; Salgado Kent et al., 2012; DSEWPaC, 2012a)*

[18]*Humpback whale – reproduction (nursing, Kimberley coast) Winter (DCCEEW, 2024b15). Breeding August–September (DSEWPac, 2012a; TSSC, 2015b). Calves present off Kimberley in October (Thums et al., 2018).*

[2] *Pygmy blue whale northern migration April–August (DCCEEW, 2024b15; DSEWPaC, 2012a; McCauley et al., 2018; CoA, 2015a). Peak April–July (Thums et al., 2022) refers to Western Australia from the Perth Canyon (April/May) to the North West Shelf (June/July).*

[21]*Pygmy blue whale southern migration October–December, possibly into January (DCCEEW, 2024b15; DSEWPaC, 2012a citing (McCauley and Jenner, 2010; McCauley et al., 2018; Thums et al., 2022; CoA, 2015a). Peak November–December (Thums et al., 2022).*

[22]*Southern right whale calving and migratory presence in Exmouth Gulf (NWMR) June to September with peak months July and August (DCCEEW, 2024a) All seabird seasonality information derived from BIA metadata, scientific publications and expert opinion (Worley, 2024).*

[19]*Limited data however sightings reported year-round (Cerchio et al., 2019).*

10. KEY ECOLOGICAL FEATURES

Key ecological features (KEFs) are elements of the Commonwealth marine environment that are considered to be important for a marine region's biodiversity or ecosystem function and integrity. KEFs have been identified by the Australian Government based on advice from scientists about the ecological processes and characteristics of the area.

KEFs meet one or more of the criteria of:

- a species, group of species, or a community with a regionally important ecological role (e.g. a predator, prey that affects a large biomass or number of other marine species)
- a species, group of species or a community that is nationally or regionally important for biodiversity
- an area or habitat that is nationally or regionally important for:
  - enhanced or high productivity (such as predictable upwellings – an upwelling occurs when cold nutrient-rich waters from the bottom of the ocean rise to the surface)
  - aggregations of marine life (such as feeding, resting, breeding or nursery areas), or
  - biodiversity and endemism (species which only occur in a specific area)
- a unique seafloor feature, with known or presumed ecological properties of regional significance.

Thirteen KEFs are designated within the NWMR, 12 KEFs within the SWMR and eight KEFs within the NMR. These KEFs have been identified in the Protected Matters search (Appendix A) and outlined in Table 10-1, Table 10-2 and Table 10-3, and Figure 10-1, Figure 10-2 and Figure 10-3.

Table 10-1: Key Ecological Features (KEFs) within the NWMR

KEF Name	Woodside Activity Area			Values[1]	Description
	Browse	NWS/S	NW Cape		
Carbonate bank and terrace system of the Sahul Shelf	✓	-	-	Unique seafloor feature with ecological properties of regional significance Regionally important because of their role in enhancing biodiversity and local productivity relative to their surrounds. The carbonate banks and terraces provide areas of hard substrate in an otherwise soft sediment environment which are important for sessile species	The carbonate banks and terrace system of the Sahul Shelf are located in the western Joseph Bonaparte Gulf and to the north of Cape Bougainville and Cape Londonderry. The carbonate banks and terraces are part of a larger complex of banks and terraces that occurs on the Van Diemen Rise in the adjacent NMR. The bank and terrace system of the Van Diemen Rise covers approximately 31,278 km^2 and forms part of the larger system associated with the Sahul Banks to the north and Londonderry Rise to the east. The feature is characterised by terrace, banks, channels and valleys (DSEWPAC, 2012c). The banks, ridges and terraces of the Van Diemen Rise are raised geomorphic features with relatively high proportions of hard substrate that support sponge and octocoral gardens. These, in turn, provide habitat to other epifauna, by providing structure in an otherwise flat environment (Przeslawski et al., 2011). Plains and valleys are characterised by scattered epifauna and infauna that include polychaetes and ascidians. These epibenthic communities support higher order species such as olive ridley turtles, sea snakes and sharks (DSEWPAC, 2012c).
Pinnacles of the Bonaparte Basin	✓	-	-	Unique seafloor feature with ecological properties of regional significance Provide areas of hard substrate in an otherwise soft sediment environment and so are important for sessile species Recognised as a biodiversity hotspot for sponges The Pinnacles of the Bonaparte Basin KEF is located within both the NWMR and NMR (refer Table 10-3)	The Pinnacles of the Bonaparte Basin provide areas of hard substrate in an otherwise relatively featureless environment, the pinnacles are likely to support a high number of species, although a better understanding of the species richness and diversity associated with these structures is required (DSEWPAC, 2012a, 2012c). Covering >520 km^2 within the Bonaparte Basin, this feature contains the largest concentration of pinnacles along the Australian margin. The Pinnacles of the Bonaparte Basin are thought to be the eroded remnants of underlying strata; it is likely that the vertical walls generate local upwelling of nutrient-rich water, leading to phytoplankton productivity that attracts. aggregations of planktivorous and predatory fish, seabirds, and foraging turtles (DSEWPAC, 2012a, 2012c).

KEF Name	Woodside Activity Area			Values[1]	Description
	Browse	NWS/S	NW Cape		
Ashmore Reef and Cartier Island and surrounding Commonwealth waters	✓	-	-	High productivity, biodiversity and aggregation of marine life that apply to both the benthic and pelagic habitats within the feature	Ashmore Reef is the largest of only three emergent oceanic reefs present in the north-eastern Indian Ocean and is the only oceanic reef in the region with vegetated islands. Ashmore contains a large reef shelf, two large lagoons, several channelled carbonate sand flats, shifting sand cays, an extensive reef flat, three vegetated islands—East, Middle and West islands—and surrounding waters. Rising from a depth of more than 100 m, the reef platform is at the edge of the NWS and covers an area of 239 km². Ashmore Reef and Cartier Island and the surrounding Commonwealth waters are regionally important for feeding and breeding aggregations of birds and other marine life; they are areas of enhanced primary productivity in an otherwise low- nutrient environment (DSEWPAC, 2012a). Ashmore Reef supports the highest number of coral species of any reef off the WA coast.
Seringapatam Reef and the Commonwealth waters in the Scott Reef complex	✓	-	-	Support diverse aggregations of marine life, have high primary productivity relative to other parts of the region, are relatively pristine and have high species richness, which apply to both the benthic and pelagic habitats within the feature	Seringapatam Reef and the Commonwealth waters in the Scott Reef complex are regionally important in supporting the diverse aggregations of marine life, high primary productivity, and high species richness associated with the reefs themselves. As two of the few offshore reefs in the North-west, they provide an important biophysical environment in the region (DSEWPAC, 2012a).

KEF Name	Woodside Activity Area			Values[1]	Description
	Browse	NWS/S	NW Cape		
Continental slope demersal fish communities	✓	✓	✓	High biodiversity of demersal fish assemblages, including high levels of endemism	The diversity of demersal fish assemblages on the continental slope in the Timor Province, the Northwest Transition and the North-west Province is high compared to elsewhere along the Australian continental slope (DSEWPAC, 2012a). The continental slope between North-west Cape and the Montebello Trough has more than 500 fish species, 76 of which are endemic, which makes it the most diverse slope bioregion in Australia (Last et al., 2005). The slope of the Timor Province and the Northwest Transition also contains more than 500 species of demersal fishes of which 64 are considered endemic (Last et al., 2005), making it the second richest area for demersal fishes throughout the whole continental slope. Demersal fish species occupy two distinct demersal biomes associated with the upper slope (225–500 m water depths) and the mid-slope (750–1000 m). Although poorly known, it is suggested that the demersal slope communities rely on bacteria and detritus-based systems comprised of infauna and epifauna, which in turn become prey for a range of teleost fishes, molluscs and crustaceans (Brewer et al., 2007). Higher-order consumers may include carnivorous fishes, deepwater sharks, large squid, and toothed whales (Brewer et al., 2007). Pelagic production is phytoplankton-based, with hot spots around oceanic reefs and islands (Brewer et al., 2007)

KEF Name	Woodside Activity Area			Values[1]	Description
	Browse	NWS/S	NW Cape		
Ancient coastline at 125 m depth contour	✓	✓	✓	Unique seafloor feature with ecological properties of regional significance Provides areas of hard substrate and therefore may provide sites for higher diversity and enhanced species richness relative to surrounding areas of predominantly soft sediment	Several steps and terraces as a result of Holocene sea level changes occur in the region, with the most prominent of these features occurring as an escarpment along the NWMR and Sahul Shelf at a water depth of 125 m. The ancient coastline is not continuous throughout the NWMR and coincides with a well-documented eustatic stillstand at about 130 m depth worldwide (Falkner et al., 2009). Where the ancient coastline provides areas of hard substrate, it may contribute to higher diversity and enhanced species richness relative to soft sediment habitat (Falkner et al., 2009). Parts of the ancient coastline, represented as rocky escarpment, are considered to provide biologically important habitat in an area predominantly made up of soft sediment. The escarpment type features may also potentially facilitate mixing within the water column due to upwelling, providing a nutrient-rich environment. Although the ancient coastline adds additional habitat types to a representative system, the habitat types are not unique to the coastline as they are widespread on the upper shelf (Falkner et al., 2009).
Canyons linking the Argo Abyssal Plain and Scott Plateau	-	✓	-	Facilitates nutrient upwelling, creating enhanced productivity and encouraging diverse aggregations of marine life Likely to be important due to their historical association with sperm whale aggregations	Interactions with the Leeuwin Current and strong internal tides are thought to result in upwelling at the canyon heads, thus creating conditions for enhanced productivity in the region (Brewer et al., 2007). As a result, aggregations of whale sharks, manta rays, humpback whales, sea snakes, sharks, predatory fishes and seabirds are known to occur in the area due to its enhanced productivity (Sleeman et al., 2007).

KEF Name	Woodside Activity Area			Values[1]	Description
	Browse	NWS/S	NW Cape		
Glomar Shoal	-	✓	-	An area of high productivity and aggregations of marine life including commercial and recreational fish species	Glomar Shoal is a submerged littoral feature located about 150 km north of Dampier on the Rowley shelf at depths of 33–77 m (Falkner et al., 2009). Studies by Abdul Wahab et al. (2018) found a number of hard coral and sponge species in water depths less than 40 m. One hundred and seventy different species of fishes were detected with greatest species richness and abundance in shallow habitats (Abdul Wahab et al., 2018). Fish species present include a number of commercial and recreational species such as rankin cod, brown striped snapper, red emperor, crimson snapper, bream and yellow-spotted triggerfish (Falkner et al., 2009; Fletcher and Santoro, 2009). These species have recorded high catch rates associated with Glomar Shoal, indicating that the shoal is likely to be an area of high productivity.
Mermaid Reef and Commonwealth waters surrounding Rowley Shoals	-	✓	-	Regionally important in supporting high species richness, higher productivity and aggregations of marine life	The Mermaid Reef and Commonwealth waters surrounding the Rowley Shoals KEF is adjacent to the three nautical mile State waters limit surrounding Clerke Reef and Imperieuse Reef, and include the Mermaid Reef Marine Park as described in Section 11. The reefs provide a distinctive biophysical environment in the region. They have steep and distinct reef slopes and associated fish communities. In evolutionary terms, the reefs may play a role in supplying coral and fish larvae to reefs further south via the southward flowing Indonesian Throughflow. Both coral communities and fish assemblages differ from similar habitats in eastern Australia (*Done* et al*.*, 1994).

KEF Name	Woodside Activity Area			Values[1]	Description
	Browse	NWS/S	NW Cape		
Exmouth Plateau	-	✓	✓	Unique seafloor feature with ecological properties of regional significance, which apply to both benthic and pelagic habitats Likely to be an important area of biodiversity as it provides an extended area offshore for communities adapted to depths of approximately 1000 m	The Exmouth Plateau is a large, mid-slope, continental margin plateau that lies off the northwest coast of Australia. It ranges in depth from about 500 to more than 5000 m and is a major structural element of the Carnarvon Basin (Miyazaki and Stagg, 2013). The large size of the Exmouth Plateau and its expansive surface may modify deep water flow and be associated with the generation of internal tides; both of which may subsequently contribute to the upwelling of deeper, nutrient-rich waters closer to the surface (Brewer et al., 2007). Satellite observations suggest that productivity is enhanced along the northern and southern boundaries of the plateau (Brewer et al., 2007). Sediments on the plateau suggest that biological communities include scavengers, benthic filter feeders and epifauna (DSEWPAC, 2012a). Fauna in the pelagic waters above the plateau are likely to include small pelagic species and nekton attracted to seasonal upwellings, as well as larger predators such as billfishes, sharks and dolphins (Brewer et al., 2007). Protected and migratory species are also known to pass through the region, including whale sharks and cetaceans.
Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula	-	-	✓	Unique seafloor feature with ecological properties of regional significance The feature creates an enhanced productivity environment, attracting aggregations of fish and higher-order consumers such as large predatory fish, sharks, toothed whales and dolphins	The canyons are associated with upwelling as they channel deep water from the Cuvier Abyssal Plain up onto the slope, Exmouth Plateau and Ningaloo Reef. This nutrient-rich water interacts with the Leeuwin Current at the canyon heads (DSEWPAC, 2012a). Aggregations of whale sharks, manta rays, sea snakes, sharks, large predatory fish, and seabirds are known to occur in this area.
Commonwealth waters adjacent to Ningaloo Reef	-	-	✓	High productivity and diverse aggregations of marine life The Commonwealth waters adjacent to Ningaloo Reef and associated canyons and plateaus are interconnected and support the high productivity and species richness of Ningaloo Reef. Ningaloo Reef is globally significant as it is the only extensive coral reef in the world that fringes the west coast of a continent	The Leeuwin and Ningaloo currents interact, leading to areas of enhanced productivity in the Commonwealth waters adjacent to Ningaloo Reef. Aggregations of whale sharks, manta rays, humpback whales, sea snakes, sharks, large predatory fish, and seabirds are known to occur in this area (DSEWPAC, 2012a). The spatial boundary of this KEF, as defined in the Australian Marine Spatial Information System, is defined as the waters contained in the existing Ningaloo AMP provided in Section 11.

KEF Name	Woodside Activity Area			Values[1]	Description
	Browse	NWS/S	NW Cape		
Wallaby Saddle	-	-	✓	High productivity and aggregations of marine life: Representing almost the entire area of this type of geomorphic feature in the NWMR. It is a unique habitat that neither occurs anywhere else nearby (within hundreds of kilometres) nor with as large an area (Falkner et al., 2009)	The Wallaby Saddle may be an area of enhanced productivity. Historical whaling records provide evidence of sperm whale aggregations in the area of the Wallaby Saddle, possibly due to the enhanced productivity of the area and aggregations of baitfish (DSEWPAC, 2012a).

[1]Values description sourced from Marine bioregional plan for the North-west Marine Region (DSEWPAC, 2012a) and the Department of Agriculture, Water and the Environment (DAWE) SPRAT database.

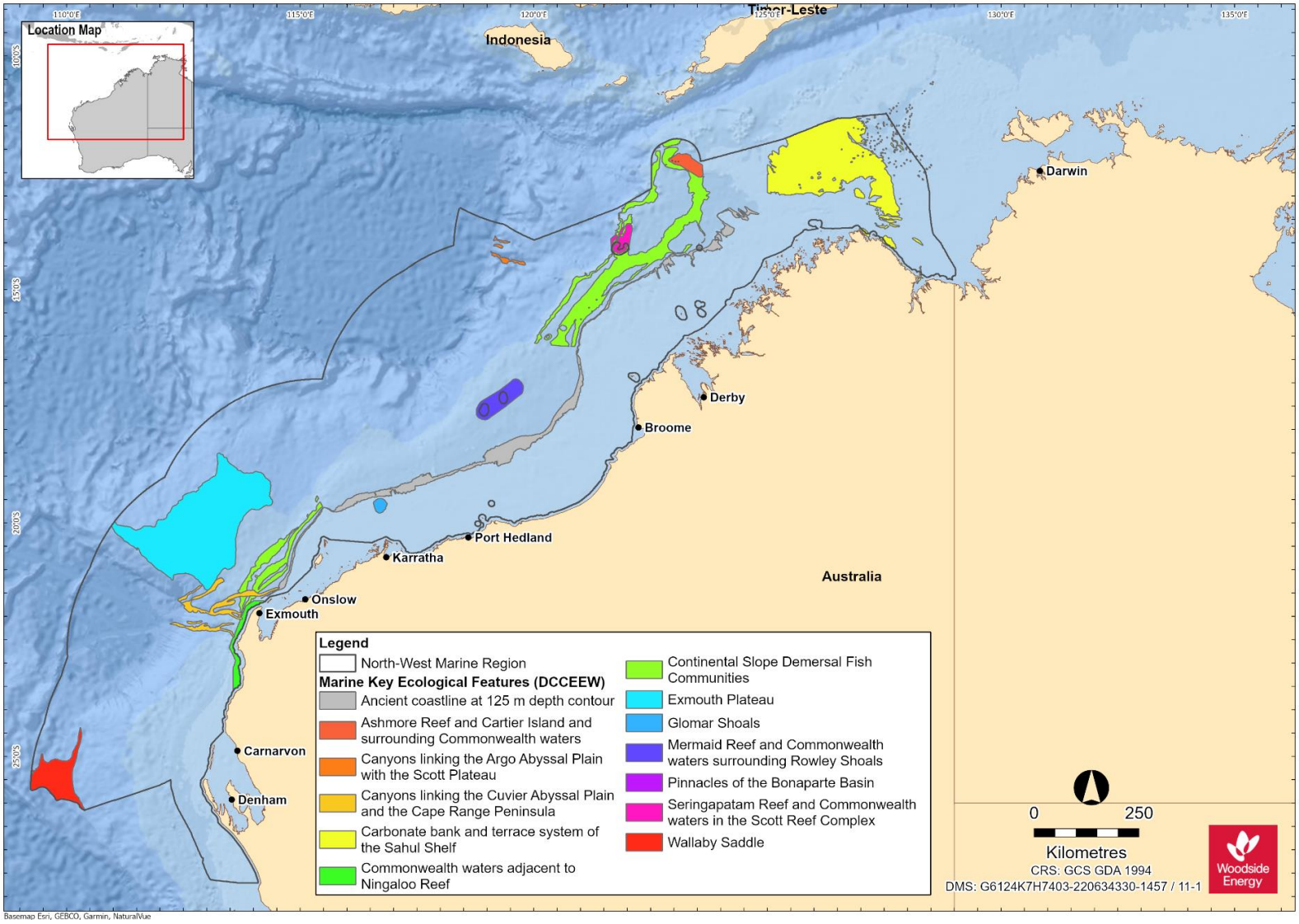


Figure 10-1: KEFs within the NWMR (data source: DCCEEW, 2024d)

Table 10-2: Key Ecological Features (KEFs) within the SWMR

KEF Name	Values[1]	Description
Albany Canyons group and adjacent shelf break	High productivity and aggregations of marine life, and unique seafloor feature with ecological properties of regional significance Both benthic and demersal habitats within the feature are of conservation value	The Albany Canyons group is thought to be associated with small, periodic subsurface upwelling events, which may drive localised regions of high productivity. The canyons are known to be a feeding area for sperm whale and sites of orange roughy aggregations. Anecdotal evidence also indicates that this area supports fish aggregations that attract large predatory fish and sharks.
Ancient coastline at 90-120 m depth	Relatively high productivity and aggregations of marine life, and high levels of biodiversity and endemism The feature creates topographic complexity, that may facilitate benthic biodiversity and enhanced biological productivity	Benthic biodiversity and productivity occur where the ancient coastline forms a prominent escarpment, such as in the western Great Australian Bight, where the sea floor is dominated by sponge communities of significant biodiversity and structural complexity.
Cape Mentelle upwelling	Facilitates nutrient upwelling, supporting high productivity and diverse aggregations of marine life	The Cape Mentelle upwelling draws relatively nutrient-rich water from the base of the Leeuwin Current, up the continental slope and onto the inner continental shelf, where it results in phytoplankton blooms at the surface. The phytoplankton blooms provide the basis for an extended food chain characterised by feeding aggregations of small pelagic fish, larger predatory fish, seabirds, dolphins and sharks.
Commonwealth marine environment surrounding the Houtman Abrolhos Islands (and adjacent shelf break)	High levels of biodiversity and endemism within benthic and pelagic habitats	The Houtman Abrolhos Islands and surrounding reefs support a unique mix of temperate and tropical species, resulting from the southward transport of species by the Leeuwin Current over thousands of years. The Houtman Abrolhos Islands are the largest seabird breeding station in the eastern Indian Ocean. They support more than one million pairs of breeding seabirds.
Commonwealth marine environment surrounding the Recherche Archipelago	Aggregations of marine life and high levels of biodiversity and endemism within benthic and demersal communities	The Recherche Archipelago is the most extensive area of reef in the SWMR. Its reef and seagrass habitat supports a high species diversity of warm temperate species, including 263 known species of fish, 347 known species of molluscs, 300 known species of sponges, and 242 known species of macroalgae. The islands also provide haul-out (resting areas) and breeding sites for Australian sea lions and New Zealand fur seals.

KEF Name	Values[1]	Description
Commonwealth marine environment within and adjacent to the west-coast inshore lagoons	High productivity and aggregations of marine life within benthic and pelagic habitats Important for benthic productivity and recruitment for a range of marine species	These lagoons are important for benthic productivity, including macroalgae and seagrass communities, and breeding and nursery aggregations for many temperate and tropical marine species. They are important areas for the recruitment of commercially and recreationally important fish species. Extensive schools of migratory fish visit the area annually, including herring, garfish, tailor and Australian salmon.
Commonwealth marine environment within and adjacent to Geographe Bay	High productivity and aggregations of marine life, and high levels of biodiversity, recruitment within benthic and pelagic communities	Geographe Bay is known for its extensive beds of tropical and temperate seagrass that support a diversity of species, many of them not found anywhere else. The bay provides important nursery habitat for many species. Juvenile dusky whaler sharks use the shallow seagrass habitat as nursery grounds for several years, before ranging out to adult feeding grounds along the shelf break. The seagrass also provides valuable habitat for fish and invertebrates (Carruthers et al., 2007). It is also an important resting area for migratory humpback whales.
Diamantina Fracture Zone	Unique seafloor feature with ecological properties of regional significance which apply to its benthic and demersal habitats	The Diamantina Fracture Zone is a rugged, deep-water environment of seamounts and numerous closely spaced troughs and ridges. Very little is known about the ecology of this remote, deep-water feature, but marine experts suggest that its size and physical complexity mean that it is likely to support deep-water communities characterised by high species diversity, with many species found nowhere else.
Naturaliste Plateau	Unique seafloor feature with ecological properties of regional significance including high species diversity and endemism which apply to its benthic and demersal habitats	The Naturaliste Plateau is Australia's deepest temperate marginal plateau. The combination of its structural complexity, mixed water dynamics and relative isolation indicate that it supports deep-water communities with high species diversity and endemism.
Perth Canyon and adjacent shelf break, and other west-coast canyons	An area of higher productivity that attracts feeding aggregations of deep-diving mammals and large predatory fish. It is also recognised as a unique seafloor feature with ecological properties of regional significance	The Perth Canyon is the largest known undersea canyon in Australian waters. Deep ocean currents rise to the surface, creating a nutrient-rich cold-water habitat attracting feeding aggregations of deep-diving mammals, such as pygmy blue whales and large predatory fish that feed on aggregations of small fish, krill and squid.

KEF Name	Values[1]	Description
Western demersal slope and associated fish communities of the Central Western Province	Provides important habitat for demersal fish communities and supports species groups that are nationally or regionally important to biodiversity	The western demersal slope provides important habitat for demersal fish communities, with a high level of diversity and endemism. A diverse assemblage of demersal fish species below a depth of 400 m is dominated by relatively small benthic species such as grenadiers, dogfish and cucumber fish. Unlike other slope fish communities in Australia, many of these species display unique physical adaptations to feed on the sea floor (such as a mouth position adapted to bottom feeding), and many do not appear to migrate vertically in their daily feeding habits
Western rock lobster	A species that plays a regionally important ecological role	This species is the dominant large benthic invertebrate in the region. The lobster plays an important trophic role in many of the inshore ecosystems of the SWMR. Western rock lobsters are an important part of the food web on the inner shelf, particularly as juveniles.

[1]Values description sourced from Marine bioregional plan for the South-west Marine Region (DSEWPAC, 2012b) and the DAWE SPRAT database.

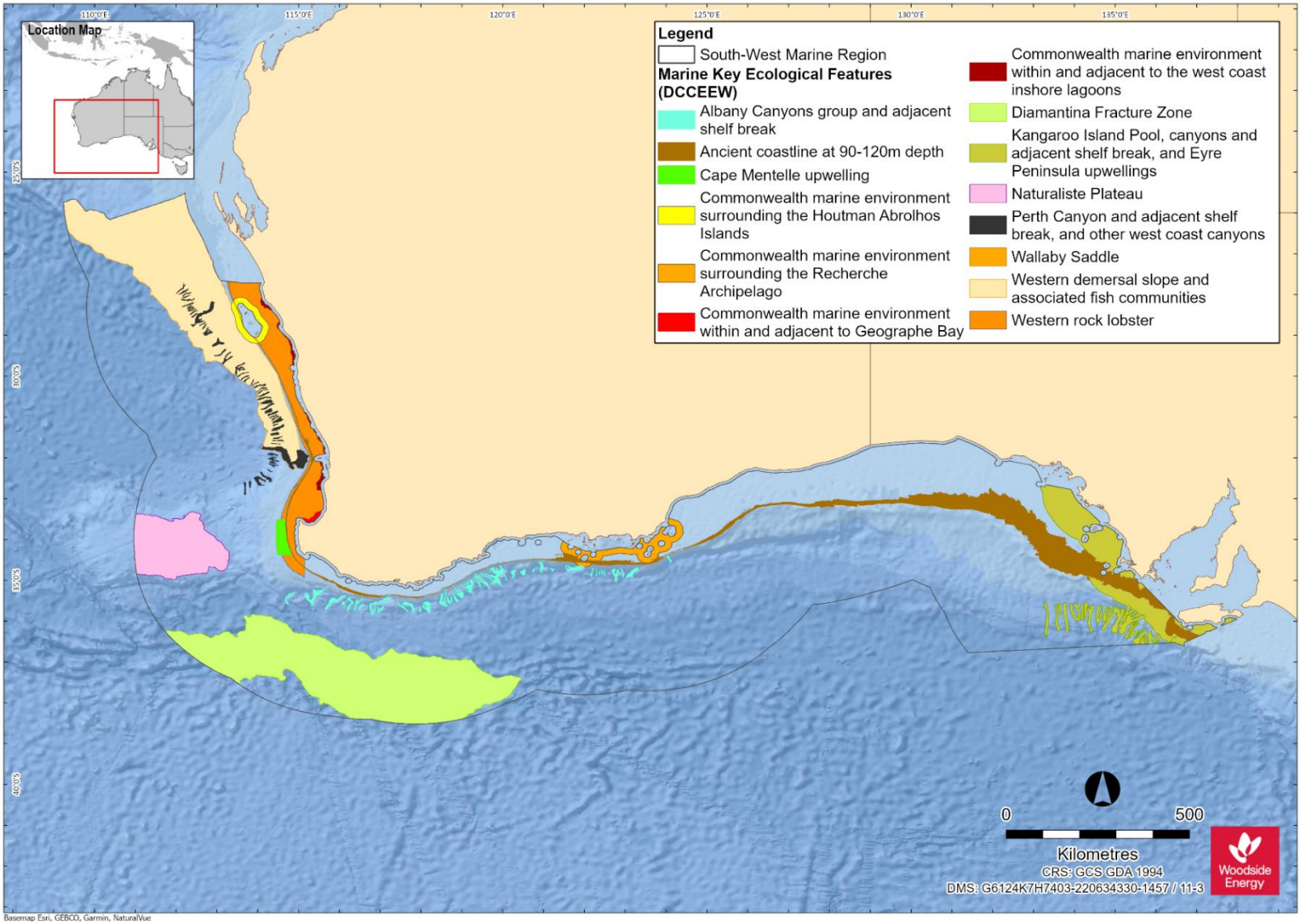


Figure 10-2: KEFs within the SWMR (data source: DCCEEW, 2024d)

Table 10-3: Key Ecological Features (KEFs) within the NMR

KEF Name	Values[1]	Description
Carbonate bank and terrace system of the Van Diemen Rise	Important for its role in enhancing biodiversity and local productivity relative to its surrounds and for supporting relatively high species diversity The feature has been identified as a sponge biodiversity hotspot (Przeslawski et al. 2014)	The bank and terrace system of the Van Diemen Rise is part of the larger system associated with the Sahul Banks to the north and Londonderry Rise to the east; it is characterised by terrace, banks, channels and valleys. The variability in water depth and substrate composition may contribute to the presence of unique ecosystems in the channels. Species present include sponges, soft corals and other sessile filter feeders associated with hard substrate sediments of the deep channels; epifauna and infauna include polychaetes and ascidians. Olive ridley turtles, sea snakes and sharks are also found associated with this feature.
Gulf of Carpentaria basin	Regional importance for biodiversity, endemism and aggregations of marine life relevant to benthic and pelagic habitats	The Gulf of Carpentaria basin is one of the few remaining near-pristine marine environments in the world. Primary productivity in the Gulf of Carpentaria basin is mainly driven by cyanobacteria that fix nitrogen but is also strongly influenced by seasonal processes. The soft sediments of the basin are characterised by moderately abundant and diverse communities of infauna and mobile epifauna dominated by polychaetes, crustaceans, molluscs, and echinoderms. The basin also supports assemblages of pelagic fish species including planktivorous and schooling fish, with top predators such as shark, snapper, tuna, and mackerel.
Gulf of Carpentaria coastal zone	High productivity, aggregations of marine life (including several endemic species) and high biodiversity compared to broader region	Nutrient inflow from rivers adjacent to the NMR generates higher productivity and more diverse and abundant biota within the Gulf of Carpentaria coastal zone than elsewhere in the region. The coastal zone is near pristine and supports many protected species such as marine turtles, dugongs, and sawfishes. Ecosystem processes and connectivity remain intact; river flows are mostly uninterrupted by artificial barriers and healthy, diverse estuarine and coastal ecosystems support many species that move between freshwater and saltwater environments.
Pinnacles of the Bonaparte Basin	Unique seafloor feature with ecological properties of regional significance Provide areas of hard substrate in an otherwise soft sediment environment and so are important for sessile species Recognised as a biodiversity hotspot for sponges The Pinnacles of the Bonaparte Basin KEF is located within both the NWMR and NMR (refer Table 10-1)	Covering more than 520 km^2 within the Bonaparte Basin, this feature contains the largest concentration of pinnacles along the Australian margin. The Pinnacles of the Bonaparte Basin are thought to be the eroded remnants of underlying strata; it is likely that the vertical walls generate local upwelling of nutrient-rich water, leading to phytoplankton productivity that attracts aggregations of planktivorous and predatory fish, seabirds and foraging turtles.
Plateaux and saddle north-west of the Wellesley Islands	High species abundance, diversity and endemism of marine life	Abundance and species density are high in the plateaux and saddle as a result of increased biological productivity associated with habitats rather than currents. Submerged reefs support corals that are typical of northern Australia, including corals that have bleach-resistant zooxanthellae; and particular reef fish species that are different to those found elsewhere in the Gulf of Carpentaria. Species present include marine turtles and reef fish such as coral trout, cod, mackerel, and shark. Seabirds frequent the plateaux and saddle, most likely due to the presence of predictable food resources for feeding offspring.

KEF Name	Values[1]	Description
Shelf break and slope of the Arafura Shelf	The shelf break and slope of the Arafura Shelf is defined as a key ecological feature for its ecological significance associated with productivity emanating from the slope It also forms part of a unique biogeographic province (Last et al., 2005)	The shelf break and slope of the Arafura Shelf is characterised by continental slope and patch reefs and hard substrate pinnacles. The ecosystem processes of the feature are largely unknown in the region; however, the Indonesian Throughflow and surface wind-driven circulation are likely to influence nutrients, pelagic dispersal and species and biological productivity in the region. Biota associated with the feature is largely of Timor–Indonesian Malay affinity.
Submerged coral reefs of the Gulf of Carpentaria	High aggregations of marine life, biodiversity and endemism Twenty per cent of the reefs found in the NMR are situated within this KEF (Harris et al., 2007)	The submerged coral reefs of the Gulf of Carpentaria are characterised by submerged patch, platform and barrier reefs that form a broken margin around the perimeter of the Gulf of Carpentaria basin, rising from the sea floor at depths of 30–50 m. These reefs provide breeding and aggregation areas for many fish species including mackerel and snapper and offer refuges for sea snakes and apex predators such as sharks. Coral trout species that inhabit the submerged reefs are smaller than those found in the Great Barrier Reef and may prove to be an endemic sub-species.
Tributary Canyons of the Arafura Depression	High productivity and high levels of species diversity and endemism of marine life within the benthic and pelagic habitats of the feature	The tributary canyons are approximately 80–100 m deep and 20 km wide. The largest of the canyons extend some 400 km from Cape Wessel into the Arafura Depression, and are the remnants of a drowned river system that existed during the Pleistocene era. Sediments in this feature are mainly calcium-carbonate rich, although sediment type varies from sandy substrate to soft muddy sediments and hard, rocky substrate. Marine turtles, deep sea sponges, barnacles and stalked crinoids have all been identified in the area.

[1]*Values description sourced from Marine bioregional plan for the North Marine Region (DSEWPAC, 2012c) and DAWE SPRAT database.*

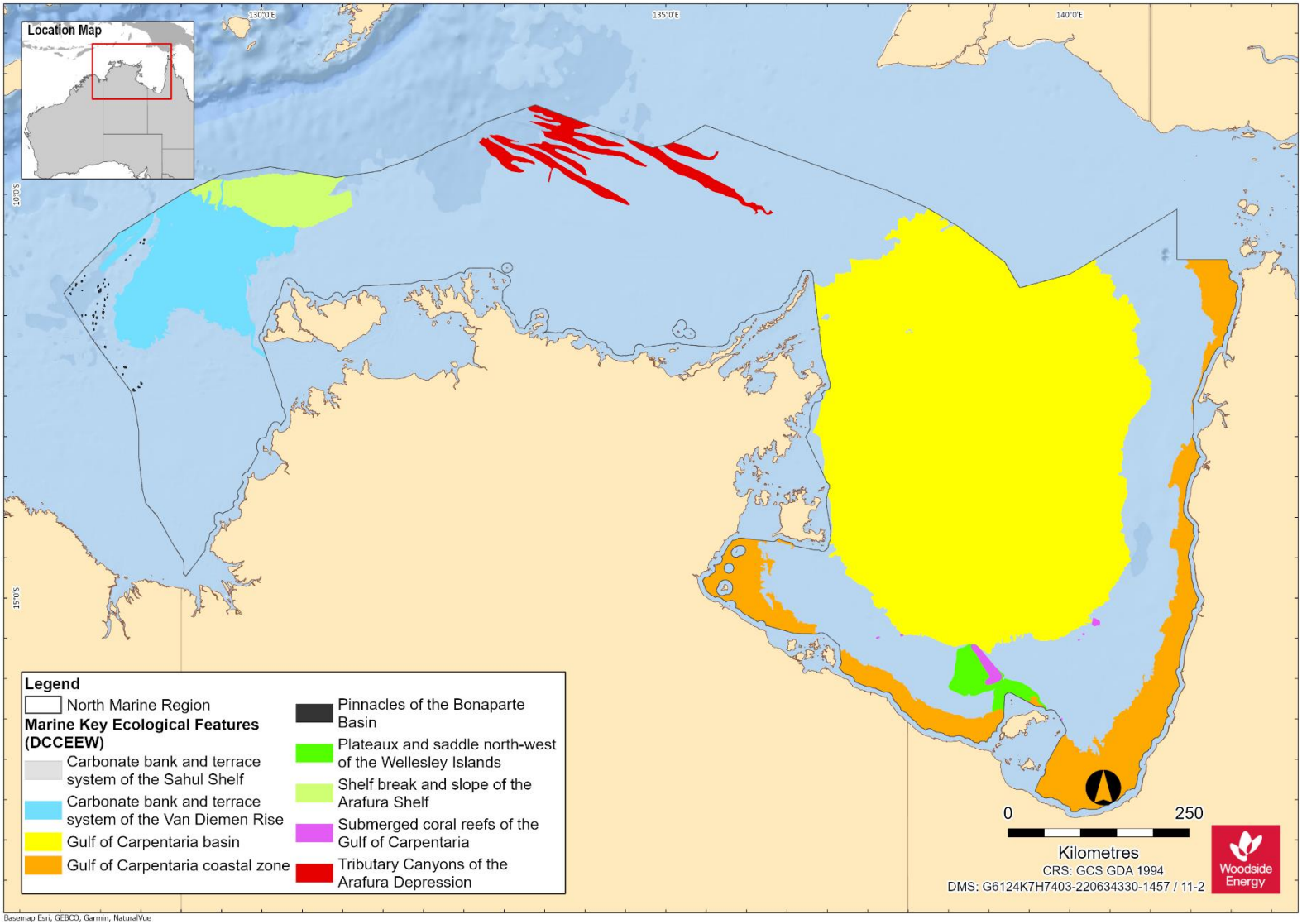


Figure 10-3: KEFs within the NMR (data source: DCCEEW, 2024d)

11. PROTECTED AREAS

11.1 Regional Context

Protected areas include World Heritage Properties, National Heritage Places, Wetlands of International Importance, Australian Marine Parks, State Marine Parks and Reserves, Threatened Ecological Communities and the Australian Whale Sanctuary. The PMST Reports (Appendix A) show that there are 29 protected areas found in the NWMR, 18 in the SWMR and 9 in the NMR.

Australian Marine Parks are outlined in Table 11-1, Table 11-2, Table 11-3 and Table 11-4. All other protected areas of each of the marine regions NWMR, SWMR and NMR are outlined in Table 11-5, Table 11-6, Table 11-7 and Table 11-8 respectively.

11.2 World Heritage Properties

World Heritage listings are sites of outstanding universal value and meet at least 10 selection criteria, compiled of cultural and natural basis criteria. World Heritage listings classed as meeting outstanding natural criteria are discussed in this section and World Heritage sites classed as meeting outstanding cultural criteria are discussed in Section 12.

The list of Australia's World Heritage Properties and the PMST Reports (Appendix A) show two World Heritage Properties within the NWMR (Table 11-6), one World Heritage Property within the SWMR (Table 11-7), and though not reported in the NMR PMST Report, Kakadu National Park World Heritage Area is included in Table 11-8.

11.3 National and Commonwealth Heritage Places – Natural

The National Heritage List is Australia's list of natural, historic, and Indigenous places of outstanding significance to the nation. The National Heritage List Spatial Database describes the place name, class (Indigenous, natural, historic), and status. Commonwealth Heritage Places are a collection of sites recognised for their Indigenous, historical and/or natural values which are owned or controlled by the Australian Government.

Only National and Commonwealth Heritage Places classed as natural are discussed in this section. Heritage Places classed as Indigenous or historic are discussed in Section 12.

A search of the National Heritage List Spatial Database and the PMST Reports Appendix A identified three natural National Heritage Places in the NWMR (Table 11-6), one in the SWMR (Table 11-7) and for the NMR, Kakadu National Park (not included in the PMST report) is included in Table 11-8.

A search of the Commonwealth Heritage List identified six natural commonwealth heritage places within the NWMR (Table 11-8) and one within the SWMR (Table 11-7).

11.4 Wetlands of International Importance (listed under the Ramsar Convention)

Australia has 65 Ramsar wetlands that cover >8.3 million ha. Ramsar wetlands are those that are representative, rare, or unique wetlands, or that are important for conserving biological diversity.

The List of Wetlands of International Importance held under the Ramsar Convention and the PMST Reports (Appendix A) identified four Ramsar Sites with coastal features within the NWMR (Table 11-6), five in the SWMR (Table 11-7) and two for the Northern Territory, included for the NMR (not included in the PMST report) (Table 11-8).

11.5 Australian Marine Parks

Australian Marine Parks (AMPs), proclaimed under the EPBC Act in 2007 and 2013, are located in Commonwealth waters from the outer edge of State and Territory waters (3 NM) to the outer boundary of Australia's EEZ 200 NM from the shore.

PMST Reports (Appendix A) show 16 AMPs within the NWMR, 10 within the SWMR and eight within the NMR. These are displayed in Figure 11-1, Figure 11-2 and Figure 11-3, respectively.

The values of all marine parks identified in the North-West, South-West and North Marine Network management plans are described in Table 11-1, Table 11-3 and Table 11-4, respectively.

There are also two AMPs in the Indian Ocean territories. These are the Cocos (Keeling) Islands Marine Park and the Christmas Island Marine Park (Table 11-2, Figure 11-1) (Commonwealth of Australia, 2021).

11.5.1 North West Marine Parks Network

Table 11-1 describes Australian Marine Parks within the North West Marine Park Network, according to the North West Marine Parks Network Management Plan 2018 (DNP, 2018a).

Table 11-1: Summary of Commonwealth Australian Marine Parks (AMPs) in the North West Marine Park Network

North West Marine Park Network	IUCN Zones	Description and Values
Argo-Rowley Terrace Marine Park	National Park (II) Multiple Use (VI) Special Purpose Zone (Trawl) (VI)	**Description** The Argo–Rowley Terrace Marine Park is located approximately 270 km north-west of Broome, Western Australia, and extends to the limit of Australia's exclusive economic zone. This AMP covers an area of 146,003 km^2 and water depths between 220 m and 6000 m, protecting ecological communities in the deep offshore region. The AMP provides connectivity between the Mermaid Reef Marine Park and WA Rowley Shoals Marine Park.
		Natural values The marine park includes ecosystems representative of: • Northwest Transition—an area of shelf break, continental slope, and the majority of the Argo Abyssal Plain. Key topographic features include Mermaid, Clerke and Imperieuse Reefs • Timor Province—an area dominated by warm, nutrient-poor waters. Canyons are an important feature in this area of the marine park and are generally associated with high productivity and aggregations of marine life. Key ecological features are: • canyons linking the Argo Abyssal Plain with the Scott Plateau • Mermaid Reef and Commonwealth waters surrounding Rowley Shoals. The marine park includes a range of seafloor features such as canyons on the slope between the Argo Abyssal Plain, Rowley Terrace and Scott Plateau. These are believed to be up to 50 million years old and are associated with small, periodic upwellings that results in localised higher levels of biological productivity. The marine park includes species listed under the EPBC Act. Biologically important areas within the marine park include resting and breeding habitat for seabirds and a migratory pathway for the pygmy blue whale.
		Cultural values Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. As noted in the North West Marine Park Management Plan, limited information regarding the cultural significance of this marine park is currently available (DNP, 2018a).
		Heritage values There are no international, Commonwealth or national heritage listings relevant to the Argo-Rowley Terrace Marine Park. The marine park contains two known shipwrecks listed under the *Historic Shipwrecks Act 1976: Alfred* (wrecked in 1908) and *Pelsart* (wrecked in 1908).

North West Marine Park Network	IUCN Zones	Description and Values
		Social and economic values Socio-economic values of this marine park include commercial fishing and mining.
Ashmore Reef Marine Park	Sanctuary (Ia) Recreational Use (IV)	**Description** The Ashmore Reef Marine Park is located approximately 630 km north of Broome and 110 km south of the Indonesian island of Roti. The marine park is located in Australia's External Territory of Ashmore and Cartier Islands. It is within an area subject to a Memorandum of Understanding (MoU) between Indonesia and Australia, known as the MoU Box. The marine park covers an area of 583 km² and water depths from less than 15 m to 500 m.
		Natural values The Ashmore Reef Marine Park includes ecosystems representative of the Timor Province—a bioregion with a depth range from about 200 m near the shelf break to 5920 m over the Argo Abyssal Plain. Ashmore Reef is an important feature of the bioregion. There are two distinct demersal fish communities: one on the upper slope, the other mid slope. The marine environment includes two extensive lagoons, sand flats, shifting sand cays, extensive reef flat and large areas of seagrass. The reef ecosystems are comprised of hard and soft corals, gorgonians, sponges and a range of encrusting organisms, with the highest number of coral species of any reef off the Western Australian coast. This marine park supports a range of species listed under the EPBC Act. Biologically important areas within the marine park include breeding, foraging and resting habitat for seabirds, resting and foraging habitat for migratory shorebirds, foraging, mating, nesting and internesting habitat for marine turtles, foraging habitat for dugong, and a migratory pathway for pygmy blue whales. The Ashmore Reef Ramsar site includes the largest of the atolls in the region. West Island, Middle Island and East Island represent the only vegetated islands in the region. The site supports internationally significant populations of seabirds and shorebirds, is important for turtles (green, hawksbill and loggerhead) and dugong, and has the highest diversity of hermatypic (reef-building) corals on the West Australian coast. It is known for its abundance and diversity of sea snakes, although populations at Ashmore Reef have been in decline since 1998. Key ecological features are: • Ashmore Reef and Cartier Island and surrounding Commonwealth waters • continental slope demersal fish communities—an area of high-diversity demersal fish assemblages.
		Cultural values Sea country is valued for Indigenous Australians cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. As noted in the North West Marine Park Management Plan, there is limited information about the cultural significance of this marine park (DNP, 2018a). This marine park is valued in Indonesian culture as it contains Indonesian artefacts and grave sites. Ashmore lagoon is still accessed as a rest or staging area for traditional Indonesian fishers travelling to and from fishing grounds within the MoU Box.

North West Marine Park Network	IUCN Zones	Description and Values
		Heritage values Ashmore Reef is a Commonwealth Heritage listed site, meeting criteria A, B and C.
		Social and economic values Tourism, recreation and scientific research are important activities in this marine park.
Carnarvon Canyon Marine Park	Habitat Protection (IV)	**Description** The Carnarvon Canyon Marine Park is located approximately 300 km north-west of Carnarvon. It covers an area of 6177 km² and a water depth range of 1500–6000 m.
		Natural values This marine park includes ecosystems representative of the Central Western Transition—a bioregion characterised by large areas of continental slope, a range of topographic features such as terraces, rises and canyons, seasonal and sporadic upwelling, and benthic slope communities. It includes the Carnarvon Canyon, a single-channel canyon covering the entire depth range of this marine park. Ecosystems of this marine park are influenced by tropical and temperate currents, deep-water environments and proximity to the continental slope and shelf. The soft-bottom environment at the base of the Carnarvon Canyon is likely to support deep seafloor species (e.g. holothurians, polychaetes and sea-pens). This marine park supports a range of species listed under the EPBC Act.
		Cultural values Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years.
		Heritage values No international, Commonwealth or national heritage listings apply to the marine park.
		Social and economic values Commercial fishing is an important activity in the marine park.
Cartier Island Marine Park	Sanctuary (Ia)	**Description** The Cartier Island Marine Park is located approximately 45 km south-east of Ashmore Reef Marine Park and 610 km north of Broome, Western Australia. Both marine parks are in Australia's External Territory of Ashmore and Cartier Islands and are also within an area subject to a Memorandum of Understanding (MoU) between Indonesia and Australia, known as the MoU Box. The Cartier Island Marine Park covers an area of 172 km² and water depths from less than 15 m to 500 m.

North West Marine Park Network	IUCN Zones	Description and Values
		Natural values This marine park includes ecosystems representative of the Timor Province—a bioregion with a depth range from about 200 m near the shelf break to 5,920 m over the Argo Abyssal Plain. The reefs and islands of this bioregion are regarded as biodiversity hotspots. Key ecological features are: • Ashmore Reef and Cartier Island and surrounding Commonwealth waters • continental slope demersal fish communities. There are two distinct demersal fish communities of the continental slope: one on the upper slope, the other mid slope. This marine park includes an unvegetated sand island (Cartier Island), mature reef flat, a small, submerged pinnacle (Wave Governor Bank), and two shallow pools to the north-east of the island. It is also an area of high diversity and abundance of hard and soft corals, gorgonians (sea fans), sponges and a range of encrusting organisms. The reef crests are generally algal dominated, while the reef flats feature ridges of coral rubble and large areas of seagrass. This marine park supports a range of species listed under the EPBC Act. Biologically important areas within this marine park include breeding and foraging habitat for seabirds, internesting, nesting and foraging habitat for marine turtles and foraging habitat for whale sharks. This marine park is internationally significant for its abundance and diversity of sea snakes.
		Cultural values Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. As noted in the North-west Marine Park Management Plan, there is limited information about the cultural significance of this marine park (DNP, 2018a).
		Heritage values This marine park contains one known shipwreck listed under the *Historic Shipwrecks Act 1976:* the *Ann Millicent* (wrecked in 1888). No international or national heritage listings apply to this marine park.
		Social and economic values Scientific research is an important activity in this marine park.
Dampier Marine Park	National Park (II) Habitat Protection (IV) Multiple Use (VI)	**Description** The Dampier Marine Park is located approximately 10 km North-east of Cape Lambert and 40 km from Dampier, extending from the Western Australian state water boundary. This marine park covers an area of 1252 km² and a water depth range between less than 15 m and 70 m.

North West Marine Park Network	IUCN Zones	Description and Values
		Natural values This marine park includes ecosystems representative of the Northwest Shelf Province—a dynamic environment influenced by strong tides, cyclonic storms, long-period swells and internal tides. The bioregion includes diverse benthic and pelagic fish communities, and ancient coastline thought to be an important seafloor feature and migratory pathway for humpback whales. This marine park supports a range of species listed under the EPBC Act. Biologically important areas within this marine park include breeding and foraging habitat for seabirds, internesting habitat for marine turtles and a migratory pathway for humpback whales.
		Cultural values Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. The Ngarluma, Yindjibarndi, Yaburara, and Mardudhunera people have responsibilities for sea country in this marine park. The native title holders for these people are represented by the Ngarluma Aboriginal Corporation and Yindjibarndi Aboriginal Corporation. These Prescribed Bodies Corporate represent traditional owners with native title over coastal areas adjacent to this marine park. The Yamatji Marlpa Aboriginal Corporation is the Native Title Representative Body for the Pilbara and Yamatji regions.
		Heritage values No international, Commonwealth or national listings apply to this marine park, however the marine park is approximately 10 km north of the Dampier Archipelago (including Burrup Peninsula) national heritage listing, which has significant Indigenous heritage values including rock art sites.
		Social and economic values Port activities, commercial fishing and recreation, including fishing, are important activities in this marine park.
Eighty Mile Beach Marine Park	Multiple Use (VI)	**Description** The Eighty Mile Beach Marine Park is located approximately 74 km north-east of Port Hedland, adjacent to the Western Australian Eighty Mile Beach Marine Park. This marine park covers an area of 10,785 km² and water depth ranges between less than 15 m and 70 m.
		Natural values This Marine Park includes examples of ecosystems representative of the Northwest Shelf Province—a dynamic environment influenced by strong tides, cyclonic storms, long-period swells and internal tides. The bioregion includes diverse benthic and pelagic fish communities, and ancient coastline thought to be an important seafloor feature and migratory pathway for humpback whales. This marine park supports a range of species listed under the EPBC Act. Biologically important areas within this marine park include breeding, foraging and resting habitat for seabirds, internesting and nesting habitat for marine turtles, foraging, nursing and pupping habitat for sawfish and a migratory pathway for humpback whales.

North West Marine Park Network	IUCN Zones	Description and Values
		Cultural values Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. The sea country of the Nyangumarta, Karajarri and Ngarla people extends into the Eighty Mile Beach Marine Park. Sea country is culturally significant and important to their identity. They have an unbroken, deep spiritual connection to their sea country, with traditional practices continuing today. Staple foods of living cultural value for the Nyangumarta, Karajarri and Ngarla people include saltwater fish, turtles, dugong, crabs and oysters. Access to sea country by families is important for cultural traditions, livelihoods and future socio-economic development opportunities. The native title holders for the Nyangumarta, Karajarri and Ngarla people are represented by the Karajarri Aboriginal Corporation, Nyangumarta Karajarri Aboriginal Corporation, Nyangumarta Warrarn Aboriginal Corporation, and Wanparta Aboriginal Corporation. These Prescribed Body Corporates represent traditional owners with native title over coastal area adjacent to the marine park. They are the points of contact for their respective areas of responsibility for sea country in the marine park. The Kimberley Land Council and the Yamatji Marlpa Aboriginal Corporation are the Native Title Representative Bodies for Kimberley and Pilbara regions.
		Heritage values This marine park contains three known shipwrecks listed under the Historic Shipwrecks Act 1976*: Lorna Doone* (wrecked in 1923), *Nellie* (wrecked in 1908), and *Tifera* (wrecked in 1923). No international, Commonwealth or national listings apply to the marine park.
		Social and economic values Tourism, commercial fishing, pearling and recreation are important activities in this marine park.
Gascoyne Marine Park	National Park (II) Habitat Protection (IV) Multiple Use (VI)	**Description** The Gascoyne Marine Park is located approximately 20 km off the west coast of the Cape Range Peninsula, adjacent to the Ningaloo Reef Marine Park and the Western Australian Ningaloo Marine Park and extends to the limit of Australia's exclusive economic zone. This marine park covers an area of 81,766 km² and water depth varies between 15 m and 6000 m.

North West Marine Park Network	IUCN Zones	Description and Values
		Natural values This marine park includes ecosystems representative of: • Central Western Shelf Transition—continental shelf with water depths up to 100 m, and a significant transition zone between tropical and temperate species • Central Western Transition—characterised by large areas of continental slope, a range of topographic features such as terraces, rises and canyons, seasonal and sporadic upwelling, benthic slope communities comprising tropical and temperate species • Northwest Province—an area of continental slope comprising diverse and endemic fish communities. Key ecological features are: • canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula • Commonwealth waters adjacent to Ningaloo Reef • continental slope demersal fish communities • Exmouth Plateau. Ecosystems represented in this Marine Park are influenced by the interaction of the Leeuwin Current, Leeuwin Undercurrent and the Ningaloo Current. This marine park supports a range of species listed under the EPBC Act. Biologically important areas within this marine park include breeding habitat for seabirds, internesting habitat for marine turtles, a migratory pathway for humpback whales, and foraging habitat and migratory pathway for pygmy blue whales.
		Cultural values Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. The Gnulli people have responsibilities for sea country in this marine park. The Yamatji Marlpa Aboriginal Corporation is the Native Title Representative Body for the Yamatji region.

North West Marine Park Network	IUCN Zones	Description and Values
		Heritage values *World heritage* The Ningaloo Coast was listed as an area of outstanding universal value under the World Heritage Convention in 2011, meeting world heritage listing criteria vii and x. The Ningaloo Coast World Heritage Property is adjacent to the marine park. *Commonwealth heritage* The Ningaloo Marine Area (Commonwealth waters) meets the Commonwealth heritage listing criteria A, B and C. The Ningaloo Marine Area is adjacent to the marine park. *National heritage* The Ningaloo Coast meets the national heritage listing criteria A, B, C, D, and F and is adjacent to the marine park. *Historic shipwrecks* The marine park contains more than five known shipwrecks listed under the Historic Shipwrecks Act 1976.
		Social and economic values Commercial fishing, mining and recreation are important activities in this marine park.
Kimberley Marine Park	Habitat Protection (IV) National Park (II) Multiple Use (VI)	**Description** The Kimberley Marine Park is located approximately 100 km north of Broome, extending from the Western Australian state water boundary north from the Lacepede Islands to the Holothuria Banks offshore from Cape Bougainville. This marine park is adjacent to the Western Australian Lalanggarram/Camden Sound Marine Park and the North Kimberley Marine Park. This marine park covers an area of 74,469 km² and water depths from less than 15 m to 800 m.

North West Marine Park Network	IUCN Zones	Description and Values
		Natural Values This marine park includes ecosystems representative of: • Northwest Shelf Province—a dynamic environment influenced by strong tides, cyclonic storms, long-period swells and internal tides. The bioregion includes diverse benthic and pelagic fish communities, and an ancient coastline thought to be an important seafloor feature and migratory pathway for humpback whales. • Northwest Shelf Transition—straddles the North-west and North Marine Regions and in the Northwest includes shelf break, continental slope, and the majority of the Argo Abyssal Plain and is subject to a high incidence of cyclones. Benthic biological communities in the deeper parts of the bioregion have not been extensively studied, although high levels of species diversity and endemism occur among demersal fish communities on the continental slope. • Timor Province—water depths (of the bioregion) ranging from about 200 m near the shelf break to 5920 m over the Argo Abyssal Plain. The reefs and islands of the bioregion are regarded as biodiversity hotspots. Endemism in demersal fish communities of the continental slope is high; two distinct communities have been identified on the upper and mid slopes. Key ecological features are: • ancient coastline at the 125 m depth contour • continental slope demersal fish communities. This marine park supports a range of species listed under the EPBC Act. Biologically important areas within this marine park include breeding and foraging habitat for seabirds, internesting and nesting habitat for marine turtles, breeding, calving and foraging habitat for inshore dolphins, calving, migratory pathway and nursing habitat for humpback whales, migratory pathway for pygmy blue whales, foraging habitat for dugong and foraging habitat for whale sharks.

North West Marine Park Network	IUCN Zones	Description and Values
		Cultural values Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. The Wunambal Gaambera, Dambimangari, Mayala, Bardi Jawi and the Nyul Nyul people's sea country extends into the Kimberley Marine Park. The Wunambal Gaambera people's country includes daagu (deep waters), with about 3400 km^2 of their sea country located in this marine park. The Wunambal Gaambera, Dambimangari, Mayala, Bardi Jawi and the Nyul Nyul people have an unbroken connection to their sea country, having deep spiritual connection through Wunggurr (creator snakes) that still live in the sea. Staple foods of living cultural value include saltwater fish, turtles, dugong, crabs and oysters. Access to sea country by families is important for cultural traditions, livelihoods and future socio-economic development opportunities. The national heritage listing for the West Kimberley recognises the following key cultural heritage values: • Wanjina Wunggurr Cultural Tradition which incorporates many sea country cultural sites • log-raft maritime tradition, which involved using tides and currents to access warrurru (reefs) far offshore to fish • interactions with Makassan traders around sea foods over hundreds of years • important pearl resources that were used in traditional trade through the wunan and in contemporary commercial agreements. The Wunambal Gaambera, Dambimangari and Bardi Jawi people consider that these values extend into the Kimberley Marine Park. The Wanjina Wunggurr is law of the Wunambal Gaambera and Dambimangari people and it is recognised that all of the sea country, land, plants and animals were put there by Wanjina Wunggurr. Under Wanjina Wunggurr law, the Wunambal Gaambera and Dambimangari people have a responsibility to manage country, to maintain the health of the country and all living things. The Wunambal Gaambera, Bardi Jawi, Mayala and the Nyul Nyul people have had native title determined over parts of their sea country included in this marine park. The native title holders for these people are represented by the Wunambal Gaambera Aboriginal Corporation, Bardi and Jawi Niimidiman Aboriginal Corporation and the Kimberley Land Council. These representative bodies are the points of contact for their respective areas of sea country for this marine park. The Kimberley Land Council is the Native Title Representative Body for the Kimberley region.
		Heritage values This Marine Park contains more than 40 known shipwrecks listed under the Historic Shipwrecks Act 1976. No international, Commonwealth or national heritage listings apply to the marine park, however the marine park is adjacent to the national heritage place of the West Kimberley.
		Social and economic values Tourism, commercial fishing, mining, recreation, including fishing and traditional use, are important activities in this marine park.

North West Marine Park Network	IUCN Zones	Description and Values
Mermaid Reef Marine Park	National Park (II)	**Description** The Mermaid Reef Marine Park is located approximately 280 km North-west of Broome, adjacent to the Argo–Rowley Terrace Marine Park and approximately 13 km from the Western Australian Rowley Shoals Marine Park. This marine park covers an area of 540 km² and water depths from less than 15 m to 500 m. Mermaid Reef is one of three reefs forming the Rowley Shoals. The reefs of the Rowley Shoals are significant as they are considered ecological stepping stones for reef species originating in Indonesian/Western Pacific waters, are one of a few offshore reef systems on the NWS, and may also provide an upstream source for recruitment to reefs further south.
		Natural values This marine park includes examples of ecosystems representative of the Northwest Transition—an area of shelf break, continental slope, and the majority of the Argo Abyssal Plain. Together with Clerke Reef and Imperieuse Reef, Mermaid Reef is a biodiversity hotspot and key topographic feature of the Argo Abyssal Plain. A key ecological feature of this marine park is the Mermaid Reef and Commonwealth waters surrounding the Rowley Shoals. Ecosystems of this marine park are associated with emergent reef flat, deep reef flat, lagoon, and submerged sand habitats. This marine park supports a range of species listed under the EPBC Act. Biologically important areas within this marine park include breeding habitat for seabirds and a migratory pathway for the pygmy blue whale.
		Cultural values Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. As noted in the North-west Marine Park Management Plan, there is limited information about the cultural significance of this marine park (DNP, 2018a).
		Heritage values No international or national listings apply to this marine park. Mermaid Reef–Rowley Shoals was established on the Commonwealth Heritage List in 2004, meeting Commonwealth heritage listing criteria A, B, C and D. This marine park contains one known shipwreck listed under the Historic Shipwrecks Act 1976: *Lively* (wrecked in 1810).
		Social and economic values Tourism, recreation, and scientific research are important activities in this marine park.
Montebello Marine Park	Multiple Use (VI)	**Description** The Montebello Marine Park is located offshore of Barrow Island and 80 km west of Dampier extending from the Western Australian State water boundary, and is adjacent to the Western Australian Barrow Island and Montebello Islands marine parks. This marine park covers an area of 3413 km² and water depths from less than 15 m to 150 m.

North West Marine Park Network	IUCN Zones	Description and Values
		Natural values This marine park includes examples of ecosystems representative of the Northwest Shelf Province—a dynamic environment influenced by strong tides, cyclonic storms, long-period swells and internal tides. The bioregion includes diverse benthic and pelagic fish communities. A key ecological feature of this Marine Park is the ancient coastline at the 125 m depth contour. This marine park supports a range of species listed under the EPBC Act. Biologically important areas within this marine park include breeding habitat for seabirds, internesting, foraging, mating, and nesting habitat for marine turtles, a migratory pathway for humpback whales and foraging habitat for whale sharks.
		Cultural values The Yamatji Marlpa Aboriginal Corporation is the Native Title Representative Body for the Pilbara region. Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. As noted in the North-west Marine Park Management Plan, there is limited information about the cultural significance of this marine park (DNP, 2018a).
		Heritage values No international, Commonwealth or national listings apply to this marine park, however this Marine Park is adjacent to the Western Australia Barrow Island and the Montebello–Barrow Island Marine Conservation Reserves which have been nominated for national heritage listing. This marine park contains two known shipwrecks listed under the Historic Shipwrecks Act 1976: *Trial* (wrecked in 1622), the earliest known shipwreck in Australian waters and *Tanami* (unknown date).
		Social and economic values Tourism, commercial fishing, mining and recreation are important activities in this marine park.
Ningaloo Marine Park	National Park (II) Recreational Use (IV)	**Description** The Ningaloo Marine Park stretches approximately 300 km along the west coast of the Cape Range Peninsula, and is adjacent to the Western Australian Ningaloo Marine Park and Gascoyne Marine Park. This marine park covers an area of 2435 km² and a water depth range of 30 m to more than 500 m. This marine park provides connectivity between deeper offshore waters of the shelf break and coastal waters of the adjacent Western Australian Ningaloo Marine Park. It includes some of the most diverse continental slope habitats in Australia, including the continental slope area between North-west Cape and the Montebello Trough. Canyons in this marine park are important for sustaining the nutrient conditions that support the high diversity of Ningaloo Reef.

North West Marine Park Network	IUCN Zones	Description and Values
		Natural values This marine park includes examples of ecosystems representative of: • Central Western Shelf Transition—continental shelf of water depths up to 100 m, and a significant transition zone between tropical and temperate species • Central Western Transition—characterised by large areas of continental slope, a range of topographic features such as terraces, rises and canyons, seasonal and sporadic upwelling, and benthic slope communities comprising tropical and temperate species • Northwest Province—an area of continental slope comprising diverse and endemic fish communities • Northwest Shelf Province—a dynamic environment, influenced by strong tides, cyclonic storms, long-period swells and internal tides. The bioregion includes diverse benthic and pelagic fish communities, and ancient coastline thought to be an important seafloor feature and migratory pathway for humpback whales. Key ecological features are: • canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula • Commonwealth waters adjacent to Ningaloo Reef • continental slope demersal fish communities. Ecosystems represented in this marine park are influenced by interaction of the Leeuwin Current, Leeuwin Undercurrent and the Ningaloo Current. This marine park supports a range of species listed under the EPBC Act. Biologically important areas within this marine park include breeding and/or foraging habitat for seabirds, internesting habitat for marine turtles, a migratory pathway for humpback whales, foraging habitat and migratory pathway for pygmy blue whales, breeding, calving, foraging and nursing habitat for dugong and foraging habitat for whale sharks.
		Cultural values Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. The Gnulli people have responsibilities for sea country in this marine park. The Yamatji Marlpa Aboriginal Corporation is the Native Title Representative Body for the Yamatji region.

North West Marine Park Network	IUCN Zones	Description and Values
		Heritage values *World heritage* This marine park is within the Ningaloo Coast World Heritage Property, meeting world heritage listing criteria vii and x. The area is valued for high terrestrial species endemism, marine species diversity and abundance, and the interconnectedness of large-scale marine, coastal and terrestrial environments. The area connects the limestone karst system and fossil reefs of the ancient Cape Range to the nearshore reef system of Ningaloo Reef, to the continental slope and shelf in Commonwealth waters. *National heritage* The Ningaloo Coast overlaps this marine park, meeting the national heritage listing criteria A, B, C, D, and F. *Commonwealth heritage* The Ningaloo Marine Area (Commonwealth waters) meets Commonwealth heritage listing criteria A, B and C. The Ningaloo Marine Area overlaps this marine park. *Historic shipwrecks* This marine park contains more than 15 known shipwrecks listed under the Historic Shipwrecks Act 1976.
		Social and economic values Tourism and recreation, including fishing, are important activities in this marine park.
Roebuck Marine Park	Multiple Use (VI)	**Description** The Roebuck Marine Park is located approximately 12 km offshore of Broome and is adjacent to the Western Australian Yawuru Nagulagun/Roebuck Bay Marine Park. This marine park covers an area of 304 km² and a water depth range of less than 15 m to 70 m. This marine park is adjacent to the Roebuck Bay Ramsar site, recognised as one of the most important areas for migratory shorebirds in Australia; and the Western Australian Yawuru Nagulagun/Roebuck Bay Marine Park, providing connectivity between offshore and inshore coastal waters of Roebuck Bay.
		Natural values This marine park includes examples of ecosystems representative of the Northwest Shelf Province—a dynamic environment influenced by strong tides, cyclonic storms, long-period swells and internal tides. The bioregion includes diverse benthic and pelagic fish communities, and ancient coastline thought to be an important seafloor feature and migratory pathway for humpback whales. This marine park supports a range of species listed under the EPBC Act. Biologically important areas within this marine park include breeding and resting habitat for seabirds, foraging and internesting habitat for marine turtles, a migratory pathway for humpback whales and foraging habitat for dugong.

North West Marine Park Network	IUCN Zones	Description and Values
		Cultural values Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. Yawuru people have always recognised the waters of Roebuck Bay as nagula (Yawuru sea country), and have customary responsibilities to care for it. They have a deep spiritual connection to offshore landscapes from Bugarrigarra (creator beings), and believe that snake-like metaphysical beings inhabit the sea. Cultural sites in sea country are also a source of law. The Yawuru people harvest marine resources according to the six Yawuru seasons. They have harvested pearl shell for food and cultural purposes. Fish are a staple food source, and fishing a form of cultural expression, connecting people to their country, modelled on tradition and based in traditional law. Access to sea country by families is important to cultural traditions, livelihoods and future socio-economic development opportunities. The Yawuru Native Title Holders Aboriginal Corporation is the Prescribed Body Corporate representing traditional owners with native title over coastal areas adjacent to this marine park, and is the point of contact for sea country in this marine park. The Kimberley Land Council is the Native Title Representative Body for the Kimberley region.
		Heritage values No international, Commonwealth or national listings apply to the marine park, however it is adjacent to the West Kimberley National Heritage Place.
		Social and economic values Tourism, commercial fishing, pearling and recreation, including fishing, are important activities that occur in the marine park.
Shark Bay Marine Park	Multiple Use (VI)	**Description** The Shark Bay Marine Park is located approximately 60 km offshore of Carnarvon, adjacent to the Shark Bay world heritage property and national heritage place. This marine park covers an area of 7443 km², extending from the Western Australian State water boundary, and a water depth range between 15 m and 220 m.

North West Marine Park Network	IUCN Zones	Description and Values
		Natural values This Marine Park includes examples of ecosystems representative of: • Central Western Shelf—a predominantly flat, sandy and low-nutrient area, in water depths 50–100 m. The bioregion is a transitional zone between tropical and temperate species • Central Western Transition—characterised by large areas of continental slope, a range of topographic features such as terraces, rises and canyons, seasonal and sporadic upwelling, and benthic slope communities comprising tropical and temperate species. Ecosystems represented in this marine park are influenced by the Leeuwin, Ningaloo and Capes currents. This marine park supports a range of species listed under the EPBC Act. Biologically important areas within this marine park include breeding habitat for seabirds, internesting habitat for marine turtles, and a migratory pathway for humpback whales. This marine park and adjacent coastal areas are also important for shallow-water snapper.
		Cultural values Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. The Gnulli and Malgana people have responsibilities for sea country in this marine park. The Yamatji Marlpa Aboriginal Corporation is the Native Title Representative Body for the Yamatji region.
		Heritage values No international, Commonwealth or national heritage listings apply to this Marine Park , but this marine park is adjacent to the Shark Bay, Western Australia World Heritage Property and Shark Bay, Western Australia National Heritage Place. The marine park contains approximately 20 known shipwrecks listed under the Historic Shipwrecks Act 1976.
		Social and economic values Tourism, commercial fishing, mining and recreation, including fishing, are important activities in the marine park.

11.5.2 Indian Ocean Territory

Table 11-2 describes the values of the Indian Ocean territory Australian Marine Parks (Commonwealth of Australia, 2021).

Table 11-2: Summary of Commonwealth marine parks within Indian Ocean territories

Indian Ocean Territory Marine Park	IUCN Zones	Values
Christmas Island Marine Park	National Park (II) Habitat Protection (IV)	**Description** Christmas Island Marine Park covers an area of 277,016 km^2 and extends from the island's shoreline to the limit of Australia's exclusive economic zone, approximately 200 NM from shore (except to the north of Christmas Island). This marine park adjoins the marine boundary of Christmas Island National Park, which extends 50 m seaward from the island. Almost all the island's port is excluded from this marine park, except for a very small and narrow part of the port's western boundary.
		Natural values The tropical waters and fringing coral reefs that surround Christmas Island contain a mix of coral reef species from both the Indian and Pacific Oceans and over 680 species of fish have been recorded in the region. The overlap of these waters gives rise to varieties of hybrid marine fish and some endemic species. Christmas Island also has the world's greatest diversity and abundance of land crabs. The island's waters are essential for the crabs, as they migrate to the coast to breed and release their eggs into the ocean. This marine park contains a range of unique seafloor features, habitats and species, particularly seamounts and deep-sea plains. Biologically important areas include foraging areas for the endemic Abbott's booby, Christmas Island frigatebird and golden bosun and other seabirds that nest on Christmas Island, as well as whale shark feeding areas and southern bluefin tuna breeding habitat.
		Cultural values The ocean is a centrepiece of life for many community members, of Christmas Island including those of Malay and Chinese heritage who maintain strong cultural traditions and connections to the surrounding marine environment.
		Social and economic values This marine park is valued for fishing (commercial, recreational and subsistence), diving, snorkelling and tourism. There is potential for scientific study and educational activities.
Cocos (Keeling) Islands Marine Park	National Park (II) Habitat Protection (IV)	**Description** Cocos (Keeling) Islands are located around 2,750 km north-west of Perth and the Cocos (Keeling) Islands Marine Park covers a 467,054 km^2 area, extending from most of the islands' shoreline to the limit of the Australian exclusive economic zone, approximately 100 NM from shore. The Cocos (Keeling) Islands are a group of 27 tropical low-lying coral islands.

Indian Ocean Territory Marine Park	IUCN Zones	Values
		Natural values The central lagoon system and outer reefs are two of the islands' important habitats. The lagoon encompasses a variety of unique and distinct habitats. This includes seagrass, which is essential for the resident green turtle population (which is a genetically distinct stock that is unique to the islands) as well as for sustaining fish populations. The outer reef habitats are dominated by hard and soft corals and have a high abundance and diversity of reef fish and other species. The offshore waters contain a range of unique seafloor features, habitats, and species, particularly seamounts, deep-sea plains, and a significant deep-sea ridgeline. This marine park also protects the foraging habitat of nesting seabirds on North Keeling Island (Pulu Keeling National Park), as well as species such as dolphins, deep-sea fish and sharks that are or may be threatened elsewhere in the region.
		Cultural values Most of the islands' community members are Cocos Malay, who maintain vibrant and unique cultural traditions including strong cultural connections to the surrounding marine environment. The lagoon and ocean are an important part of life for all community members living on the remote atoll.
		Social and economic values This marine park is valued for recreational and subsistence activities (i.e., fishing, boating, diving, snorkelling, kite surfing, and kayaking), tourism, scientific research, and educational activities.

11.5.3 South-west Marine Parks Network

Table 11-3 describes the Australian Marine Parks within the South-west Marine Parks Network (South-west Network), according to the South West Marine Parks Network Management Plan 2018 (DNP, 2018b).

Table 11-3: Summary of Commonwealth AMPs for the South West Marine Park Network

South West Marine Park Network	IUCN Zones	Natural Values
Abrolhos Marine Park	National Park (II) Habitat Protection (IV) Multiple Use (VI) Special Purpose Zone (Trawl) (VI)	**Description** The Abrolhos Marine Park is located adjacent to the Western Australian Houtman Abrolhos Islands, covering a large offshore area extending from the Western Australian State water boundary to the edge of Australia's exclusive economic zone. It is located approximately 27 km south-west of Geraldton and extends north to approximately 330 km west of Carnarvon. The northernmost part of the shelf component of the marine park, north of Kalbarri, is adjacent to the Shark Bay World Heritage Area. This marine park covers an area of 88,060 km² and a water depth range between less than 15 m and 6000 m.

South West Marine Park Network	IUCN Zones	Natural Values
		Natural values This marine park includes ecosystems representative of: • Central Western Province—characterised by a narrow continental slope incised by many submarine canyons and the most extensive area of continental rise in any of Australia's marine regions. A significant feature within the area are several eddies that form off the Leeuwin Current at predictable locations, including west of the Houtman Abrolhos Islands. • Central Western Shelf Province— a predominantly flat, sandy and low nutrient area, in water depths between 50 and 100 m. Significant seafloor features of this area include a deep hole and associated area of banks and shoals offshore of Kalbarri. The area is a transitional zone between tropical and temperate species. • Central Western Transition—a deep ocean area characterised by large areas of continental slope, a range of significant seafloor features including the Wallaby Saddle, seasonal and sporadic upwelling, and benthic slope communities comprising tropical and temperate species. • South-west Shelf Transition—a narrow continental shelf that is noted for its physical complexity. The Leeuwin Current has a significant influence on the biodiversity of this nearshore area as it pushes subtropical water southward along the area's western edge. The area contains a diversity of tropical and temperate marine life including a large number of endemic fauna species. Key ecological features are: • Commonwealth marine environment surrounding the Houtman Abrolhos Islands • demersal slope and associated fish communities of the Central Western Province • mesoscale eddies • Perth Canyon and adjacent shelf break, and other west-coast canyons • western rock lobster • ancient coastline between 90 m and 120 m depth • Wallaby Saddle. This marine park supports a range of species listed under the EPBC Act. Biologically important areas within this marine park include foraging and breeding habitat for seabirds, foraging habitat for Australian sea lions and white sharks, and a migratory pathway for humpback and pygmy blue whales. The marine park is adjacent to the northernmost Australian sea lion breeding colony in Australia on the Houtman Abrolhos Islands.

South West Marine Park Network	IUCN Zones	Natural Values
		Cultural values Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. The Nanda and Naaguja People have responsibilities for sea country in this marine park. Traditional owners have strong stories that connect ocean and land. Artefacts from ancestors are abundant on islands in the adjacent State marine park. The Yamatji Marlpa Aboriginal Corporation is the Native Title Representative Body for the Yamatji region.
		Heritage values No international heritage listings apply to this marine park, however this marine park is adjacent to the Western Australian Shark Bay World Heritage Property, listed as an area of outstanding universal value under the World Heritage Convention in 1991, meeting world heritage listing criteria vii, viii, ix, and x. No Commonwealth or national heritage listings apply to this marine park, however this marine park is adjacent to the Western Australian Shark Bay National Heritage Place. This marine park contains 11 known shipwrecks listed under the Historic Shipwrecks Act 1976. The *Zuytdorp* (wrecked in 1712) historic shipwreck protected zone lies in State waters adjacent to the northernmost part of the shelf component of the marine park, north of Kalbarri. The *HMAS Sydney II* and *HSK Kormoran* Shipwreck Sites (1941) lie at 2,500 m depth about 75 km east of the northern part of the marine park. This site is on the National Heritage List and a historic shipwreck protected zone. The *Batavia* (wrecked on the adjacent Abrolhos Islands in 1629) Shipwreck Site and Survivor Camps Area are on the National Heritage List.
		Social and economic values Tourism, commercial fishing, mining, recreation including fishing, are important activities in the marine park.
Bremer Marine Park	National Park Zone (II) Special Purpose Zone (Mining Exclusion) (VI)	**Description** The Bremer Marine Park is located approximately half-way between Albany and Esperance, offshore from the Fitzgerald River National Park, extending from the Western Australian State water boundary. This marine park covers an area of 4472 km² and water depths from 15 m to 5000 m.

South West Marine Park Network	IUCN Zones	Natural Values
		Natural values This marine park includes examples of ecosystems representative of: • Southern Province—includes the deepest ocean areas of the Australian exclusive economic zone, reaching depths of around 5900 m, and is characterised by a long continental slope incised by numerous, well-developed submarine canyons • South-west Shelf Province—marine life in this area is very diverse and likely influenced by the warm waters of the Leeuwin Current. The sheltered bays along the south coast are important southern right whale calving areas. Key ecological features are: • Albany Canyon group and adjacent shelf break • ancient coastline between 90 m and 120 m depth. This marine park supports a range of species listed under the EPBC Act. Biologically important areas within this marine park include foraging habitat for seabirds, Australian sea lions, and white sharks, a migratory pathway for humpback whales, and a significant calving area for southern right whales. This marine park includes canyons—important aggregation areas for killer whales.
		Cultural values Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. The Noongar people have responsibilities for sea country in this Marine Park. Local traditional owners recognise Kaart, Koort and Waarnginy (head, heart and talking) as bringing together the narratives and protocols that have been practiced for thousands of years and the kinship that influences all stages and cycles of life. Traditional owners have responsibility for cultural values and are focussed on the creation and regeneration of spiritual, ethical, cultural and practical benefits and opportunities for marine systems. The South West Aboriginal Land and Sea Council is the Native Title Service Provider for the South-west region.
		Heritage values No international, Commonwealth or national heritage listings apply to this marine park.
		Social and economic values Tourism, commercial fishing and recreation, including fishing, are important activities in this marine park.
Eastern Recherche Marine Park	National Park Zone (II) Special Purpose Zone (VI)	**Description** The Eastern Recherche Marine Park is located approximately 135 km east of Esperance, adjacent to the Recherche Archipelago, close to the Western Australian Cape Arid National Park. This marine park covers an area of 20,575 km², extending from the Western Australia State water boundary to the edge of Australia's exclusive economic zone, and a water depth range from less than 15 m to 6000 m.

South West Marine Park Network	IUCN Zones	Natural Values
		Natural values This marine park includes ecosystems representative of: • South-west Shelf Province—marine life in this area is very diverse and likely influenced by the warm waters of the Leeuwin Current. It includes globally important biodiversity hotspots, such as the waters surrounding the Recherche Archipelago. • Southern Province—includes the deepest ocean areas of the Australian exclusive economic zone, reaching depths of around 5,900 m, and is characterised by a long continental slope, numerous, well-developed submarine canyons, and extensive mid-slope terraces. • Great Australian Bight Shelf Transition—a vast and shallow area characterised by an extensive area of flat continental shelf. The invertebrate communities that inhabit the seafloor are among the most diverse in the world. The inshore areas of the bioregion are globally important for threatened southern right whale and the Australian sea lion. Key ecological features are: • mesoscale eddies • ancient coastline between 90 m and 120 m depth • Commonwealth marine environment surrounding the Recherche Archipelago. This marine park supports a range of species listed under the EPBC Act. Biologically important areas within this marine park include foraging habitat for seabirds, Australian sea lions and white sharks, and a calving buffer area for southern right whales.
		Cultural values Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. The Ngadju and Esperance Nyungar people have responsibilities for sea country in this marine park. Local traditional owners recognise Kaart, Koort and Waarnginy (head, heart and talking) as bringing together the narratives and protocols that have been practiced for thousands of years and the kinship that influences all stages and cycles of life. Traditional owners have responsibility for cultural values and are focussed on the creation and regeneration of spiritual, ethical, cultural and practical benefits and opportunities for marine systems. The South West Aboriginal Land and Sea Council is the Native Title Service Provider for the South-west region.
		Heritage values No international, Commonwealth or national heritage listings apply to this marine park. This marine park contains two known shipwrecks listed under the Historic Shipwrecks Act 1976—*Rodondo* (wrecked in 1894) and *Start* (wrecked in 1879).
		Social and economic values Tourism, commercial fishing, mining and recreation, including fishing, are important activities in this marine park.

South West Marine Park Network	IUCN Zones	Natural Values
Geographe Marine Park	National Park Zone (II) Habitat Protection (IV) Multiple Use (VI) Special Purpose (Mining Exclusion Zone) (VI)	**Description** The Geographe Marine Park is located in Geographe Bay, approximately 8 km west of Bunbury and 8 km north of Busselton, adjacent to the Western Australian Ngari Capes Marine Park. This marine park covers an area of 977 km^2, extending from the Western Australian State water boundary, and a water depth range between 15 m and 70 m.
		Natural values This marine park includes examples of ecosystems representative of the South-west Shelf Province—an area of diverse marine life, influenced by the warm waters of the Leeuwin Current. The bioregion includes globally important biodiversity hotspots, such as the waters off Geographe Bay. Key ecological features are: • Commonwealth marine environment within and adjacent to Geographe Bay • western rock lobster. This marine park supports a range of species listed under the EPBC Act. Biologically important areas within this marine park include foraging habitat for seabirds, a migratory pathway for humpback and pygmy blue whales, and a calving buffer area for southern right whales.
		Cultural values Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. The Noongar people have responsibility for sea country in this marine park. Traditional owners have maintained cultural responsibilities for sea country as passed down from elders, to keep the oceans healthy, to support spiritual wellbeing and to uphold and protect obligatory cultural responsibilities for future generations. The South West Aboriginal Land and Sea Council is the Native Title Service Provider for the South-west region.
		Heritage values No international, Commonwealth or national heritage listings apply to this marine park. This marine park contains eight known shipwrecks listed under the Historic Shipwrecks Act 1976.
		Social and economic values Tourism, commercial fishing and recreation, including fishing, are important activities in the marine park.

South West Marine Park Network	IUCN Zones	Natural Values
Great Australian Bight Marine Park	National Park Zone (II) Multiple Use Zone (VI) Special Purpose Zone (Mining Exclusion) (VI) Special Purpose Zone (VI)	**Description** The Great Australian Bight Marine Park is located approximately 12 km south-east of Eucla and 174 km west of Ceduna, adjacent to the South Australian Far West Coast and Nuyts Archipelago marine parks. This marine park covers an area of 45,822 km², extending from South Australian State water boundary to the edge of Australia's exclusive economic zone, and a water depth range between less than 15 m and 6000 m.
		Natural values This marine park includes examples of ecosystems representative of: • Great Australian Bight Shelf Transition—a vast and shallow area, characterised by an extensive area of flat continental shelf. The invertebrate communities that inhabit the seafloor are among the most diverse in the world. The inshore areas of the bioregion are globally important for the threatened southern right whale and the Australian sea lion. • Southern Province—includes the deepest ocean areas of the Australian exclusive economic zone, reaching depths of around 5,900 m, and that is characterised by a long continental slope, numerous, well-developed submarine canyons, and extensive mid-slope terraces such as the Ceduna Terrace. Key ecological features are: • ancient coastline between 90 m and 120 m depth • benthic invertebrate communities of the eastern Great Australian Bight • small pelagic fish of the South-west Marine Region. This marine park supports a range of species listed under the EPBC Act. Biologically important areas within this marine park include foraging habitat for seabirds, Australian sea lions, white sharks and pygmy blue and sperm whales, and a calving area, migratory pathway and large aggregation area for southern right whales.
		Cultural values Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. The Mirning and Wirangu people have responsibilities for sea county in this marine park. The far west coast region of South Australia includes over 1000 km of coastline along the Nullarbor Cliffs of the Great Australian Bight and the Nyuts Archipelago, and supports a sea-based tradition and culture. The Mirning people have a strong connection to land and sea country of the Nullarbor, and the Wirangu people have a strong connection to land and sea country across the remainder of the far west coastal region. Fishing is woven into the beliefs and values of this region, through the use of resources such as shellfish, periwinkles, abalone and razorfish; and the sharing of traditional fishing knowledge, catch and meals. The care and protection of these waters, the coastline, marine life and resources correspond directly with cultural stories, sites and knowledge. South Australian Native Title Services is the native title service provider for the South Australian region.

South West Marine Park Network	IUCN Zones	Natural Values
		Heritage values No international, Commonwealth or national heritage listings apply to this marine park.
		Social and economic values Tourism, commercial fishing, and mining are important activities in this marine park.
Jurien Marine Park	National Park Zone (II) Special Purpose (VI)	**Description** The Jurien Marine Park is located approximately 148 km north of Perth and 155 km south of Geraldton, adjacent to the Western Australian Jurien Bay Marine Park. This marine park covers an area of 1,851 km² of continental shelf, extending from the Western Australian State water boundary, and a water depth range between 15 m and 220 m.
		Natural values This marine park includes ecosystems representative of: • South-west Shelf Transition—consists of a narrow continental shelf that is noted for its physical complexity. The Leeuwin Current has a significant influence on the biodiversity of this nearshore area as it pushes subtropical water southward along the bioregion's western edge. The area contains a diversity of tropical and temperate marine life including a large number of endemic fauna species. • Central Western Province—this Marine Park includes a small component of this bioregion, characterised by a narrow continental slope and influenced by the Leeuwin Current. Key ecological features are: • ancient coastline between 90 m and 120 m depth • demersal slope and associated fish communities of the Central Western Province • western rock lobster. This marine park supports a range of species listed under the EPBC Act. Biologically important areas within this marine park include foraging habitat for seabirds, Australian sea lions and white sharks, and a migratory pathway for humpback and pygmy blue whales.
		Cultural values Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. The Noongar people have responsibilities for sea country in this marine park. Traditional owners have strong stories that connect ocean and land. Artefacts from ancestors are abundant on islands in the adjacent State marine park. The South West Aboriginal Land and Sea Council is the Native Title Service Provider for the South-west region.

South West Marine Park Network	IUCN Zones	Natural Values
		Heritage values No international, Commonwealth or national heritage listings apply to this marine park. This marine park contains two known shipwrecks listed under the Historic Shipwrecks Act 1976— *SS Cambewarra* (wrecked in 1914) and *Oleander* (wrecked in 1884).
		Social and economic values Tourism, commercial fishing, mining and recreation, including fishing, are important activities in this marine park.
Murat Marine Park	National Park Zone (II)	**Description** The Murat Marine Park is located 86 km off the west coast south-west of Ceduna, south of the South Australian Nuyts Archipelago Marine Park. This marine park covers an area of 938 km² and is relatively shallow, with water depths between less than 15 m and 70 m.
		Natural values This marine park includes examples of ecosystems representative of the Great Australian Bight Shelf Transition—a vast and shallow area characterised by an extensive area of flat continental shelf. The invertebrate communities that inhabit the seafloor are among the most diverse in the world. The inshore areas of the bioregion are globally important for the threatened southern right whale and the Australian sea lion. Key ecological features are: • benthic invertebrate communities of the eastern Great Australian Bight • small pelagic fish of the South-west Marine Region. This marine park supports a range of species listed under the EPBC Act. Biologically important areas within this marine park include foraging habitat for seabirds and Australian sea lions.
		Cultural values Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. The Mirning people have a strong attachment to land and sea country of the Nullarbor, while the Wirangu people have a strong attachment to land and sea country across the remainder of the far west coast region. The care and protection of the waters, coastline, marine creatures, marine environments and sea resources correspond directly with cultural stories and important cultural sites and knowledge. South Australian Native Title Services is the native title service provider for the South Australian region.
		Heritage values No international, Commonwealth or national heritage listings apply to this marine park.

South West Marine Park Network	IUCN Zones	Natural Values
		Social and economic values The remoteness of this marine park makes access difficult with most recreational and tourism activities confined to State waters. Commercial ships may pass through this Marine Park to and from the port of Ceduna.
Perth Canyon Marine Park	National Park (II) Habitat Protection (IV) Multiple Use (VI)	**Description** The Perth Canyon Marine Park is located approximately 52 km west of Perth and approximately 19 km west of Rottnest Island. This marine park covers an area of 7409 km² and water depths range between 120 m and 5000 m.
		Natural values This marine park includes examples of ecosystems representative of: • Central Western Province—characterised by a narrow continental slope incised by many submarine canyons, including Perth Canyon, and the most extensive area of continental rise in any of Australia's marine regions. A significant feature within the area are several eddies that form off the Leeuwin Current at predictable locations, including the Perth Canyon. • South-west Shelf Province—marine life in this area is diverse and influenced by the warm waters of the Leeuwin Current. • South-west Transition—significant features of this area include the submarine canyons that incise the northern parts of the slope and the deep-water mixing that results from the dynamics of major ocean currents when these meet the seafloor, particularly in the Perth Canyon. • South-west Shelf Transition—consists of a narrow continental shelf that is noted for its physical complexity. The Leeuwin Current has a significant influence on the biodiversity of this nearshore area as it pushes subtropical water southward along the area's western edge. The area contains a diversity of tropical and temperate marine life including many endemic fauna species. Key ecological features are: • Perth Canyon and adjacent shelf break, and other west-coast canyons • demersal slope and associated fish communities of the Central Western Province • western rock lobster • mesoscale eddies. This marine park supports a range of species listed under the EPBC Act. Biologically important areas within this marine park include foraging habitat for seabirds, Antarctic blue, pygmy blue and sperm whales, a migratory pathway for humpback, Antarctic blue and pygmy blue whales, and a calving buffer area for southern right whales.

South West Marine Park Network	IUCN Zones	Natural Values
		Cultural values Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. The Swan River traditional owners have responsibilities for sea country in this marine park. Traditional owners have maintained cultural responsibilities for sea country as passed down from elders, to keep the oceans healthy, to support spiritual wellbeing and to uphold and protect obligatory cultural responsibilities for future generations. The South West Aboriginal Land and Sea Council is the Native Title Service Provider for the South-west region.
		Heritage values No international, Commonwealth or national heritage listings apply to this marine park.
		Social and economic values Tourism, commercial shipping, commercial fishing, recreation, including fishing, and defence training are important activities in this marine park.
Southern Kangaroo Island Marine Park	Special Purpose Zone (Mining Exclusion) (VI)	**Description** The Southern Kangaroo Island Marine Park is located approximately 140 km south-west of Adelaide, adjacent to the South Australian Kangaroo Island Marine Park. This marine park covers an area of 630 km² extending from the South Australian State water boundary, and water depth ranges between 15 m and 100 m.
		Natural values The marine park includes examples of ecosystems representative of the Spencer Gulf Shelf. Seasonal winds and ocean currents interact with seafloor features to produce small seasonal upwellings that are important for biological productivity. The area is noted for its diverse seafloor communities, productivity hotspots and aggregations of marine life associated with seasonal upwellings of nutrient-rich water. A key ecological feature of this marine park is the Kangaroo Island Pool, canyons and adjacent shelf break, and Eyre Peninsula upwellings. This marine park supports a range of species listed under the EPBC Act. Biologically important areas within this marine park include foraging habitat for seabirds, Australian sea lions and white sharks and a calving buffer area for southern right whales.
		Cultural values Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. South Australian Native Title Services is the Native Title Service Provider for the South Australian region.
		Heritage values No international, Commonwealth or national heritage listings apply to this marine park.

South West Marine Park Network	IUCN Zones	Natural Values
		Social and economic values Tourism, commercial fishing and recreation are important activities in this marine park. The Kangaroo Island community values the island's unique qualities and character.
South-west Corner Marine Park	National Park (II) Habitat Protection (IV) Multiple Use (VI) Special Purpose (VI) Special Purpose (Mining Exclusion)	**Description** The South-west Corner Marine Park is located adjacent to the Western Australian Ngari Capes Marine Park, covering an extensive offshore area that is closest to Western Australia State waters approximately 48 km west of Esperance, 73 km west of Albany and 68 km west of Bunbury, and extends to the edge of Australia's exclusive economic zone. This marine park covers an area of 271,833 km² and a water depth range from less than 15 m to 6400 m.
		Natural values This marine park includes ecosystems representative of: • Southern Province—includes the deepest ocean areas of the Australian exclusive economic zone, reaching depths of around 5,900 m, and is characterised by a long continental slope incised by numerous, well-developed submarine canyons and the Diamantina Fracture Zone, a rugged area of deep seafloor comprising seamounts and many ridges and troughs. • South-west Transition—the main features of this area are the Naturaliste Plateau, the deepest submarine plateau along Australia's continental margins. The Naturaliste Plateau supports rich and diverse biological communities. Deep-water mixing results from the dynamics of major ocean currents when these meet the seafloor. • South-west Shelf Province—marine life in this area is diverse and influenced by the warm waters of the Leeuwin Current. A small upwelling of nutrient-rich water off Cape Mentelle during summer increases productivity locally, attracting aggregations of marine life. Key ecological features are: • Albany Canyon group and adjacent shelf break • Cape Mentelle upwelling • Diamantina Fracture Zone • Naturaliste Plateau • western rock lobster • ancient coastline between 90 m and 120 m depth. This marine park supports a range of species listed under the EPBC Act. Biologically important areas within this marine park include foraging habitat for seabirds, Australian sea lions, white sharks and sperm whales, a migratory pathway for Antarctic blue, pygmy blue and humpback whales, and a calving buffer area for southern right whales.

South West Marine Park Network	IUCN Zones	Natural Values
		Cultural values Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. The Nyungar/Noongar people have responsibilities for sea country in this marine park. Traditional owners have maintained cultural responsibilities for sea country as passed down from elders, to keep the oceans healthy, to support spiritual wellbeing and to uphold and protect obligatory cultural responsibilities for future generations. The South West Aboriginal Land and Sea Council is the Native Title Service Provider for the South-west region.
		Heritage values No international, Commonwealth or national heritage listings apply to the marine park. This marine park contains 10 known shipwrecks listed under the Historic Shipwrecks Act 1976.
		Social and economic values Tourism, commercial fishing, commercial shipping, and recreation, including fishing, are important activities in this marine park.
Twilight Marine Park	National Park Zone (II) Special Purpose Zone (Mining Exclusion) (VI)	**Description** The Twilight Marine Park is located approximately 245 km south-west of Eucla and 373 km north-east of Esperance, adjacent to the Western Australian State water boundary. This marine park covers an area of 4641 km² and water depths between less than 15 m and 70 m.
		Natural values This marine park includes ecosystems representative of the Great Australian Bight Shelf Transition—a vast and shallow area characterised by an extensive area of flat continental shelf. There are diverse invertebrate communities inhabiting the seafloor. The inshore areas of the bioregion are globally important for the threatened southern right whale and the Australian sea lion. This marine park supports a range of species listed under the EPBC Act. Biologically important areas within this marine park include foraging habitat for seabirds, Australian sea lions and white sharks, and a calving buffer area for southern right whales.
		Cultural values Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. The Mirning and Spinifex people have responsibilities for sea country in this marine park. Local traditional owners recognise Kaart, Koort and Waarnginy (head, heart and talking) as bringing together the narratives and protocols that have been practiced for thousands of years and the kinship that influences all stages and cycles of life. Traditional owners have responsibility for cultural values and are focussed on the creation and regeneration of spiritual, ethical, cultural and practical benefits and opportunities for marine systems. The Goldfields Land and Sea Council is the Native Title Representative Body for the Goldfields region.

South West Marine Park Network	IUCN Zones	Natural Values
		Heritage values No international, Commonwealth or national heritage listings apply to this marine park.
		Social and economic values Tourism and commercial and recreational fishing are important activities in this marine park.
Two Rocks Marine Park	Multiple Use (VI)	**Description** The Two Rocks Marine Park is located approximately 25 km north-west of Perth, to the north-west of the Western Australian Marmion Marine Park. The marine park covers an area of 882 km², extending from the Western Australian State water boundary, and a water depth range from 15 m to 120 m.
		Natural values This marine park includes examples of ecosystems representative of the South-west Shelf Transition—an area of narrow continental shelf that is noted for its physical complexity. The Leeuwin Current has a significant influence on the biodiversity of this nearshore area as it pushes subtropical water southward along the area's western edge. The area contains a diversity of tropical and temperate marine life including endemic fauna species. The inshore lagoons are thought to be important areas for benthic productivity and recruitment for marine species. Key ecological features are: • Commonwealth marine environment within and adjacent to the west-coast inshore lagoons • western rock lobster • ancient coastline between 90 m and 120 m depth. This marine park supports a range of species listed under the EPBC Act. Biologically important areas within this marine park include foraging habitat for seabirds and Australian sea lions, a migratory pathway for humpback and pygmy blue whales, and a calving buffer area for southern right whales.
		Cultural values Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. The Swan River traditional owners have responsibilities for sea country in this marine park. Traditional owners have maintained cultural responsibilities for sea country as passed down from elders, to keep the oceans healthy, to support spiritual wellbeing and to uphold and protect obligatory cultural responsibilities for future generations. The South West Aboriginal Land and Sea Council is the Native Title Service Provider for the South-west region.
		Heritage values No international, Commonwealth or national heritage listings apply to this marine park.

South West Marine Park Network	IUCN Zones	Natural Values
		Social and economic values Tourism, commercial fishing, recreation, including fishing, and scientific research are important activities in this marine park.
Western Eyre Marine Park	National Park Zone (II) Multiple Use Zone (VI) Special Purpose Zone (VI) Special Purpose Zone (Trawl) (VI)	**Description** The Western Eyre Marine Park is located approximately 123 km² south-west of Port Lincoln and 28 km west of Streaky Bay, adjacent to South Australia's Investigator, West Coast Bays and Nuyts Archipelago marine parks. This marine park covers an area of 57,944 km², extending from the South Australian State water boundary to the edge of Australia's exclusive economic zone, and water depths range between 15 m and more than 6000 m.
		Natural values This marine park includes ecosystems representative of*:* • Spencer Gulf Shelf—seasonal winds and ocean currents interact with seafloor features to produce a number of small seasonal upwellings that are important for biological productivity. The area is noted for its very diverse seafloor communities, productivity hotspots and aggregations of marine life associated with seasonal upwellings of nutrient- rich water. • Great Australian Bight Shelf Transition—a vast and shallow area, characterised by an extensive area of flat continental shelf. The invertebrate communities that inhabit the seafloor are among the most diverse in the world. The inshore areas of the bioregion are globally important for the threatened southern right whale and the Australian sea lion. • Southern Province—includes the deepest ocean areas of the Australian exclusive economic zone, reaching depths of around 5,900 m, and is characterised by a long continental slope; numerous, well-developed submarine canyons; and extensive mid-slope terraces such as the Ceduna Terrace. Key ecological features are: • ancient coastline between 90 m and 120 m depth • Kangaroo Island Pool, canyons and adjacent shelf break, and Eyre Peninsula upwellings • mesoscale eddies • benthic invertebrate communities of the eastern Great Australian Bight • small pelagic fish of the South-west Marine Region. This marine park provides connectivity between deeper offshore waters and the adjacent South Australian Investigator, West Coast Bays and Nuyts Archipelago Marine Parks. Waters surrounding the Nuyts Archipelago and Investigator Group form part of the ecologically important offshore islands that protect the coastline. This marine park is a hotspot for productivity, with feeding aggregations of marine mammals, sharks and seabirds. This marine park supports a range of species listed under the EPBC Act. Biologically important areas within this marine park include breeding and foraging habitat for seabirds, foraging habitat for Australian sea lions, white sharks and pygmy blue and sperm whales, and a calving buffer area for southern right whales.

South West Marine Park Network	IUCN Zones	Natural Values
		Cultural values Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. The far west coast region of South Australia includes over 1000 km of coastline along the Nullarbor Cliffs of the Great Australian Bight and the Nyuts Archipelago, and supports a sea-based tradition and culture. The Mirning people have a strong connection to land and sea country of the Nullarbor, and the Wirangu people have a strong connection to land and sea country across the remainder of the far west coastal region. Fishing is woven into the beliefs and values of this region, through the use of resources such as shellfish, periwinkles, abalone and razorfish; and the sharing of traditional fishing knowledge, catch and meals. The care and protection of these waters, the coastline, marine life and resources correspond directly with cultural stories, sites and knowledge. South Australian Native Title Services is the Native Title Service Provider for the South Australian region.
		Heritage values No international, Commonwealth or national heritage listings apply to this marine park.
		Social and economic values Tourism, commercial fishing, recreation and mining are important activities in this marine park.
Western Kangaroo Island Marine Park	National Park Zone (II) Special Purpose Zone (Mining Exclusion) (VI) Special Purpose Zone (VI)	**Description** The Western Kangaroo Island Marine Park is located approximately 230 km south-west of Adelaide and 110 km south of Port Lincoln, adjacent to the South Australian Western Kangaroo Island Marine Park. The marine park covers an area of 2335 km² and water depths range between 15 m and 165 m.
		Natural values This marine park includes examples of ecosystems representative of the Spencer Gulf Shelf. Seasonal winds and ocean currents interact with seafloor features to produce a number of small seasonal upwellings that are important for biological productivity. The area is noted for its diverse seafloor communities, productivity hotspots and aggregations of marine life associated with the seasonal upwellings of nutrient rich water. Key ecological features are: • the ancient coastline between 90 m and 120 m depth • Kangaroo Island Pool, canyons and adjacent shelf break, and Eyre Peninsula upwellings. This marine park supports a range of species listed under the EPBC Act. Biologically important areas within this marine park include foraging habitat for seabirds, Australian sea lions, white sharks and pygmy blue and sperm whales, and a calving buffer area for southern right whales.

South West Marine Park Network	IUCN Zones	Natural Values
		Cultural values Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. South Australian Native Title Services is the Native Title Service Provider for the South Australian region.
		Heritage values No international, Commonwealth or national heritage listings apply to this marine park.
		Social and economic values Tourism, commercial fishing and recreation are important activities in this marine park. The Kangaroo Island community values the island's unique qualities and character.

11.5.4 North Marine Park Network

Table 11-4 describes the Commonwealth marine parks within the North Marine Park Network according to the North Marine Park Network Management Plan 2018 (DNP, 2018c).

Table 11-4: Summary of Commonwealth AMPs for the North Marine Park Network

North Marine Park Network	IUCN Zones	Values
Arafura Marine Park	Multiple Use Zone (VI) Special Purpose Zone (VI)	**Description** The Arafura Marine Park is located approximately 256 km north-east of Darwin and 8 km offshore of Croker Island, Northern Territory. It extends from Northern Territory waters to the limit of Australia's exclusive economic zone. This marine park covers an area of 22,924 km², and a water depth range from less than 15 m to 500 m.

North Marine Park Network	IUCN Zones	Values
	Special Purpose Zone (Trawl) (VI)	**Natural values** The Arafura Marine Park includes examples of ecosystems representative of: • Northern Shelf Province—a dynamic region, with gently sloping shelf topped with a number of pinnacles at depths ranging from 5 m to 30 m. Tidal eddies induce localised upwellings and hotspots of productivity, which correspond with aggregations of marine life within this Marine Park. • Timor Transition Province—includes continental slope, canyons, ridges, terraces and the Arafura Depression. The primary drivers of biological productivity are associated with deep water upwellings at canyon heads, driven by strong tides. The key ecological feature in this marine park is the tributary canyons of the Arafura Depression. The canyons channel deep ocean waters, enhancing productivity and supporting large predatory fish, whale sharks, sawfish and marine turtles, deep sea sponges, and barnacles. This marine park supports a range of species listed under the EPBC Act. Biologically important areas within this marine park include internesting habitat for marine turtles and important foraging and breeding habitat for seabirds.
		Cultural values Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. The Yuwurrumu members of the Mandilarri-Ildugij, the Mangalara, the Murran, the Gadura-Minaga and the Ngaynjaharr clans have responsibilities for sea country in this marine park. These clans have native title determined over part of their sea country, which is included in this marine park. The Northern Land Council is the Native Title Representative Body for the Northern Territory's northern region and is assisting these native title holders in the absence of a native title Prescribed Body Corporate. It is the point of contact for this marine park.
		Heritage values No international, Commonwealth or national heritage listings apply to this marine park.
		Social and economic values Commercial fishing, tourism, and recreation, including fishing, are important activities in this marine park.
Arnhem Marine Park	Special Purpose Zone (VI)	**Description** The Arnhem Marine Park is located approximately 100 km south-east of Croker Island and 60 km south-east of the Arafura Marine Park. It extends from Northern Territory waters surrounding the Goulburn Islands, to the waters north of Maningrida. This marine park covers an area of 7125 km² and water depth ranges from less than 15 m to 70 m.

North Marine Park Network	IUCN Zones	Values
		Natural values This marine park includes ecosystems representative of the Northern Shelf Province. Internal currents in the region drive a net clockwise movement of nutrient-rich coastal water contributing to high biological diversity. Tidal eddies induce localised upwellings and hotspots of productivity that correspond with aggregations of marine life within this marine park. This marine park supports a range of species listed under the EPBC Act. Biologically important areas within this marine park include foraging habitat and a migratory pathway for marine turtles and seabirds.
Gulf of Carpentaria Marine Park	National Park Zone (II) Special Purpose Zone (Trawl) (VI)	**Description** The Gulf of Carpentaria Marine Park is located approximately 90 km north-west of Karumba, Queensland and is adjacent to the Wellesley Islands in the south of the Gulf of Carpentaria basin. This Marine Park covers an area of 23,771 km² and water depths range from less than 15 m to 70 m.
		Natural values This marine park includes ecosystems representative of the Northern Shelf Province—a dynamic region with a gently sloping shelf topped with a number of pinnacles at depths ranging from 5 m to 30 m. Tidal eddies induce localised upwellings and hotspots of productivity that correspond with aggregations of marine life within the marine park. Key ecological features are: • Gulf of Carpentaria basin • Gulf of Carpentaria coastal zone • plateaux and saddle north-west of the Wellesley Islands • submerged coral reefs of the Gulf of Carpentaria. This marine park supports a range of species listed under the EPBC Act. Biologically important areas within this marine park include breeding and foraging areas for seabirds and internesting and foraging areas for turtles.

North Marine Park Network	IUCN Zones	Values
		Cultural values Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. The Lardil, Yangkaal, Kaiadlit and Gangalidda people of the Wellesley Islands have a continuing spiritual connection with their sea country and responsibilities for managing that country. They have had their native title rights recognised. Both the Thuwathu-Bujimulla Indigenous Protected Area (IPA) and the Wellesely Island Sea Claim determination extend over part of the Gulf of Carpentaria Marine Park. The Thuwathu-Bujimulla IPA includes 160 sites of cultural heritage significance and the largest collection of stone fish traps in the southern hemisphere. The Lardil, Yangkaal, Kaiadlit and Gangalidda people of the Wellesley Islands hold a wealth of cultural knowledge about their islands and sea country. They recognise the presence of the Rainbow Serpent (Thuwathu or Bujimulla) in cyclones, waterspouts and rainbows, and understand that the Rainbow Serpent has the power to cause a special type of sickness known as Markiriil in Lardil. They also consider that there are dangerous places on their country where spirits can do you harm if you are not accompanied by the right people for that area. Many prominent marine features, such as reefs, rocks, oyster banks or sand bars have their own specific names. Among these named sites are special 'story places', where significant events happened in the past, where people carry out ritual activities to maintain particular animal or plant species, or which are responsible for making tidal floods, cyclones or strong winds. The Lardil people, as the traditional owners of Mornington Island and surrounding sea country, are recognised as the people of the Wellesley Islands with the authority to speak for sea country within the Gulf of Carpentaria Marine Park. The Gulf Region Aboriginal Corporation Prescribed Body Corporate represents the Lardil, Yangkaal, Kaiadlit and Gangalidda native title holders of the Wellesley Islands and is the point of contact for this Marine Park. The Carpentaria Land Council Aboriginal Corporation is the Native Title Representative Body for the region.
		Heritage values This marine park contains four known shipwrecks listed under the Historic Shipwrecks Act 1976—*Douglas Mawson* (wrecked in 1923); *A.D.C*. (wrecked in 1886); *Wild Duck* (wrecked in 1876); and *Ada* (wrecked 1886). No international, Commonwealth or national heritage listings apply to this marine park.
		Social and economic values Commercial fishing, tourism, and recreation, including fishing, are important activities in this marine park.
Limmen Marine Park	Habitat Protection Zone (IV)	**Description** The Limmen Marine Park is located approximately 315 km south-west of Nhulunbuy, Northern Territory, in the south-west of the Gulf of Carpentaria. It extends from Northern Territory waters, between the Sir Edward Pellew Group of Islands and Maria Island in the Limmen Bight, adjacent to the Northern Territory Limmen Bight Marine Park. This marine park covers an area of 1399 km² and water depths range from less than 15 m to 70 m.

North Marine Park Network	IUCN Zones	Values
		Natural values This marine park includes examples of ecosystems representative of the Northern Shelf Province—a dynamic region with gently sloping shelf, topped with a number of pinnacles at depths ranging from 5 m to 30 m. Tidal eddies induce localised upwellings and hotspots of productivity that correspond with aggregations of marine life within this marine park. The key ecological feature in this marine park is the Gulf of Carpentaria coastal zone—nutrients from rivers flowing into the coastal zone support high productivity and diverse biota. A prominent seafloor feature within this marine park is the Labyrinthian Shoals, a group of sand banks, some with rocky heads, in depths of less than 1.8 m. This marine park supports a range of species listed under the EPBC Act. Biologically important areas within this marine park include internesting and foraging habitat for marine turtles.
		Cultural values Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. The Marra people have responsibilities for sea country in this marine park, and share song-lines that travel through this Marine Park with the Yanyuwa People. The Northern Land Council is the Native Title Representative Body for the Northern Territory's northern region.
		Heritage values No international, Commonwealth or national heritage listings apply to this marine park.
		Social and economic values Commercial fishing, tourism, and recreation, including fishing, are important activities in this marine park.
Wessel Marine Park	Habitat Protection Zone (IV) Special Purpose Zone (Trawl) (VI)	**Description** The Wessel Marine Park is located approximately 22 km east of Nhulunbuy, Northern Territory. It extends from Northern Territory waters adjacent to the tip of the Wessel Islands to Northern Territory waters adjacent to Cape Arnhem. This marine park covers an area of 5908 km² and water depths between 15 m and 70 m.

North Marine Park Network	IUCN Zones	Values
		Natural values This marine park includes examples of ecosystems representative of the Northern Shelf—a dynamic region with gently sloping shelf topped with a number of pinnacles at depths ranging from 5 m to 30 m. Tidal eddies induce localised upwellings and hotspots of productivity that correspond with aggregations of marine life within this marine park. The key ecological feature in this marine park is the Gulf of Carpentaria basin—characterised by soft sediments that support abundant and diverse communities dominated by polychaetes, crustaceans, molluscs and echinoderms, with pelagic fish species such as shark, snapper, tuna and mackerel. This marine park overlaps the Arafura Sill, which is a seafloor barrier that restricts movement of water into the Gulf of Carpentaria basin and forms a distinct biogeographical transition point for sessile invertebrate (e.g. sponges and corals) and fish species. This marine park supports a range of species listed under the EPBC Act. Biologically important areas within this marine park include breeding habitat for seabirds and internesting and foraging habitat for marine turtles.
		Cultural values Sea country is valued for Indigenous cultural identity, health and wellbeing. Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. The Yolŋu people have responsibilities for sea country in this marine park. This marine park contains sites which are registered under the Northern Territory Aboriginal Sacred Sites Act 1989 (NT). The Northern Land Council is the Native Title Representative Body for the Northern Territory's northern region.
		Heritage values No international, Commonwealth or national heritage listings apply to this marine park.
		Social and economic values Commercial fishing, tourism, and recreation, including fishing, are important activities in this marine park.
West Cape York Marine Park	National Park Zone (II) Habitat Protection Zone (IV) Special Purpose Zone (VI)	**Description** The West Cape York Marine Park is located adjacent to the northern end of Cape York Peninsula approximately 25 km south-west of Thursday Island and 40 km north-west of Weipa, Queensland. It extends from Queensland State waters to the limit of Australia's exclusive economic zone. This Marine Park covers an area of 16,012 km² and water depths range from less than 15 m to 70 m.

North Marine Park Network	IUCN Zones	Values
		Natural values This marine park includes ecosystems representative of: • Northeast Shelf Transition—includes continental shelf, shallow water depths and high bottom salinity. It is influenced by tidal currents and has sandy substrates and reefs supporting benthic marine communities, reef-dwelling and pelagic species. • Northern Shelf Province—a dynamic region with gently sloping shelf topped with a number of pinnacles at depths ranging from 5 m to 30 m. Tidal eddies induce localised upwellings and hotspots of productivity that correspond with aggregations of marine life within this marine park. Key ecological features are: • Gulf of Carpentaria basin • Gulf of Carpentaria coastal zone. This marine park supports a range of species listed under the EPBC Act. Biologically important areas within this marine park include breeding and foraging habitat for seabirds, internesting and foraging habitat for marine turtles and dugong, and foraging, breeding and calving habitat for dolphins.
		Cultural values Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. Torres Strait Islanders and coastal First Nations people of the west coast of Cape York have responsibilities for sea country in this marine park. The Cape York Land Council is the Native Title Representative Body for the Cape York region, which includes most of this marine park. The Carpentaria Aboriginal Land Council and the Torres Strait Regional Authority also perform the function of Native Title Representative Bodies for parts of this marine park.
		Heritage values No international, Commonwealth or national heritage listings apply to the marine park. The marine park contains one known shipwreck listed under the Historic Shipwrecks Act 1976.
		Social and economic values Commercial fishing, tourism, and recreation, including fishing, are important activities in this marine park.
Oceanic Shoals	National Park Zone (II) Multiple Use (VI) Oceanic Shoals Special Purpose (Trawl) (VI)	**Description** The Oceanic Shoals Marine Park is located west of the Tiwi Islands, approximately 155 km north-west of Darwin, Northern Territory and 305 km north of Wyndham, Western Australia. It extends to the limit of Australia's exclusive economic zone. The marine park covers an area of 71,743 km² and water depths from less than 15 m to 500 m.

North Marine Park Network	IUCN Zones	Values
	Habitat Protection (IV)	**Natural values** This marine park includes ecosystems representative of the Northwest Shelf Transition—a dynamic environment influenced by strong tidal currents, upwellings of nutrient-rich waters, and a range of prominent seafloor features. The pinnacles, carbonate banks and shoals are sites of enhanced biological productivity. Key ecological features are: • carbonate bank and terrace systems of the Van Diemen Rise • carbonate bank and terrace system of the Sahul Shelf • pinnacles of the Bonaparte Basin • shelf break and slope of the Arafura Shelf. This marine park supports a range of species listed under the EPBC Act. Biologically important areas within this marine park include foraging and internesting habitat for marine turtles.
		Cultural values Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. At the commencement of this plan, there was limited information about the cultural significance of this marine park. The Northern Land Council and the Kimberley Land Council are the Native Title Representative Bodies for the Northern Territory's northern region, and the Kimberley region. The Tiwi Land Council collectively represents traditional owners of the Tiwi Islands.
		Heritage values No international, Commonwealth or national heritage listings apply to this marine park.
		Social and economic values Commercial fishing and mining are important activities in this marine park.
Joseph Bonaparte Gulf Marine Park	Multiple Use Zone (VI) Special Purpose Zone (VI) (NMR only)	**Description** The Joseph Bonaparte Gulf Marine Park is located approximately 15 km west of Wadeye, Northern Territory, and approximately 90 km north of Wyndham, Western Australia, in the Joseph Bonaparte Gulf. It is adjacent to the Western Australian North Kimberley Marine Park. This marine park covers an area of 8597 km² and water depth ranges between less than 15 m and 100 m.

North Marine Park Network	IUCN Zones	Values
		Natural values This marine park includes examples of ecosystems representative of the Northwest Shelf Transition—a dynamic environment influenced by strong tidal currents, monsoonal winds, cyclones and wind generated waves. The large tidal ranges and wide intertidal zones near this marine park create a physically dynamic and turbid marine environment. The key ecological feature in this marine park is the carbonate bank and terrace system of the Sahul Shelf—characterised by terraces, banks, channels and valleys supporting sponges, soft corals, sessile filter feeders, polychaetes and ascidians. This marine park supports a range of species listed under the EPBC Act. Biologically important areas within this Marine Park include foraging habitat for marine turtles and the Australian snubfin dolphin.
		Cultural values Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. The Miriuwung, Gajerrong, Doolboong, Wardenybeng and Gija and Balangarra people have responsibilities for sea country in this marine park. They are represented by the following Prescribed Bodies Corporate: Miriuwung and Gajerrong Aboriginal Corporation, and Balanggarra Aboriginal Corporation. These corporations are the points of contact for their respective areas of sea country in this marine park. The Northern Land Council and the Kimberley Land Council are the Native Title Representative Bodies for the Northern Territory's northern region, and the Kimberley region.
		Heritage values No international, Commonwealth or national heritage listings apply to this marine park, however this marine park is adjacent to the West Kimberley National Heritage Place.
		Social and economic values Tourism, commercial fishing, mining, and recreation including fishing, are important activities in this marine park.

11.6 Threatened Ecological Communities

No Threatened Ecological Communities (TECs) as listed under the EPBC Act are known to occur within the marine waters of the NWMR, or NMR as indicated by the PMST Reports (Appendix A).The Monsoon vine thickets (which is a TEC) occurs on the coastal dunes of Dampier Peninsula (NWMR). The subtropical and temperate coastal saltmarsh (which is a TEC) occurs within the marine water of the SWMR. Both TECs are described in Table 11-5.

Table 11-5: Summary of threatened ecological communities within the NWMR, NMR and SWMR

Threatened Ecological Community	Description	Conservation Values
Threatened Ecological Communities in the NWMR		
Monsoon vine thickets on the coastal sand dunes of Dampier Peninsula	The ecological community represents certain occurrences of monsoon vine thickets in the southwest Kimberley region of Western Australia, predominantly restricted to the coastlines of the Dampier Peninsula from Broome in the south to One Arm Point in the north and on the northeastern coast of the Peninsula from One Arm Point to Goodenough Bay (DSEWPaC, 2013d). The TEC occurs as discontinuous patches of dense vegetation and contains approximately 23% of vascular plant species that occur on the Dampier Peninsula. The ecological community contains deciduous, semi-deciduous and evergreen perennial flora species (DSEWPaC, 2013d).	The Monsoon vine thickets on the coastal sand dunes of Dampier Peninsula ecological community is listed as endangered (DSEWPaC, 2013d). The extent of the ecological community corresponds to country (the traditional lands) of the Bardi Jawi, Djabera Djabera, Goolarabaloo, Jabirr Jabirr, Nyul Nyul and Yawuru Indigenous people. The ecological community is of cultural significance (DSEWPaC, 2013d). Patches of the TEC operate as an ecological network with birds, mammals and frugivore species providing connectivity. The vegetation provides refuge for animals (DSEWPaC, 2013d).
Threatened Ecological Communities in the NMR		
N/A		
Threatened Ecological Communities in the SWMR		
Subtropical and Temperate Coastal Saltmarsh	The ecological community spans six state jurisdictions: Queensland (southern), New South Wales, Victoria, Tasmania, South Australia and Western Australia (south-western) (DSEWPaC, 2013c). The TEC occupies a relatively narrow strip along the Australian coast, in areas which have an intermittent or regular tidal influence. The coastal saltmarsh community consists mainly of salt-tolerant vegetation including grasses, herbs, sedges, rushes and shrubs (Adam, 1990 cited in DSEWPaC, 2013c).	The Subtropical and Temperate Coastal Saltmarsh TEC is listed as vulnerable (DCCEEW, 2023a). This TEC consists of organisms including and associated with saltmarsh in coastal regions of sub-tropical and temperate Australia (DSEWPaC, 2013c). A wide range of infaunal and epifaunal invertebrates and low and high tide visitors such as fish, birds and prawns also inhabit the TEC (DSEWPaC, 2013c). It is reported as an important nursery habitat for fish and prawn species. The dominant marine residents are benthic invertebrates, including molluscs and crabs (Ross et al., 2009 cited in DSEWPaC, 2013c) with insects also abundant and considered an important food source for fauna (DSEWPaC, 2013c).

11.7 Australian Whale Sanctuary

The Australian Whale Sanctuary has been established to protect all whales and dolphins found in Australian waters. Under the EPBC Act all cetaceans (whales, dolphins and porpoises) are protected in Australian waters.

The Australian Whale Sanctuary includes all Commonwealth waters from the three nautical mile State/Territory waters limit out to the boundary of the economic exclusion zone (i.e. out to 200 NM and further in some places). Within the Australian Whale Sanctuary it is an offence to kill, injure or interfere with a cetacean. Severe penalties apply to anyone convicted of such offences.

11.8 State Marine Parks and Reserves

State Marine Parks and Reserves, proclaimed under the Conservation and Land Management Act 1984 (WA) (CALM Act), are located in State waters and vested in the WA Conservation and Parks Commission. State Marine Parks and Reserves of Western Australia have been considered, with 10 occurring in the NWMR (Table 11-6) and six occurring in the SWMR (Table 11-7).

Three new marine parks were established in 2022 in the Buccaneer Archipelago of the Kimberley. Boundaries commenced on July 1, 2023. The parks have been co-designed and are joint-managed by Traditional Owners, alongside with the Department of Biodiversity, Conservation and Attractions (DBCA, 2021b). The three new marine parks are:

- Bardi Jawi Gaarra Marine Park
- Lalang-gaddam Marine Park (formed from the amalgamation of Lalang-garram/Camden Sound Marine Park, Lalang-garram/Horizontal Falls Marine Park, North Lalang-garram Marine Park and Maiyalam Marine Park along Western Australia's Kimberley Coast)
- Mayala Marine Park.

There is a marine park to be defined in the Exmouth Gulf (EPA, 2022). The Exmouth Gulf Taskforce Interim Report to the Minister for Environment (DWER, 2023) outlines the values and recommended management approach of the Exmouth Gulf Marine Park.

11.9 Summary of Protected Areas Within the NWMR

Table 11-6: Protected areas within the NWMR

Protected Area	Woodside Activity Area			IUCN Protected Area Category* or Relevant Park Zone	Description and Values
	Browse	NWS/S	NW Cape		
World Heritage Properties					
Shark Bay World Heritage Property	-	-	✓		**Description** The Shark Bay World Heritage Property is adjacent to the Shark Bay AMP and was included on the World Heritage List in 1991 (UNESCO, 1991).
					Conservation Values Universal values of the Shark Bay World Heritage Property include large and diverse seagrass beds, stromatolites and populations of dugong and threatened species. Inscribed under Natural Criteria vii, viii, ix and x (UNESCO, 1991).
The Ningaloo Coast World Heritage Property	-	-	✓		**Description** The Ningaloo Coast World Heritage Property is approximately 710,000 ha and lies within the Ningaloo AMP and was included on the World Heritage List in 2011 (UNESCO, 2011).
					Conservation Values Universal values of the Ningaloo Coast World Heritage Property include high marine species diversity and abundance; in particular, Ningaloo Reef supports both tropical and temperate marine reptiles and mammals. Inscribed under Natural Criteria vii and x (UNESCO, 2011).
National Heritage Places – Natural					
Shark Bay	-	-	✓		**Description** The Shark Bay National Heritage Place consists of the same area included in the Shark Bay World Heritage Property (refer above) and was established on the National Heritage List in 2007 (DEC, 2008).

Protected Area	Woodside Activity Area			IUCN Protected Area Category* or Relevant Park Zone	Description and Values
	Browse	NWS/S	NW Cape		
					Conservation Values This national heritage place has a number of exceptional natural features, including one of the largest and most diverse seagrass beds in the world, colonies of stromatolites and rich marine life including a large population of dugongs, and also provides a refuge for a number of other globally threatened species. Shark Bay meets the national heritage listing criteria a, b, c, d, e, f, g, h and I (DEC, 2008).
The Ningaloo Coast	-	-	✓		**Description** The Ningaloo Coast National Heritage Place consists of the same area included in the Ningaloo Coast World Heritage Property (refer above) and was established on the National Heritage List in 2010 (Commonwealth of Australia, 2010).
					Natural Values The Ningaloo Coast contains one of the best developed near-shore reefs in the world, being home to rugged limestone peninsulas, spectacular coral and sponge gardens and the whale shark. The Ningaloo Coast meets the national heritage listing criteria a, b, c, d, and f (Commonwealth of Australia, 2010).
The West Kimberley	✓	✓	-		**Description** The West Kimberley National Heritage Place covers an area of around 192,000 km^2 located in the north-west of Australia from Broome to Wyndham, and was established on the National Heritage List in 2011 (Commonwealth of Australia, 2011).
					Conservation Values The Kimberley plateau, north-western coastline and northern rivers of the West Kimberley provide a vital refuge for many native plants and animals that are found nowhere else or which have disappeared from much of the rest of Australia. In addition, Roebuck Bay is internationally recognised as one of Australia's most significant sites for migratory wading birds. This national heritage place also contains a remarkable history of First Nations occupation, with many places of indigenous sacred value. The West Kimberley meets the national heritage listing criteria a, b, c, d, e, f, g, h and I (Commonwealth of Australia, 2011).

Protected Area	Woodside Activity Area			IUCN Protected Area Category* or Relevant Park Zone	Description and Values
	Browse	NWS/S	NW Cape		
Commonwealth Heritage Places – Natural					
Mermaid Reef – Rowley Shoals	-	✓	-		**Description** The Mermaid Reef – Rowley Shoals Commonwealth Heritage Place is located within the boundary of the Mermaid Reef Marine National Nature Reserve. The site was listed as a Commonwealth Heritage Place in 2004 (DCCCEEW, n.d.-a). **Conservation Values** The Mermaid Reef-Rowley Shoals Commonwealth Heritage Place is regionally important for the diversity of its fauna and together with Clerke and Imperieuse reefs, has biogeographical significance due to the presence of species which are at, or close to, the limits of their geographic ranges, including fishes known previously only from Indonesian waters. Rowley Shoals is important for benchmark studies as one of the few places off the north-west coast of Western Australia which have been the site of major biological collection trips by the WA Museum (DCCCEEW, n.d.-a).
Ashmore Reef National Nature Reserve	✓	-	-		**Description** The Ashmore Reef Commonwealth Heritage Place is located within the boundary of the Ashmore Reef Marine Park (refer AMPs below). The site was listed as a Commonwealth Heritage Place in 2004 (DCEEW, n.d-d). **Conservation Values** Ashmore Reef has major significance as a staging point for wading birds migrating between Australia and the Northern Hemisphere and supports high concentrations of breeding seabirds, many of which are nomadic and typically breed on small isolated islands. Ashmore Reef is an important scientific reference area for migratory seabirds, sea snakes and marine invertebrates. The Ashmore Reef Commonwealth Heritage Place is significant for its history of human occupation and use. The island is believed to have been visited by Indonesian fisherman since the early eighteenth century. The islands were used both for fishing and as a staging point for voyages to the southern reefs off Australia's coast (DCEEW, n.d-d).

Protected Area	Woodside Activity Area			IUCN Protected Area Category* or Relevant Park Zone	Description and Values
	Browse	NWS/S	NW Cape		
Scott Reef and Surrounds – Commonwealth Area	✓	-	-		**Description** Scott Reef and Surrounds Commonwealth Heritage Place is located within the Western Australian Coastal Waters surrounding North and South Scott Reef. The site was listed as a Commonwealth Heritage Place in 2004 (DCEEW, n.d-e).
					Conservation Values The Scott Reef and Surrounds Commonwealth Heritage Place is regionally important for the diversity of its fauna and has biogeographical significance due to the presence of species which are at, or close to, the limits of their geographic ranges, including fish known previously only from Indonesian waters. Scott Reef is recognised as important for scientific research and benchmark studies due to its age, the extensive documentation of its geophysical and physical environmental characteristics and its use as a site of major biological collection trips and surveys by the WA Museum and the Australian Institute of Marine Science (DCEEW, n.d-e).
Ashmore Reef National Nature Reserve	✓	-	-		**Description** The Ashmore Reef Commonwealth Heritage Place is located within the boundary of the Ashmore Reef Marine Park (refer AMPs below). The site was listed as a Commonwealth Heritage Place in 2004 (DCEEW, n.d-d).
					Conservation Values Ashmore Reef has major significance as a staging point for wading birds migrating between Australia and the Northern Hemisphere and supports high concentrations of breeding seabirds, many of which are nomadic and typically breed on small isolated islands. Ashmore Reef is an important scientific reference area for migratory seabirds, sea snakes and marine invertebrates. The Ashmore Reef Commonwealth Heritage Place is significant for its history of human occupation and use. The island is believed to have been visited by Indonesian fisherman since the early eighteenth century. The islands were used both for fishing and as a staging point for voyages to the southern reefs off Australia's coast (DCEEW, n.d-d).

Protected Area	Woodside Activity Area			IUCN Protected Area Category* or Relevant Park Zone	Description and Values
	Browse	NWS/S	NW Cape		
Scott Reef and Surrounds – Commonwealth Area	✓	-	-		**Description** Scott Reef and Surrounds Commonwealth Heritage Place is located within the Western Australian Coastal Waters surrounding North and South Scott Reef. The site was listed as a Commonwealth Heritage Place in 2004 (DCEEW, n.d-e).
					Conservation Values The Scott Reef and Surrounds Commonwealth Heritage Place is regionally important for the diversity of its fauna and has biogeographical significance due to the presence of species which are at, or close to, the limits of their geographic ranges, including fish known previously only from Indonesian waters. Scott Reef is recognised as important for scientific research and benchmark studies due to its age, the extensive documentation of its geophysical and physical environmental characteristics and its use as a site of major biological collection trips and surveys by the WA Museum and the Australian Institute of Marine Science (DCEEW, n.d-e).
Ningaloo Marine Area – Commonwealth Waters	-	-	✓		**Description** The Ningaloo Marine Area Commonwealth Heritage Place is located within the Commonwealth waters of the Ningaloo Marine Park (refer AMPs below). The site was listed as a Commonwealth Heritage Place in 2004 (DCEEW, n.d-f).
					Conservation Values The Ningaloo Marine Area Commonwealth Heritage Place provides a migratory pathway for humpback whales and foraging habitat for whale shark. The place is an important breeding area for billfish and manta ray. The Ningaloo Marine Area provides opportunities for scientific research relating to aspects of the area's unique features including tourism (marine ecology, whales, turtles, whale shark, fish and oceanography (DCEEW, n.d-f).
Yampi Defence Area	✓	-	-		**Description** Located 35 km south of Koolan Island the Yampi Defence Area displays a unique mosaic of geographical landforms that is unique to the region. The occurrence of such diverse landscapes within a small area is an unusual occurrence (DCCEEW, n.d.-c).

Protected Area	Woodside Activity Area			IUCN Protected Area Category* or Relevant Park Zone	Description and Values
	Browse	NWS/S	NW Cape		
					Conservation Values The Yampi Defence Area occurs at the confluence of three biogeographic regions in the North-west of Australia. It exhibits diverse landforms, soils, and vegetation representative of the sandstone plateaux of the wetter areas of the North-west Kimberley to the broad plains and pindin scrub of the drier areas in the South-west Kimberley. The Yampi peninsula contains one of the richest amphibian records in the Kimberley. The Yampi Defence Area meets the Commonwealth heritage listing criteria a,b,c (DCCEEW, n.d.-c).
Learmonth Air Weapons Range Facility	-	-	✓		**Description** Located along the Ningaloo coastline, the Learmonth Air Weapons Range Facility was one of Australia's most active bombing ranges until 1990. It is of considerable importance in documenting sea level and landform changes since the late Cenozoic period (DCCEEW, n.d.-b).
					Conservation Values The area includes an ancient reef complex and cave fauna that is of exceptional importance. The ages of the reef terraces are key to understanding the timing of uplift events. The Learmonth Air Weapons Range Facility meets the Commonwealth heritage listing criteria a,b,c (DCCEEW, n.d.-b).

Protected Area	Woodside Activity Area			IUCN Protected Area Category* or Relevant Park Zone	Description and Values
	Browse	NWS/S	NW Cape		
Wetlands of International Importance (Ramsar)					
Ashmore Reef National Nature Reserve	✓	-	-	Ramsar	**Description** The Ashmore Reef Ramsar site is located within the boundary of the Ashmore Reef Marine Park (refer AMPs below). The site was listed under the Ramsar Convention in 2002 (Commonwealth of Australia, 2002b).
					Conservation Values The Ashmore Reef Ramsar site supports internationally significant populations of seabirds and shorebirds, is important for turtles (green, hawksbill and loggerhead) and dugong, and has the highest diversity of hermatypic (reef-building) corals on the Western Australian coast. It is known for its abundance and diversity of sea snakes. However, since 1998 populations of sea snakes at Ashmore Reef have been in decline (Commonwealth of Australia, 2002b).
					Cultural Values Indonesian fishers have regularly visited Ashmore Reef since the early eighteenth century to fish within the area and use the islands for staging points before travelling to other reefs in the region. Indonesian artefacts have been found on Cartier Island, and West, Middle and East Islands (Commonwealth of Australia, 2002b).
Eighty Mile Beach	-	✓	-	Ramsar	**Description** The Eighty Mile Beach Ramsar site covers an area of 1250 km^2, located along a long section of the Western Australian coastline adjacent to the Eighty Mile Beach AMP (refer below) (CALM, 2003a).
					Conservation Values The Eighty Mile Beach Ramsar site includes saltmarsh and a raised peat bog more than 7000 years old. The site contains the most important wetland for waders in north-western Australia, supporting up to 336,000 birds, and is especially important as a land fall for waders migrating south for the austral summer (CALM, 2003a).

Protected Area	Woodside Activity Area			IUCN Protected Area Category* or Relevant Park Zone	Description and Values
	Browse	NWS/S	NW Cape		
Roebuck Bay	-	✓	-	Ramsar	**Description** The Roebuck Bay Ramsar site covers an area of 550 km^2, located south of Broome and adjacent to the Roebuck AMP (refer below) (CALM, 2003b).
					Conservation Values The Roebuck Bay Ramsar site is recognised as one of the most important areas for migratory shorebirds in Australia. The site regularly supports over 100,000 waterbirds, with numbers being highest in the austral spring when migrant species breeding in the Palearctic stop to feed during migration. Roebuck Bay supports one of the largest known populations of Australian snubfin dolphins (*Orcaella heinsohni*)—a species with a limited distribution, vulnerable conservation status, and high cultural value (CALM, 2003a; D'Cruz *et.al.*, 2022).
Ord River Floodplain	✓			Ramsar	**Description** The Ord River Floodplain Ramsar site is in the East Kimberley region and encompasses an extensive system of river, seasonal creek, tidal mudflat, and floodplain wetlands. The site is a nursery, feeding and/or breeding ground for migratory birds, waterbirds, fish, crabs, prawns, and crocodiles. The site supports vulnerable species under the EPBC Act, including: Freshwater Sawfish (*Pristis microdon*), Green Sawfish (*Pristis zijsron*) and the Australian Painted Snipe (*Rostratula australis*). The site is also one of the only two known habitats in WA of the nationally endangered Northern River Shark (*Glyphis garricki*) (DCCEEW, 2019a).
					Conservation Values The site represents the best example of wetlands associated with the floodplain and estuary of a tropical river system in the Tanami-Timor Sea Coast Bioregion in the Kimberley. In addition, the False Mouths of the Ord are the most extensive mudflat and tidal waterway complex in Western Australia (DCCEEW, 2019a).

Protected Area	Woodside Activity Area			IUCN Protected Area Category* or Relevant Park Zone	Description and Values
	Browse	NWS/S	NW Cape		
Wetlands of National Importance (DAWE, 2019)					
Ashmore Reef	✓	-	-		**Description** Ashmore Reef is a shelf-edge platform reef located among the Sahul Banks of north-western Australia. It covers an area of 583 km^2 and consists of three islets surrounded by intertidal reef and sand flats (DCCEEW, 2019b).
					Conservation Values These islets are major seabird nesting sites with 20 breeding species recorded to date. The total bird population has been estimated to exceed 100,000 during the peak breeding season. The marine reserve also has the highest diversity of marine fauna of the reefs on the NWS and differs from other reefs and coastal areas in the region. The area meets criteria 1, 3, 4 and 5 for inclusion on the Directory of Important Wetlands in Australia (DCCEEW, 2019b).
Mermaid Reef	-	✓	-		**Description** Mermaid Reef Marine Park covers an area of around 540 km^2, located ~280 km west north-west of Broome, and is the most north-easterly atoll of the Rowley Shoals (DCCEEW, 2019b).
					Conservation Values The reefs of the Mermaid Reef Marine Park have biogeographic value due to the presence of species that are at or close to the limit of their distribution. The coral communities are one of the special values of Mermaid Reef. The area meets criteria 1, 2 and 3 for inclusion on the Directory of Important Wetlands in Australia (DCCEEW, 2019b).
Exmouth Gulf East	-	-	✓		**Description** Exmouth Gulf East covers an area of 800 km^2 and includes wetlands in the eastern part of Exmouth Gulf, from Giralia Bay; to Urala Creek, Locker Point (DCCEEW, 2019b).

Protected Area	Woodside Activity Area			IUCN Protected Area Category* or Relevant Park Zone	Description and Values
	Browse	NWS/S	NW Cape		
					Conservation Values The Exmouth Gulf East is an outstanding example of tidal wetland systems of the low coast of north-west Australia, with well-developed tidal creeks, extensive mangrove swamps and broad saline coastal flats. The site is one of the major population centres for dugong in WA and its seagrass beds and extensive mangroves provide nursery and feeding areas for marine fishes and crustaceans in the Gulf. The area meets criteria 1, 2 and 3 for inclusion on the Directory of Important Wetlands in Australia (DCCEEW, 2019b).
Hamelin Pool	-	-	✓		**Description** Hamelin Pool covers an area of 900 km^2 in the far south-east part of Shark Bay (DCCEEW, 2019b).
					Conservation Values Hamelin Pool is an outstanding example of a hypersaline marine embayment and supports extensive microbialite (subtidal stromatolite) formations, which are the most abundant and diverse examples of growing marine microbialites in the world. The area meets criteria 1 and 6 for inclusion on the Directory of Important Wetlands in Australia (DCCEEW, 2019b).
Shark Bay East	-	-	✓		**Description** Shark Bay East covers a 250 km area of coastline comprising tidal wetlands, and marine waters less than 6 m deep at low tide, in the east arm of Shark Bay (DCCEEW, 2019b).

Protected Area	Woodside Activity Area			IUCN Protected Area Category* or Relevant Park Zone	Description and Values
	Browse	NWS/S	NW Cape		
					Conservation Values The site is an outstanding example of a very large, shallow marine embayment, with particularly extensive occurrence of seagrass beds and substantial areas of intertidal mud/sandflats and mangrove swamp. The site supports what is probably the world's largest discrete population of dugong; it is also a major nursery and/or feeding area for turtles, rays, sharks, other fishes, prawns and other marine fauna; and is a major migration stop-over area for shorebirds. The area meets criteria 1, 2, 3, 4, 5 and 6 for inclusion on the Directory of Important Wetlands in Australia (DCCEEW, 2019b).
State Marine Parks and Reserves					
North Kimberley Marine Park	✓	-	-	Sanctuary, Special Purpose and General Use Zones	**Description** The North Kimberley Marine Park covers. 18,450 km^2 with its south- western boundary located ~270 km north-east of Derby (DPAW, 2016a).
					Conservation Values The marine park covers approximately 1,845,000 hectares. The coral reefs of the North Kimberley have the greatest diversity in Western Australia and are some of the most pristine and remarkable reefs in the world. The park surrounds more than 1000 islands and is home to listed species such as dugongs, marine turtles, and sawfishes (DPAW, 2016a).
					Social and Economic Values The park features diverse wildlife, remarkable scenery and cultural heritage which provides excellent opportunities for tourism experiences, recreational and nature-based activities such as fishing and hunting (DPAW, 2016a).
					Cultural Values The Wunambal Gaambera, Balanggarra, Ngarinyin and Miriuwung Gajerrong people have strong and ongoing cultural connections to the North Kimberley saltwater country and rely on coastal and marine environments and resources for their cultural identity, livelihoods and economy (DPAW, 2016a).

Protected Area	Woodside Activity Area			IUCN Protected Area Category* or Relevant Park Zone	Description and Values
	Browse	NWS/S	NW Cape		
Rowley Shoals Marine Park	-	✓	-	Sanctuary, Recreation and General Use Zones	**Description** The Rowley Shoals comprise of three reef systems, Mermaid Reef, Clerke Reef and Imperieuse Reef, all 30-40 km apart. These reef systems are located ~300 km west north-west of Broome (DEC, 2007a).
					Conservation Values The three coral atolls of the Rowley Shoals Marine Park comprise of shallow lagoons inhabited by diverse corals and abundant marine life, each covering around 80 km^2 at the edge of Australia's continental shelf (DEC, 2007a). Further offshore, the seafloor slopes away to the abyssal plain, some 6000 m below. Undersea canyons slice the slope; these features are commonly associated with diverse communities of deep-water corals and sponges and create localised upwellings that aggregate pelagic species like tunas and billfish (DEC, 2007a).
					Social and Economic Values Due to its remote location, the Rowley Shoals has low numbers of visitors with most arriving aboard licenced charter boats. Popular activities in the area include scuba diving, recreational fishing, and boating (DEC, 2007a).
Yawuru Nagulagun / Roebuck Bay Marine Park	-	✓	-	Special Purpose Zone	**Description** Yawuru Nagulagun / Roebuck Bay Marine Park is a series of intertidal flats lying on the coast to the south-east of Broome.
					Conservation Values Roebuck Bay is an internationally significant wetland and one of the most important feeding grounds for migratory shorebirds in Australia. Australian snubfin and Australian humpback dolphins frequent the waters and humpback whales pass through on their annual migration. Flatback turtles nest on the shores and are found in the bay's waters with other sea turtle species. Seagrass and macroalgae communities provide food for protected species such as the dugong and flatback turtles (DPAW, 2016b).
					Social and Economic Values The marine park is adjacent to Broome and supports tourism activities and provides an active outdoor lifestyle for the residents of the region (DPAW, 2016b).

Protected Area	Woodside Activity Area			IUCN Protected Area Category* or Relevant Park Zone	Description and Values
	Browse	NWS/S	NW Cape		
					Cultural Values The Yawuru people have lived along the shores of Roebuck Bay for thousands of years and have a dynamic and enduring relationship with the Yawuru country. The coastline is important for cultural activities and is a place for hunting, fishing, gathering and camping for the Yawuru people (DPAW, 2016b).
Eighty Mile Beach Marine Park	-	✓	-	Sanctuary, Recreation, Special Purpose and General Use Zones	**Description** Eighty Mile Beach Marine Park covers ~2000 km^2 stretching across 220 km of coastline between Port Hedland and Broome (DPAW, 2014a).
					Conservation Values Eighty Mile Beach Marine Park is one of the world's most important feeding grounds for small wading birds that migrate to the area each summer, travelling from countries thousands of kilometres away. The marine park is a major nesting area for flatback turtles which are found only in northern Australia. Sawfishes, dugongs, dolphins and millions of invertebrates inhabit the sand and mud flats, seagrass meadows, coral reefs and mangroves (DPAW, 2014a).
					Social and Economic Values Social values of the marine park include tourism, nature-based recreational activities and commercial fishing (DPAW, 2014a).
					Cultural Values The Karajarri, Nyangumarta and Ngarla people have a powerful connection to the land and sea of this region. Traditional hunting and fishing are important cultural activities for the traditional owners of this marine park (DPAW, 2014a).

Protected Area	Woodside Activity Area			IUCN Protected Area Category* or Relevant Park Zone	Description and Values
	Browse	NWS/S	NW Cape		
Montebello Islands Marine Park, Barrow Island Marine Park and Barrow Island Marine Management Area (jointly managed)	-	✓	-	Sanctuary, Recreation, General Use and Special Purpose Zones	**Description** The Montebello Islands Marine Park, Barrow Island Marine Park and Barrow Island Marine Management Area are located off the north-west coast of WA, ~1600 km north of Perth, and cover areas of ~583 km^2, 42 km^2 and 1,147 km^2, respectively (DEC, 2007b).
					Conservation Values The Montebello/Barrow Islands marine conservation reserves have very complex seabed and island topography, resulting in a myriad of different habitats, subtidal coral reefs, macroalgal and seagrass communities, subtidal soft-bottom communities, rocky shores and intertidal reef platforms, which support a rich diversity of invertebrates and finfish. The reserves are important breeding areas for several species of marine turtles and seabirds, which use the undisturbed sandy beaches for nesting. Humpback whales migrate through the reserves and dugongs occur in the shallow warm waters (DEC, 2007b).
					Social and Economic Values Major commercial fishing and pearling occur within the area which provide employment and economic value to surrounding communities. Nature based-tourism, water sports and recreational fishing are popular recreational activities undertaken in the area (DEC, 2007b).
					Cultural Values There are no recorded seabed aboriginal sites within this park. However, it is possible there are aboriginal archaeological sites on the seabed that were created before the most recent sea level rise (DEC, 2007b).

Protected Area	Woodside Activity Area			IUCN Protected Area Category* or Relevant Park Zone	Description and Values
	Browse	NWS/S	NW Cape		
Ningaloo Marine Park and Muiron Islands Marine Management Area (jointly managed)	-	-	✓	Sanctuary, Recreation, General Use and Special Purpose Zones	**Description** The Ningaloo Marine Park and Muiron Islands Marine Management Area are located off the North-west Cape, ~1200 km north of Perth, and cover areas of ~2633 km^2 and 286 km^2 respectively (CALM, 2005a).
					Ecological Values Ningaloo Reef is the largest fringing coral reef in Australia. Temperate and tropical currents converge in the Ningaloo region resulting in highly diverse marine life including spectacular coral reefs, abundant fishes and species with special conservation significance such as turtles, whale sharks, dugongs, whales and dolphins. The region has diverse marine communities including mangroves, algae and filter-feeding communities and has high water quality. These values contribute to the Ningaloo Marine Park being regarded as the State's premier marine conservation icon. The Muiron Islands Marine Management Area is also important, containing a very diverse marine environment, with coral reefs, filter-feeding communities and macroalgal beds. In addition, the Islands are important seabird and green turtle nesting areas (CALM, 2005a).
					Social and Economic Values The Ningaloo region has a high number of visitors enjoying the area who come to appreciate nature-based tourism which brings important economic value to the communities of the area (CALM, 2005a).
					Cultural Values The Ningaloo Reef has a long history of occupancy by aboriginal communities and aboriginal heritage sites. The Jinigudira and Baiyungu people have lived in this region for thousands of years and use coastal areas for fishing, camping and hunting of turtles and dugongs (CALM, 2005a).

Protected Area	Woodside Activity Area			IUCN Protected Area Category* or Relevant Park Zone	Description and Values
	Browse	NWS/S	NW Cape		
Shark Bay Marine Park and Hamelin Pool Marine Nature Reserve (jointly managed)	-	-	✓	Sanctuary, Recreation, General Use and Special Purpose Zones	**Description** The Shark Bay Marine Park and Hamelin Pool Marine Nature Reserves are located 400 km north of Geraldton, covering areas of ~7487 km^2 and 1270 km^2, respectively (CALM, 1996).
					Conservation Values Seagrass covers over 4000 km^2 of the Shark Bay Marine Park, with 12 different species making it one of the most diverse seagrass assemblages in the world. Dugongs regularly use this habitat, with the bay containing one of the largest dugong populations in the world. Humpback whales also use the bay as a staging post in their migration along the coast. Green and loggerhead turtles occur in the bay, with Dirk Hartog Island providing the most important nesting site for loggerheads in Western Australia. Hamelin Pool contains the most diverse and abundant examples of stromatolites found in the world. These are living representatives of stromatolites that existed some 3500 million years ago (CALM, 1996).
					Social and Economic Values Commercial fishing and tourism are important economic values of the region. Popular recreational activities include nature-based tourism, recreational fishing and water sports (DEC, 2008).
					Cultural Values The Malgana people occupy the land and waters in the vicinity of Shark Bay and have strong cultural connection to the region. The area is important for cultural practices and for fishing, hunting and camping for the Malgana people (DEC, 2008).

Protected Area	Woodside Activity Area			IUCN Protected Area Category* or Relevant Park Zone	Description and Values
	Browse	NWS/S	NW Cape		
Bardi Jawi Gaarra Marine Park	✓	-	-	Sanctuary, Recreation, Special Purpose Zones (biocultural conservation and cultural protection), and General use	**Description** The Bardi Jawi Gaara Marine Park is located in the West Kimberley region surrounding the northern part of the Dampier Peninsula and the western islands of the Buccaneer Archipelago covering areas of ~2040 km^2.
					Conservation Values The Bardi Jawi Gaara Marine Park has a tidal range of 11 m, which is the highest in Australia. The mangrove lined creeks, intertidal and fringing reef areas that encompass the coastline and islands are ecologically important and host a vast number of plants and animals that have adapted to the unique area. Migratory marine mammals including humpback whales migrate to the areas between June and November each year to birth their young. Dugongs visit the area in the cooler months from May to July (DBCA, 2022a).
					Social and Economic Values Commercial fishing, pearling and aquaculture are important economic activities that occur within this region. The area is a popular tourism destination and hosts a number or recreational activities and water sports (DBCA, 2022a).
					Cultural Values The Bardi and Jawi people have a significant connection to the animals, sites and places within this region which are connected by stories and songlines. The sea country is used for hunting, fishing, cultural activities and business (DBCA, 2022a).
Lalang-gaddam Marine Park	✓	-	-	Sanctuary, Recreation, General Use and Special Purpose Zones	**Description** Amended joint management plan for the Lalang-gaddam / Camden Sound, Lalang-gaddam / Horizontal Falls and North Lalang-gaddam marine parks, and indicative joint management plan for the proposed Maiyalam Marine Park. The Lalang-gaddam Marine Park is located in the Kimberley region of Western Australia and adjacent to Derby and the Shire of Wyndham. The Class A marine park covers ~13,085 km^2 (DBCA, 2022b).

Protected Area	Woodside Activity Area			IUCN Protected Area Category* or Relevant Park Zone	Description and Values
	Browse	NWS/S	NW Cape		
					Conservation Values The Lalang-gaddam / Camden Sound Marine Park is the most important humpback whale nursery in the Southern Hemisphere. It also features the spectacular coastal Montgomery Reef. The marine park is home to six species of threatened marine turtle. Australian snubfin and Indo-Pacific humpback dolphins, saltwater crocodiles, manta rays, several species of protected sawfish, and the world's large population of dugongs (~12,000). The Lalang-gaddam Marine Park's most celebrated attraction, The Horizontal Falls is created by massive tides of up to 10 m and narrow gaps in two parallel tongues of land meaning the tide falls faster than the water can escape, producing 'horizontal falls'. There are also islands with fringing coral reefs and mangrove-lined creeks and bays. This marine park has a number of islands fringed with coral reef and has been identified as an ecological hotspot and supports more than 1% of the world's population of brown boobies, with up to 2,000 breeding pairs. Approximately 500 pairs of crested terns also nest on the island (DBCA, 2022b).
					Social and Economic Values This marine park has spectacular scenery which attracts a number of tourists and generates approximately $563 million annually. Recreational fishing and recreational maritime activities are popular within this marine park. Commercial fisheries can operate within the waters of this marine park, however many do not regularly fish within this area. Pearling and aquaculture occurs within this marine park and provides economic value for the region (DBCA 2022b).
					Cultural Values The area is of cultural significance to the Dambeemangarddee people who have lived on the land and cared for land and sea country for tens of thousands of years. Some animals such as the barramundi and rock cod have particular cultural significance and are sacred animals to the Dambeemangarddee people. Numerous coastal and marine plants continue to be an important food source for the traditional owners of this marine park (DBCA, 2022b).

Protected Area	Woodside Activity Area			IUCN Protected Area Category* or Relevant Park Zone	Description and Values
	Browse	NWS/S	NW Cape		
Mayala Marine Park	✓	-	-	Sanctuary, Recreation, General Use and Special Purpose Zones	**Description** The Mayala Marine Park is a Class A reserve located in the West Kimberley region and covers ~3150 km^2 (DBCA, 2022c).
					Conservation Values The Mayala Marine Park has a tidal range of 11 m, the highest in Australia. The mangrove lined creeks, intertidal and fringing reef areas that encompass the coastline and islands are ecologically important and host a vast number of plants and animals that have adapted to the unique area. The seagrass communities provide habitat and food for many species including turtles and dugongs. Migratory marine mammals including humpback whales migrate to the areas between June and November each year to birth their young. Dugongs visit the area in the cooler months from May to July (DBCA, 2022c).
					Social and Economic Values Due to the extraordinary natural values of the area, the number of visitors to the area has continued to grow over the years. Popular activities within the park include fishing, boating, and wildlife watching. The waters of this area provide optimal conditions for commercial fishing, pearling and aquaculture (DBCA, 2022c).
					Cultural Values The area is of exceptional cultural significance to the Malaya people who are true saltwater people and use both land and sea resources and have a strong connection to the land, animals and plants of the region. This marine park has many sacred sites that occur on land and sea which include artefacts, fish traps, and man-made structures. This marine park is culturally significant to the Malaya people who care for country and use this marine park for fishing, hunting and camping (DBCA, 2022c).

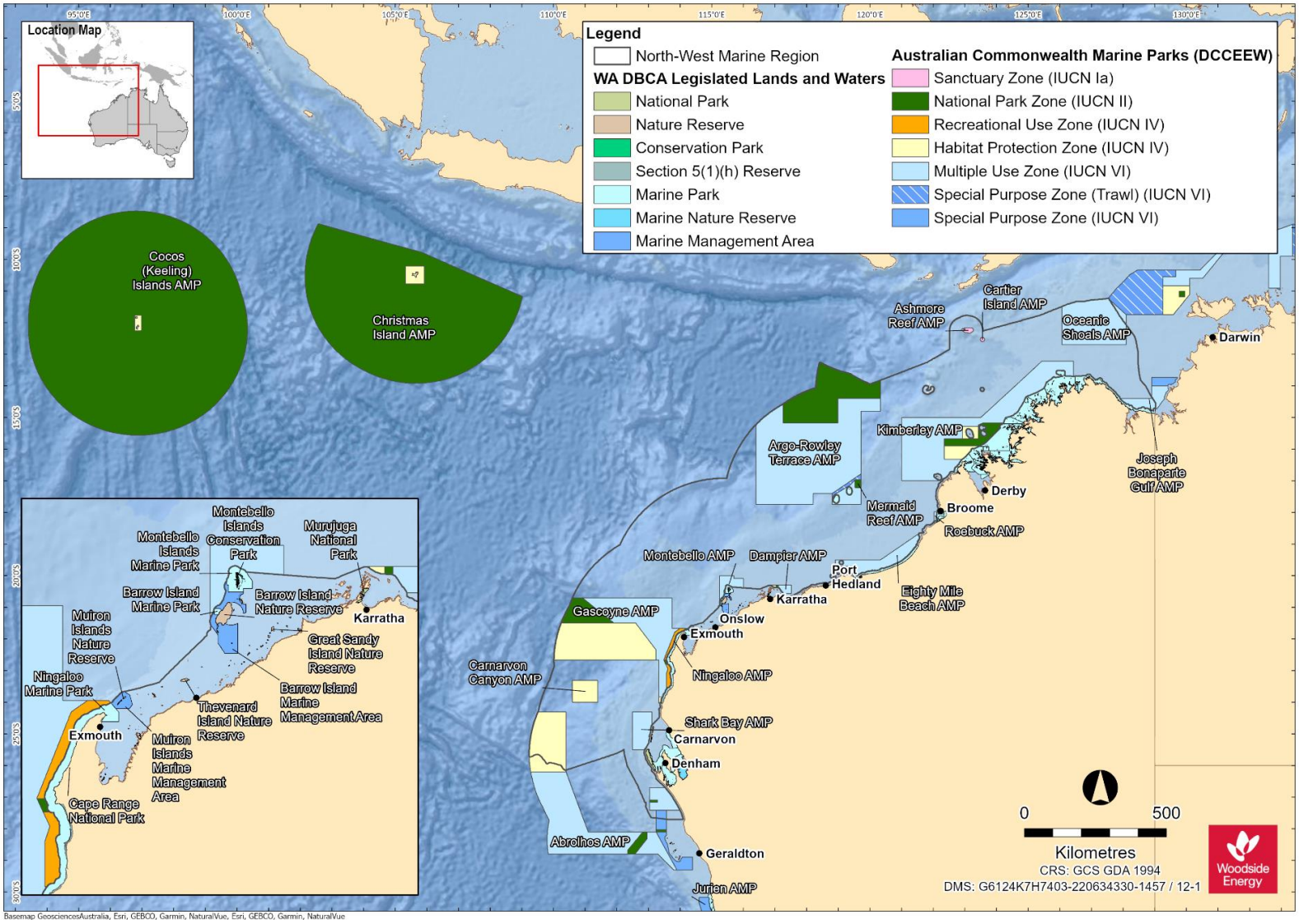


Figure 11-1: Commonwealth and State Marine Protected Areas for the NWMR and Indian Ocean Territories (data source: GA, 2024)

11.10 Summary of Protected Areas Within the SWMR

Table 11-7: Protected areas within the SWMR

Protected Area	IUCN Protected Area Category* or Relevant Park Zone	Description and Values
World Heritage Properties		
Australian Convict Sites (Fremantle Prison)		**Description** Fremantle Prison contains well preserved remnants of the earliest phase of European settlement of Western Australia. The Prison includes 16 intact convict-built structures surrounded by a six-metre-high limestone perimeter wall. The prison is one of the largest surviving convict establishments in the world (DCCEEW, 2021a).
		Conservation Values The Australian Convict Sites represent the global phenomenon of convictism—the forced migration of convicts to penal colonies in the 18th and 19th centuries (DCCEEW, 2021a).
National Heritage Places—- Natural		
N/A		
Commonwealth Heritage Places—- Natural		
Garden Island		**Description** Garden Island, and in particular the Cliff Point Historic Site, is highly valued by the community for its cultural associations as the site of first settlement in Western Australia. The absence of feral predators means that Garden Island provides a significant refuge for animals vulnerable to predation on the mainland (DAWE, 2004).
		Conservation Values It is likely that Indigenous values exist at this place. As yet these have not been identified, documented or assessed for National Estate significance by the Australian Heritage Commission. Species of particular interest include the Tammar wallaby (*Macropus eugenii*), carpet python (*Morelia spilota*), and the lined skink (*Lerista lineata*). The parabolic sand dunes on the western side of the island are among the best-preserved dunes of the Quindalup soil unit (DAWE, 2004).
Wetlands of International Importance (Ramsar)		
Becher Point Wetlands	Ramsar	**Description** Beecher Point Wetlands is a system of about sixty small wetlands located near Rockingham in south- west WA, covering an area of around 7 km^2. The site was listed under the Ramsar Convention in 2001 (DPAW, 2014b).

Protected Area	IUCN Protected Area Category* or Relevant Park Zone	Description and Values
		Conservation Values The wetlands support sedgelands, herblands, grasslands, open-shrublands and low open-forests. The sedgelands that occur within the linear wetland depressions of the Ramsar site are a nationally listed threatened environmental community. At least four species of amphibians and 21 species of reptiles have been recorded on the site. The site also supports the southern brown bandicoot. The site meets criteria 1 and 2 of the Ramsar Convention (DPAW, 2014b).
Forrestdale and Thomsons Lakes	Ramsar	**Description** Forrestdale Lake is located in the City of Armadale and Thomsons Lake is located in the City of Cockburn both of which lie within the southern Perth metropolitan area, in Western Australia. The site was listed under the Ramsar Convention in 1990 (CALM, 2003c).
		Conservation Values The lakes are surrounded by medium density urban development and some agricultural land. The sediments of Thomsons Lake are between 30,000 and 40,000 years old, which are the oldest lake sediments discovered in WA to date. These lakes are the best remaining examples of brackish, seasonal lakes with extensive fringing sedgeland, typical of the Swan Coastal Plain. The site meets criteria 1, 3, 5 and 6 of the Ramsar Convention (CALM, 2003c).
Peel-Yalgorup System	Ramsar	**Description** The Peel-Yalgorup System, located adjacent to the City of Mandurah in Western Australia, is a large and diverse system of shallow estuaries, coastal saline lakes and freshwater marshes. The site was listed under the Ramsar Convention in 1990 (CALM, 2003d).
		Conservation Values The Peel-Yalgorup System Ramsar site is the most important area for waterbirds in south-western Australia. It supports a large number of waterbirds, and a wide variety of waterbird species. It also supports a wide variety of invertebrates, and estuarine and marine fish. The system also includes an occurrence of thrombolites. The site meets criteria 1, 3, 5 and 6 of the Ramsar Convention (CALM, 2003d).

Protected Area	IUCN Protected Area Category* or Relevant Park Zone	Description and Values
Vasse-Wonnerup System	Ramsar	**Description** The Vasse-Wonnerup System Ramsar wetland is situated in the Perth Basin, south-western Western Australia. The site was listed under the Ramsar Convention in 1990 (DPAW, 2014b).
		Conservation Values The Vasse-Wonnerup System is an extensive, shallow, nutrient-enriched wetland system of highly varied salinities. Large areas of the wetland dry out in late summer. The Vasse-Wonnerup System supports tens of thousands of resident and migrant waterbirds of a wide variety of species. More than 80 species of waterbird have been recorded in the system, such as red-necked avocets and black-winged stilts, wood sandpiper, sharp-tailed sandpiper, long-toed stint, curlew sandpiper and common greenshank. 13 waterbird species are also known to breed at the Ramsar site, including the largest regular breeding colony of black swans in south-western Australia. The site meets criteria 5 and 6 of the Ramsar Convention (DPAW, 2014b).
Lake Warden System	Ramsar	**Description** The Lake Warden System Ramsar site is located adjacent to Esperance, south-western Australia. It is a system of saline lakes, lagoons and marsh areas behind beach-front dunes and at least one relatively narrow connection to the sea. The site was listed under the Ramsar Convention in 1990.
		Conservation Values The wetlands within the Lake Warden System form a system of inter-connected lakes and coastal brackish/saline lagoons connected by channels. It provides a significant habitat, nursery and refuge for waterbirds. Supporting up to 20,000 birds regularly. The system supports over 1% of hooded plovers in south-western Australia who breed regularly at the Lake Warden System. It meets criteria 1, 5 and 6 of the Ramsar Convention (DEC, 2009b).
Wetlands of National Importance (DAWE, 2019)		
Rottnest Island Lakes		**Description** The Rottnest Island Lakes site is the cluster of 18 lakes and swamps on the north-east part of Rottnest Island (DCCEEW, 2019b).
		Conservation Values An outstanding example of a series of lakes/swamps of varied depth and salinity located on an offshore island; the only island among 200 plus in WA exceeding 10 ha in area, that has a salt-lake complex; the only known example of seasonally meromictic lakes in Australia. The area meets criteria 1, 2, 3 and 6 for inclusion on the Directory of Important Wetlands in Australia (DCCEEW, 2019b).

Protected Area	IUCN Protected Area Category* or Relevant Park Zone	Description and Values
		State Marine Parks and Reserves
Jurien Bay Marine Park	Sanctuary, Special Purpose and General Use Zones	**Description** The Jurien Bay Marine Park is located on the central west coast of WA ~200 km north of Perth and covers an area of 824 km^2 (CALM, 2005b).
		Ecological Values The Jurien Bay region is dominated by five major marine habitats: seagrass meadows, bare or sparsely vegetated mobile sand, shoreline and offshore intertidal reef platforms, subtidal limestone reefs, and reef pavement. An extensive limestone reef system parallel to the shore has created a huge shallow lagoon that provides perfect habitat for Australian sea lions, dolphins and a myriad of juvenile fish. Extensive seagrass meadows inside the reef shelter many marine animals such as western rock lobsters, octopus and cuttlefish that make up the diet of young sea lions. The marine park also surrounds dozens of ecologically important islands that contain rare and endangered animals found nowhere else in the world (CALM, 2005b).
		Social and Economic Values Commercial fishing for rock lobster has the highest economic value of any single species commercial fishery in Australia and is important for the economy of the Jurien Bay region. Recreational water activities such as fishing, boating, surfing, diving, and wind surfing are popular within the area (CALM, 2005b).
		Cultural Values The Nyungar people have occupied the land and waters in this region and depended on coastal resources for more than 30,000 years. There are burial sites, middens and other sites of significance listed within the region (CALM, 2005b).
Marmion Marine Park	Sanctuary, Recreation and Special Use Zones.	**Description** The Marmion Marine Park lies within State waters between Trigg Island and Burns Beach and encompasses a coastal area of ~95 km^2. Marmion Marine Park was the State's first marine park, declared in 1987 (CALM, 1992).
		Ecological Values The marine park has a number of sanctuary zones including Little Island, The Lumps and the Boyinaboat Reef protecting a variety of habitats from limestone reefs, seagrass beds and clear shallow lagoons that support a diversity of marine life. In addition, there are the general use zone and the Waterman Recreation Area. The marine park contains important habitat for the endemic Australian sea lion, an array of seabird species, and migratory whales are regular visitors (CALM, 1992; DPAW, 2016c).

Protected Area	IUCN Protected Area Category* or Relevant Park Zone	Description and Values
		Social Values The marine park is popular for recreational water activities including boating, swimming, kayaking, snorkelling, whale watching, kite and windsurfing. Scuba diving and freediving is common at the Boyinaboat Reef which is located close to Hillary's Boat Harbour. Recreational fishing is permitted in most areas (DPAW, 2016c).
South Coast Marine Park	Sanctuary Zone Special Purpose Zone (cultural protection) Special Purpose Zone (whale conservation) Special Purpose Zone (wildlife conservation) General Use Zone	**Description** The south-west marine park lies within State waters, between Bremer Bay to the WA/SA border.
		Ecological Values The marine park supports seagrass meadows, macroalgae, cetaceans, pinnipeds, shorebirds and seabirds, fish, sharks and rays, and marine invertebrates. The South-west region has some of the highest seagrass and macroalgal diversity globally, approximately half of the species found here occur nowhere else in the world. The marine park supports foraging areas for cetaceans and seabird and shorebirds, and habitat for the Australian sea lion and New Zealand fur seal. The region supports high proportion of endemic species and high diversity of marine invertebrates (DBCA, 2024).
		Social Values The marine park supports recreational and commercial fishing, and recreational activities and tourisms such as, diving and snorkelling, surfing, four-wheel driving, camping, wildlife watching, swimming, kayaking, and boating (DBCA, 2024).
		Cultural and heritage values First Nations people have had connection in the Western Australian south coast for tens of thousands of years. Native title or traditional ownership has been recognised for several First Nations groups throughout the region, including the Wagyl Kaip and Southern Noongar Traditional Owners, and the Esperance Nyungar, Ngadju People and Mirning People native title holders.
Swan Estuary Marine Park	Special Purpose and Nature Reserve Zones	**Description** Three biologically important areas of Perth's Swan River make up the Swan Estuary Marine Park, including Alfred Cove, Pelican Point and Crawley. These three sites cover a total area of 3.4 km^2 (CALM, 1999).
		Ecological Values The sand flats, mud flats and beaches at the three locations of the Swan Estuary Marine Park provide the only remaining significant feeding and resting areas in the Swan Estuary for trans-equatorial migratory wading and waterbirds. This Marine Park and adjacent reserves also provide habitat for a diverse assemblage of aquatic and terrestrial flora and fauna (CALM, 1999).
		Social and Economic Values Nature-based wildlife tourism operates in the area and this Marine Park supports commercial net fishing. Recreational activities that occur within the area include fishing, bird watching, kayaking, windsurfing, boating, and sightseeing (DBCA, 2023).

Protected Area	IUCN Protected Area Category* or Relevant Park Zone	Description and Values
		Cultural Values The Whadjuk people are the traditional owners of the land and waters of Swan Canning Estuary and have frequented the waters of this park for many years. The estuarine and terrestrial habitats provide a source of fish, shellfish, reptiles and birds for hunting (CALM, 1999; DBCA, 2023).
Shoalwater Islands Marine Park	Sanctuary, Special Purpose and General Use Zones	**Description** The Shoalwater Islands Marine Park is located adjacent to Rockingham on the south-west coast of Western Australia, ~50 km south of Perth and covers an area of ~66 km^2 (DEC, 2007c).
		Ecological Values The Shoalwater Islands Marine Park consists of a complex seabed and coastal topography consisting of islands, limestone ridges and reef platforms, protected inshore areas and deeper basins, sandbars and beaches, and is home to five species of cetacean and 14 species of sea and shore bird. The waters of this marine park are also used to access feeding grounds for the little penguin (*Eudyptula minor*) colony on Penguin Island, which is close to the northernmost limit of the species' range and is the largest known breeding colony in Western Australia (DEC, 2007c). A recent study has also reported a recurrent aggregation of scalloped hammerheads (*Sphyrna lewini*) within this marine park (López et al., 2022).
		Social and Economic Values Commercial fisheries target a number of species within the area and this marine park also supports a mussel farming industry. Tourism is a popular activity within this marine park and includes water sports such as scuba diving, snorkelling, sailing, kayaking, kite surfing, and windsurfing. Recreational fishing is popular in this area and is likely to increase. The diversity of this marine park biota makes this marine park important for scientific research and education among tertiary institutions, schools and outdoors organisations (DEC, 2007c).
		Cultural Values This marine park is of cultural significance to the Gnaarla Karla Booja people who are the traditional owners and have frequented this marine park for thousands of years. The Gnaarla Karla Booja people have continued to use this Marine Park for fishing and hunting. Shoalwater and Garden Island areas are significant parts of the story of creation and there are a number of sites adjacent to and within this marine park that are registered as culturally significant (DEC, 2007c).

Protected Area	IUCN Protected Area Category* or Relevant Park Zone	Description and Values
Ngari Capes Marine Park	Sanctuary, Special Purpose and Recreation Zones	**Description** The Ngari Capes Marine Park is located off the south-west coast of Western Australia, ~250 km south of Perth, covering ~1238 km^2 (DEC, 2013).
		Ecological Values The Ngari Capes Marine Park consists of a complex arrangement of sandy bays, high energy limestone and granite reefs bordered by headlands and cliffs and two weathered capes. Coral communities consist of both tropical and temperate species. Cetaceans and pinnipeds are resident in and/or transient through this Marine Park as well as a diverse range of seabirds and shorebirds (DEC, 2013).
		Social and Economic Values A diverse range of commercial fisheries and aquaculture occur within and around this marine park targeting species such as abalone, salmon, sharks, demersal finish, baitfish, and western rock lobster. This marine park offers a wide range of attractions for marine based tourism which include shore-based and boat-based whale watching tours and dive and snorkel tours. Recreational activities that occur within this marine park include diving, fishing, snorkelling and wildlife watching (DEC, 2013).
		Cultural Values The Pibelmen and Wardani people occupy the lands adjacent to this marine park and utilise the coastline for fishing, hunting, ceremonial activities and resource gathering as they have continued to do for thousands of years. At least 45 sites of Indigenous significance have been identified within or adjacent to this marine park. Many marine species including mammang borungar (whale) and kalda (sea mullet) are culturally significant to the Indigenous people of the southwest region (DEC, 2013).
Walpole and Nornalup Inlets Marine Park	Recreation Zone	**Description** The Walpole and Nornalup Inlets Marine Park is located adjacent to the towns of Walpole and Nornalup on the south coast of Western Australia, ~120 km west of Albany, and covers ~14 km^2 (DEC, 2009a).
		Conservation Values The Walpole and Nornalup Inlets Marine Park consists of a geologically complex lagoonal estuarine system comprising three significant rivers and two connected inlets that are permanently open to the ocean. Approximately 40 marine and estuarine finfish species commonly inhabit the inlet system, as well as a variety of shark and ray species and numerous seabirds and shorebirds. The sandy beaches and shoreline vegetation of the inlet system are of high ecological and social importance to this marine park (DEC, 2009a).
		Social Values The diversity of wildlife and easily accessible terrestrial, estuarine, and coastal scenery has enhanced nature-based tourism within the area. Popular recreational activities that occur within this marine park include boating, fishing, swimming, hiking, bird watching, and wildlife watching (DEC, 2009a).

Protected Area	IUCN Protected Area Category* or Relevant Park Zone	Description and Values
		Cultural Values Estuaries are significant hunting, fishing and gathering areas for Minang people of south-western Australia who have a strong spiritual connection to the area. Aboriginal artefact scatters and other listed areas of cultural significance have been found within and adjacent to this marine park (DEC, 2009a).

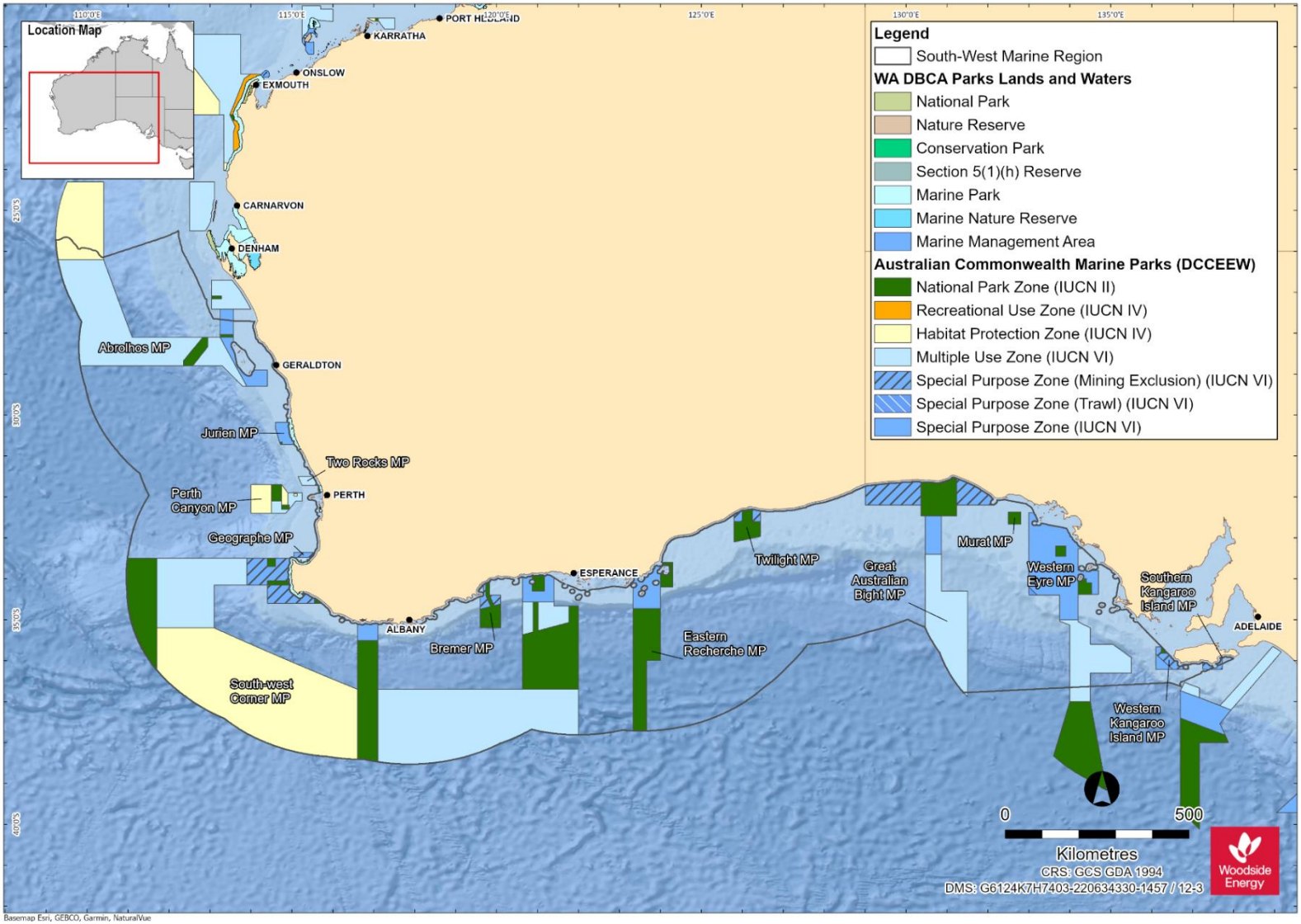


Figure 11-2: Commonwealth and State Marine Protected Areas for the SWMR (data source: GA, 2024)

11.11 Summary of Protected Areas Within the NMR

Table 11-8: Protected Areas within the NMR

Protected Area	IUCN Protected Area Category* or Relevant Park Zone	Description and Values
World Heritage Properties		
Kakadu National Park		**Description** Kakadu National Park is a living landscape with exceptional natural and cultural values. It is the largest National Park in Australia and preserves the greatest variety of ecosystems on the Australian continent including extensive areas of floodplains, mangroves, tidal mudflats, coastal areas and monsoon forests. The park was inscribed on the World Heritage list in three stages over 11 years. It is located in tropical north Australia covering a total area of 19,810 km^2 (Director of National Parks, 2016).
		Ecological Values The conservation values reflect the WHA Criterion: (i), (vi), (vii) and (ix): Natural features relate to Criterion (vii) – the remarkable contrast between the internationally recognised Ramsar-listed wetlands and the spectacular rocky escarpment and its outliers and Criterion (ix) – four major river systems of tropical Australia and floodplains that are dynamic environments, shaped by changing sea levels and big floods every wet season. These floodplains illustrate the ecological and geomorphological effects that have accompanied Holocene climate change and sea level rise. Kakadu National Park contains important and significant habitats supporting a diverse range of flora and fauna. Coastal areas of the park are dominated by mudflats which are mostly lined by mangroves which support breeding and nursery grounds for a variety of animals. The threatened flatback turtles nest on Field Island which is within the park. Kakadu National Park is a key habitat for threatened species including one species of river shark, two sawfish species and two inshore dolphin species (Director of National Parks, 2016).
		Social Values Kakadu National Park is a popular tourist destination which provides important economic value to the region through boat and fishing tours and wildlife tours. Commercial tours operate within the area which provides employment opportunities for local communities. Popular recreational activities within the park include bushwalking, camping, recreational fishing and boating, swimming, wildlife watching, and viewing culturally significant sites (Director of National Parks, 2016).
		Cultural Values The Bininj/Mungguy people are the traditional owners of Kakadu National Park and have had longstanding custodianship and spiritual connection with the Kakadu region and continue to use the park for cultural practices. Kakadu holds one of the world's greatest concentrations of rock art sites and there is thought to be up to 15,000 sites in total with some sites estimated to be over 20,000 years old (Director of National Parks, 2016).

Protected Area	IUCN Protected Area Category* or Relevant Park Zone	Description and Values
National Heritage Places –- Natural		
Kakadu National Park		Refer to World Heritage Property description and values above.
Commonwealth Heritage Places–- Natural		
N/A		
Wetlands of International Importance (Ramsar)		
Kakadu National Park		**Description** Australian Ramsar site number 2. The stage 1 and 2 Ramsar sites, established in 1980, 1985 and 1989, respectfully were combined into a single Ramsar site in 2010 (BMT WBM, 2010).
		Conservation Values The Kakadu National Park Ramsar site straddles the western edge of the Arnhem Land Plateau encompassing a range of landforms and extensive floodplains. It is a mosaic of contiguous wetlands comprising the catchments of two large river systems, the East and South Alligator rivers and encompasses extensive tidal mudflat areas. It is an internationally important site for migratory shorebirds as part of the EAAF (BMT WBM, 2010).
Cobourg Peninsula		**Description** Australian Ramsar site number 1 established in 1974. This Ramsar site includes freshwater and extensive intertidal areas but excludes subtidal areas. It is in a remote location and there has been minimal human impact on the site (BMT WBM, 2011).
		Conservation Values The wetlands encompassed in the Ramsar site are some of the better protected and near-natural wetlands in the bioregion and there is a diverse array of wetland in a confined area. The site supports important turtle nesting habitat and habitat for coastal dolphin species and is an internationally significant migratory shorebird habitat as part of the EAAF and an important location for seabird breeding colonies (BMT WBM, 2011).

Protected Area	IUCN Protected Area Category* or Relevant Park Zone	Description and Values
Wetlands of National Importance (DAWE, 2019)		
Southern Gulf Aggregation		**Description** The site is a complex continuous wetland aggregation in the Gulf of Carpentaria, covering an area of ~5460 km^2 located 58 km east of Burketown, Queensland (DCCEEW, 2019b).
		Conservation Values The Southern Gulf Aggregation is the largest continuous estuarine wetland aggregation of its type in northern Australia. It is one of the three most important areas for shorebirds in Australia. The area meets criteria 1, 2, 3, 4, 5 and 6 for inclusion on the Directory of Important Wetlands in Australia (DCCEEW, 2019b).
		Social Values The area is an important site for recreational barramundi fishing and is a popular site for ecotourism (DCCEEW, 2019b).
Territory Marine Parks and Reserves		
Cobourg Marine Park	II, IV, VI	**Description** Cobourg Marine Park covers an area of 2290 km^2 and is located in the waters surrounding the Cobourg Peninsula ~220 km north-east of Darwin. This marine park is part of the larger Garig Gunak Barlu National Park. Garig Gunak Barlu National Park includes both this marine park and the Cobourg Sanctuary (Northern Territory Government, 2011)
		Conservation Values Cobourg Marine Park is located in the Cobourg and Van Diemen Gulf marine bioregions with the northern portion of the marine park covered by the Cobourg marine bioregion and the southern portion covered by the Van Diemen Gulf marine bioregion. This marine park is characterised by a number of deeply incised bays and estuaries on its northern shores. These bays are ancient river valleys that were drowned during periods of sea level rise and provide a varied environment and habitat that is quite distinct from the open water areas of the marine park. The areas of the marine park that have been studied and where extensive collections have been made indicates that the Marine Park supports rich and diverse marine life including live coral reefs, seagrass, diverse reef and pelagic fish populations, saltwater crocodiles, and six species of threatened marine turtles and dugong (Northern Territory Government, 2011).
		Social and Economic Values A variety of commercial fisheries, aquaculture and pearling occur within this marine park. The marine park has visitors who stay within the Cobourg sanctuary, sailors who moor in the area and guests who stay at onsite accommodation. Water sports such as fishing, boating, sailing, scuba diving, recreational fishing, sightseeing and wildlife viewing are popular activities undertaken in the marine park (Northern Territory Government, 2011).

Protected Area	IUCN Protected Area Category* or Relevant Park Zone	Description and Values
		Cultural Values The Cobourg people have a longstanding connection to the lands and seas of Cobourg Marine Park. The marine park is a culturally significant place for the Cobourg people to practice customary activities including ceremonies and fishing and hunting of marine resources (Northern Territory Government, 2011).

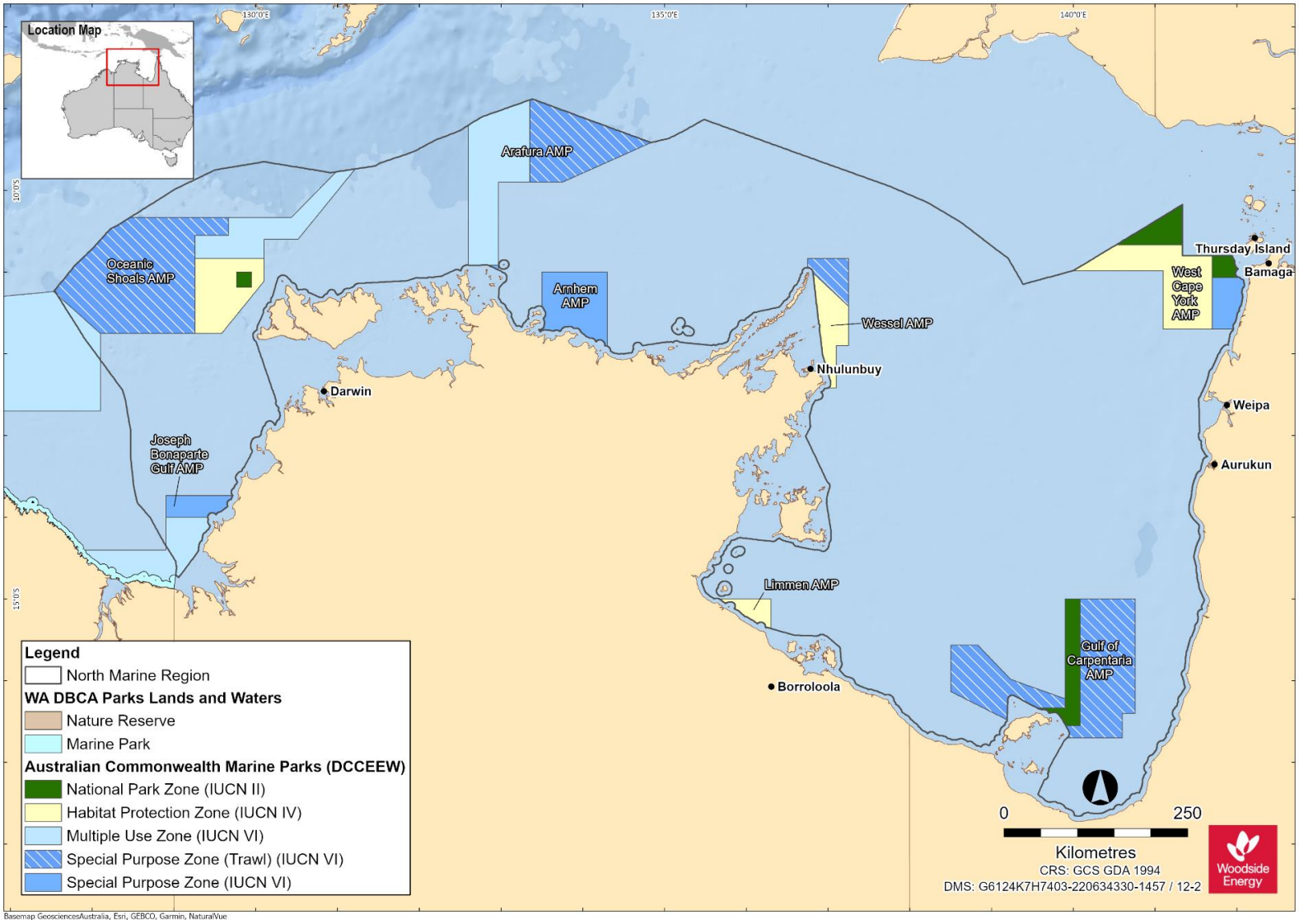


Figure 11-3: Commonwealth and State Marine Protected Areas within the NMR (data source: GA, 2024)

12. SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT

This section summarises the information relating to the socio-economic and cultural environment of the regions offshore of Western Australia, with a focus on the NWMR and to a lesser extent the SWMR and NWR.

12.1 Cultural Values and Heritage

Woodside's approach to Cultural Values and Heritage management reflects our publicly available First Nations Communities Policy (Woodside, 2022). This policy is underpinned by core principles that ensure our management of cultural heritage is thorough, transparent and supported by consultation and continued engagement with First Nations communities. Our approach to the identification, management and protection of cultural heritage is consistent with the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), engaging with First Nations communities in ways that reflect the principles of seeking Free, Prior and Informed Consent (FPIC). Where heritage is concerned Woodside seeks to avoid impact, or if avoidance is not possible, to minimise and mitigate impact through consultation with relevant First Nations communities. We seek to ensure Traditional Owners and Custodians are central to heritage management so that cultural values are understood and remain protected.

Australia ICOMOS (International Council on Monuments and Sites) is a non-government peak body for cultural heritage professionals formed as a national committee for ICOMOS (international). Australia ICOMOS' mission is to lead cultural heritage conservation in Australia by issuing standards and practice notes. Woodside understands heritage value to mean the cultural significance of a place to an individual or group in line with the Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance (Australia ICOMOS, 2013) (Burra Charter), and associated practice notes. A cultural feature is therefore comparable to the Burra Charter term "fabric" and refers to a place's elements, fixtures, contents and objects which have cultural values. Although these features are necessarily physical, the place they inhabit or comprise may have tangible or intangible dimensions (Australia ICOMOS. 2013).

12.1.1 Native Title

Woodside uses established systems, such as native title, to identify First Nations groups that may have functions, interests or activities that may be affected. While acknowledging that cultural features and heritage values may exist outside of the native title framework, native title claims, determinations and ILUAs are defined under the *Native Title Act 1993* (Cth). Woodside considers this to be the broadest extent over which First Nations groups have claimed native title rights and interests.

Native title claims are applications made to the Federal Court under the Native Title Act for a determination or decision about native title in a particular area. A claim is made by a native title claim group which asserts it holds native title rights and interests in an area of land and/or water, according to its traditional laws and customs. By making a claim, the native title claim group seeks a decision that native title exists so that its native title rights and interests are recognised by the common law of Australia. This is called a native title determination. A determination is a decision by a recognised body, such as the Federal Court or High Court of Australia, that native title either does or does not exist in relation to a particular area (Native Title Tribunal).

A requirement to establishing a positive determination of native title in court is proving that there is an organised society that occupied the land and/or waters at the time of British annexation. The requirement of an 'organised society' is set out by Justice Toohey in the historic judgment of Mabo v Queensland (No 2)) [1992] HCA 23; (1992) 175 CLR 1 ('Mabo'). Justice Toohey had the following to say (at 187):

it is inconceivable that indigenous inhabitants in occupation of land did not have a system by which land was utilized in a way determined by that society. There must, of course, be a society sufficiently

organized to create and sustain rights and duties…

Therefore, Woodside understands that native title rights and interests are held communally by an organised society, that native title claims are understood to represent the area over which First Nations groups are claiming these rights and interests, and that native title determinations provide clarity on where native title rights and interests are found to either exist or not exist. Where native title rights or interests are determined to exist, they will be held by a Registered Native Title Body Corporate (section 57, Native Title Act 1993) in trust or as agent for native title holders.

Indigenous Land Use Agreements (ILUAs) are voluntary agreements between native title parties and other people or bodies about the use and management of land and/or waters and are registered by the Native Title Registrar in the Register of ILUAs. An ILUA can be made over areas where:

- native title has been determined to exist in at least part of the area, or
- a native title claim has been made, or
- where no native title claim has been made.

While registered, ILUAs operate as a contract between the parties, including relevant native title holders (Native Title Tribunal).

The Native Title Act provides for a Representative Aboriginal/Torres Strait Islander Body (Native Title Representative Body) to be recognised by the Commonwealth Minister for an area. Native Title Representative Bodies have specialist functions set out in the Native Title Act within the area for which they are the Native Title Representative Body. However, the functions of a Native Title Representative Body are such that they do not hold details on the cultural features or heritage values of an area and therefore do not inform Woodside's understanding of heritage values or cultural features.

12.1.2 Coastal First Nations Groups

First Nations groups are keenly aware of the extent of their rights, interests and responsibilities for Country, and these are generally discrete, defined areas, including areas of sea (Smyth, 2007). To identify cultural features and heritage values which may exist outside of native title claim, determination and ILUA areas, Woodside considers native title claims, determinations and ILUAs coastally adjacent to areas of operation to be an instructive means of identifying potentially relevant First Nations groups to be consulted.

Woodside understands from engagement with stakeholders that extending a native title group's responsibility to areas which those groups have elected to not include in their claims or ILUAs can have significant cultural consequences for groups and individuals. This may also, over time, build expectations in the broader community that a group is responsible for maintaining environmental values in areas for which they do not hold traditional knowledge.

Woodside acknowledges that a First Nations group's relative proximity to any Operational Areas is not necessarily a meaningful indicator of the connection to the area and providing advice over such areas can be culturally dangerous. As a result, caution must be used when conducting broader engagement.

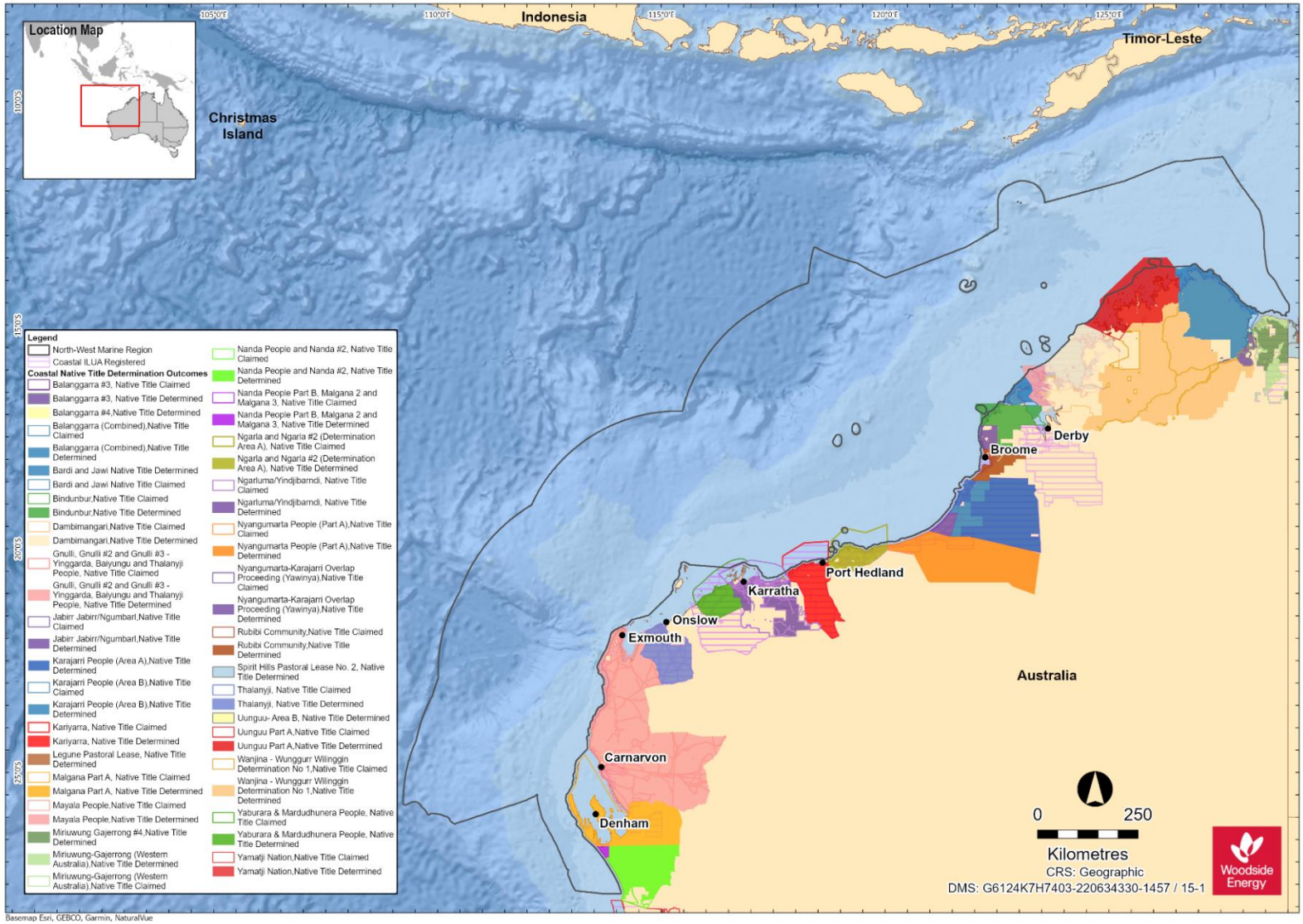


Figure 12-1: Coastal Native Title Claims / Determinations and Indigenous Land Use Agreements (ILUAs) in the NWMR (data source: DPLH, 2024)

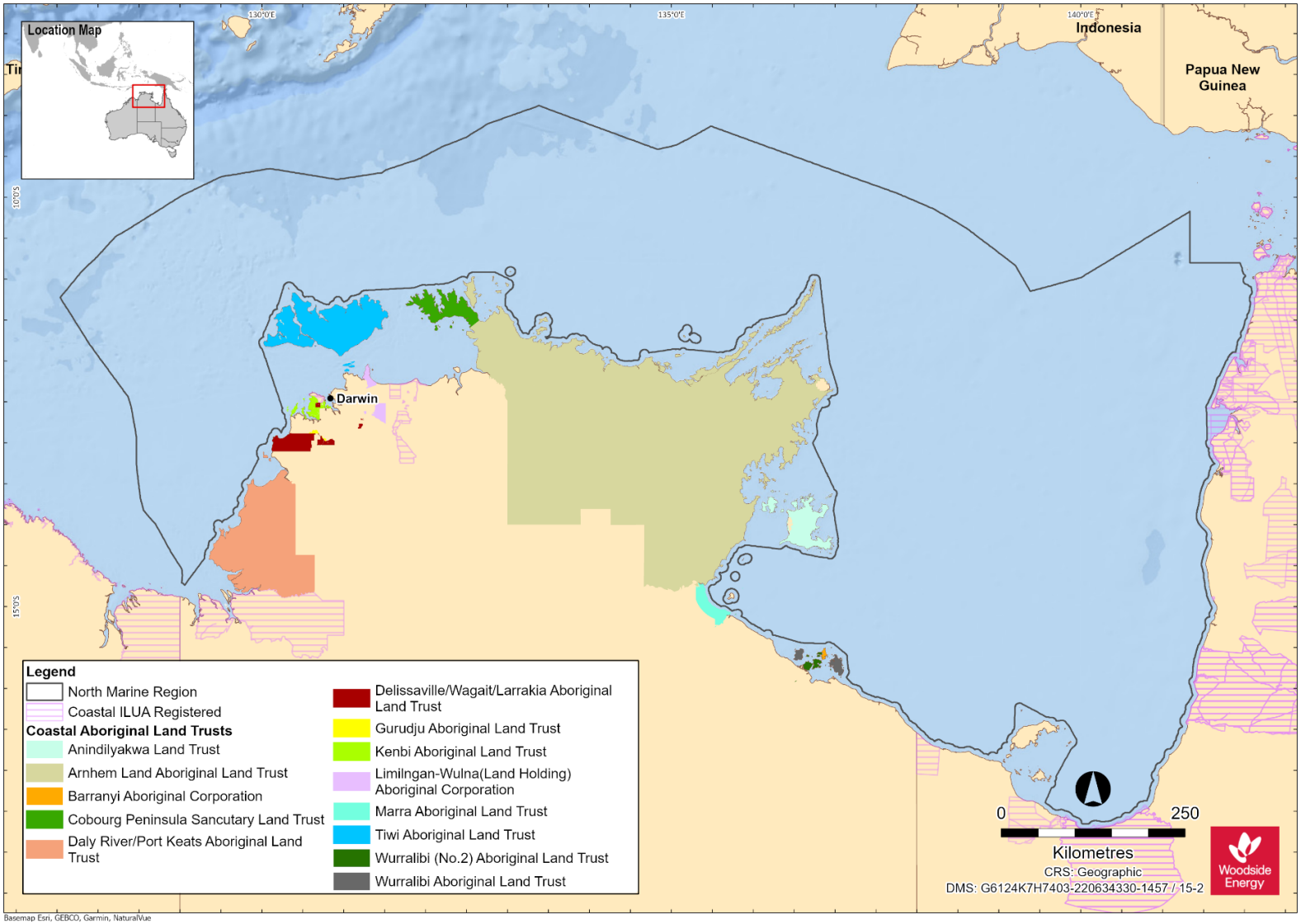


Figure 12-2: Coastal Native Title Claims / Determinations and ILUAs in the NMR (data source: DPLH, 2024)

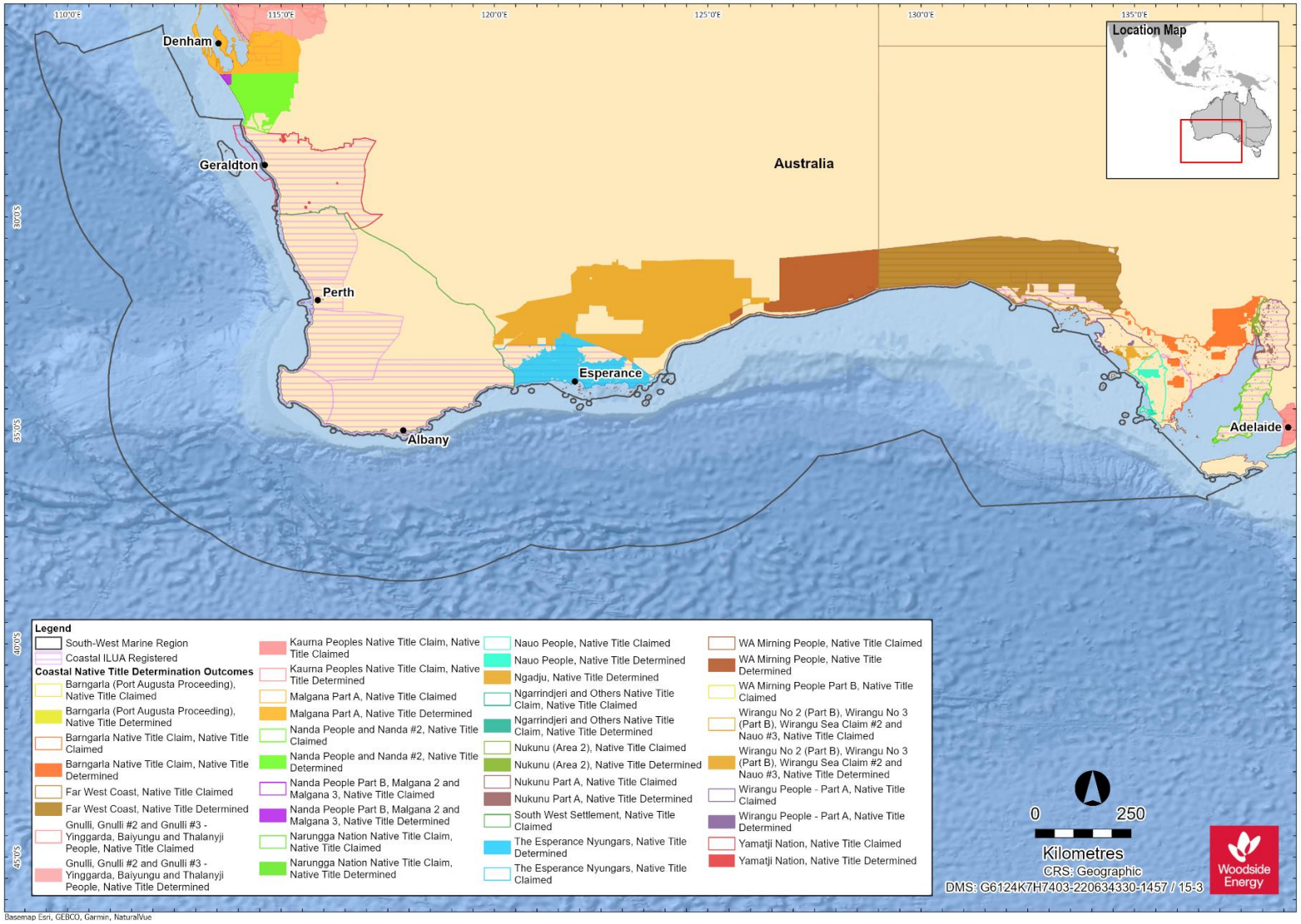


Figure 12-3: Coastal Native Title Claims / Determinations and ILUAs in the SWMR (data source: DPLH, 2024)

12.1.3 Sea Country

“Sea country is valued for Indigenous cultural identity, health and wellbeing” (DNP, 2018a, 2018b).

Woodside recognises the potential for marine ecosystems to include cultural features as well as environmental values. This is one aspect of the broader concept of “Sea Country”, which can be defined as the area of sea over which a First Nations group has interests, cultural value, connection and use. It has been noted that “the saltwater peoples of the north-west are associated with discrete clan estates or tribal areas, often referred to in contemporary Aboriginal English as ‘Saltwater Country’ or ‘Sea Country’.

‘Country’ refers to more than just a geographical area: it is shorthand for all the values, places, resources, stories and cultural obligations associated with that geographical area.” (Smyth, 2007).

It necessarily follows that an impact to marine ecosystems has the potential to impact cultural features where the impact is detectable within Sea Country—the seascape which Traditional Custodians view, interact with or hold knowledge of. The link between environmental protection and cultural heritage protection is illustrated in the Australian Government’s Indigenous Protected Areas Program. The Indigenous Protected Areas program provides for “areas of land and sea managed by Indigenous groups as protected areas for biodiversity conservation…IPAs deliver environmental benefits…Managing IPAs also helps Indigenous communities protect the cultural values of their country for future generations…” (DCCEEW, 2024c).

McNiven (2004) suggests that “For those mainland groups whose exploitation of the sea was limited to littoral resources, it is likely that seascapes extended no more than c. 20–30km out to sea, out to the horizon and the limit of human visibility. However, in some coastal places, clouds that can be seen well over 100km out to sea are imbued with spiritual significance. For those groups with elaborate canoe technology, seascapes extend well over the horizon.” While there is some evidence of traditional watercraft in Australia’s North West, the recorded evidence is limited to travel across inland rivers (e.g. Barber and Jackson, 2011) or travel between coastal islands (Paterson et al., 2019).

Cultural features of coastal areas may include marine species that may travel many thousands of kilometres through areas with similar cultural values to multiple Indigenous language groups. Some species may travel as far as 5000 km from Antarctica to the Kimberley region of Western Australia (Double et al., 2010, 2012), passing First Nations language groups along the entire west coast of Australia.

Table 12-1: Commonly identified Sea Country species and habitats

Value	Details
Marine mammals	Whales, and in particular humpback whales and dugongs, are commonly identified through consultation with First Nations people as culturally important species, with totemic importance. Common interests include maintaining their populations, biodiversity, and migration patterns.
Marine reptiles	Turtles and sea snakes are commonly identified through consultation with First Nations people as culturally important species and a favoured resource. First Nations people that identify marine reptiles as species of totemic importance or integral to songlines may place high cultural value on their protection. Cultural knowledge of turtles at a population level (turtle migration, behaviour and the related marine environment) may all be important in ensuring the continuation of cultural functions and activities that remain valuable to First Nations people (Fijn, 2021:47; Delisle et al., 2018).
Fish and cephalopods	Fish and squid are commonly identified through consultation with First Nations people as a culturally important species, with fish generally being identified as a resource. First Nations may identify cultural values associated with fish species as important to maintaining both tangible (physical cultural sites) and intangible (cultural knowledge) cultural heritage. Tangible cultural heritage associated with fish can include important cultural sites such as midden sites, fish traps and thalu sites. There are increase ceremonies/rituals for species of squid and octopus to enhance or maintain populations. Thalu are places where these increase ceremonies are performed.
Seabirds	Seabirds, and in particular shags, are commonly identified through literature as a culturally significant species (Malgana Land and Sea Management et al., 2021), as well as a resource (seabird eggs; Smyth, 2007).
Benthic habitats	First Nations groups identify benthic habitats as valuable for both their ecological and aesthetic values. Corals attract fish and seagrass providing shelters for fauna, as well as an important resource for dugongs.
Shoreline habitats	First Nations groups identify shoreline habitats as valuable for their ecological values, including mangroves for providing shelter to marine invertebrates, which are identified resources, and potential nursery for turtles. Literature also notes that mangroves are also valued for the flora and fauna they are associated with and support (Commonwealth of Australia, 2002) and Smyth (2007) reports that mangrove seeds are used as a resource by Ngarda-Ngarli.

12.1.4 Marine Parks

Woodside acknowledges that Commonwealth and State Marine Park Management Plans have sought to recognise cultural values and responsibilities of First Nations groups. Australian Marine Parks (AMP) describe this framework in the following way: ‘when making decisions about what can occur in marine parks and what action we will take to protect AMPs, we take values into account’. AMP summarises these values as natural values, cultural values, heritage values and socio-economic values (Refer to Section 11.5).

12.1.5 Indigenous Protected Areas (IPAs)

Indigenous Protected Areas (IPAs) are areas of land and sea managed by Indigenous groups as protected areas for biodiversity conservation through voluntary agreements with the Australian Government. IPAs are an essential component of Australia’s National Reserve System, which is the network of formally recognised parks, reserves and protected areas across Australia. There are currently 85 dedicated IPAs over 74 million hectares. These account for more than 50 per cent of the National Reserve System (NIAA, 2023). As of August 2024, an additional 36 Traditional Owner consultation projects to develop management plans for proposed IPAs are underway (DCCEEW, 2024c). Ten Sea Country IPA consultation projects were announced in 2022. One of these, Tukujana pa Karajarri Kura Jurrar, is in the NWMR and extends from the existing Karajarri IPA into the sea off the south-west Kimberley coast (DCCEEW, 2024c). The Indigenous Protected Areas program is administered by the National Indigenous Australians Agency in partnership with DCCEEW. Dedicated and proposed IPAs are shown in Figure 12-4.

The following IPAs are within the NWMR:

12.1.5.1 Nyangumarta Warrarn IPA

The Nyangumarta Warrarn IPA is comprised of four areas totalling approximately 28,675 km², including parts of the Great Sandy Desert, Walyarta Conservation Reserve, Kujungurru Warrarn Conservation Reserve Area and the Eighty Mile Beach Marine Park Intertidal Area. The traditional owners of the designated IPA self-identify as and are identified by other Pilbara First Nations people as Nyangumarta people. Nyangumarta people are the native title holders of the land and waters.

Ecological values in the IPA include a complex wetland system associated with Mandora Marsh, known to Nyangumarta people as Nyamaring. Walyarta (or Salt Creek). The Mandora Marsh area holds the most inland distribution of mangroves in Australia and the mound springs associated with Mandora Marsh area, such as Yalayala (Eil Eil), are recognised as important bird nesting sites (NWAC and YMAC, 2015).

12.1.5.2 Karajarri IPA

Karajarri Indigenous Protected Area (IPA) was dedicated in 2014, to manage, protect and enhance Karajarri country. The IPA covers nearly 25,000 km² of land in the southern Kimberley, including 130 km of coastline stretching from Gordon Bay to Cape Missiessy. It comprises extensive coastlines, tidal creeks and wetlands as well as arid country that stretches into the Great Sandy Desert (NIAA, n.d.).

Karajarri people want to ensure areas of cultural and natural significance are looked after correctly according to their own protocols, and they view their environmental responsibilities as Palanapayana Tukjana Ngurra meaning “everybody looking after country properly” (KTLA, 2014a).

The IPA includes two different zoning categories to help manage country: IUCN Category 2 (National Park) and Category 6 (Protected area with sustainable use of resources). The category 2 zoning allows for the area to become part of an integrated system of protected areas with Eighty-mile beach to the south and Roebuck Bay to the north of the IPA (KTLA, 2014a).

To assist in the planning and development of the IPA, the Karajarri Traditional Lands Association (KTLA) developed a Healthy Country Plan, which provides direction for addressing threats and for working on priorities for land and cultural site management (KTLA, 2014b).

The Tukujana pa Karajarri Kura Jurrar IPA has been announced under the Sea Country IPA Program, extending from the existing Karajarri IPA into the sea off the south-west Kimberley coast (DCCEEW, 2023b). The area includes a network of coastal habitats, such as intertidal and subtidal reefs, mangrove systems, lagoons and tidal creeks, and connects the Ramsar sites of Roebuck Bay and Eighty-mile Beach (DCCEEW, 2023b).

12.1.5.3 Yawuru IPA

The Yawuru IPA was dedicated by Yawuru people in 2017, covering 2109 km² of Yawuru coastal and inland country (YRNTBC, 2014). The Yawuru people are the Native Title holders of their land and sea–-their ancestors have lived along the foreshores of Roebuck Bay, across the Pindan Plains and inland along the fringes of the Great Sandy Desert for thousands of years (NIAA, n.d.-a).

The Yawuru IPA is managed under the Walyjalajala nagulagabu birrangun buru Plan of Management for 2017-2026 (YRNTBC, 2014). The plan includes eight targets for management, being:

- Yawuru cultural knowledge and practice
- Yawuru significant areas
- Yawuru rights and responsibilities
- Niyamarri – sand dunes

- Bilarra – wetlands
- Birra – bush and pindan country
- Nagulagun – saltwater country (deep water and intertidal)
- seasonal resources and biodiversity.

Cultural values include Yawuru named sites, tracks and areas, historical sites associated with pearling and pastoral industries, archaeological sites and traditional bush/sea resources. Ecological values include reefs and seagrass beds that provide habitat for dugongs (*Dugong dugon*) and EPBC Act-listed threatened sea turtle species including hawksbill turtle (*Eretmochelys imbricata*), loggerhead turtle (*Caretta caretta*), green turtle (*Chelonia mydas*) and flatback turtle (*Nataden depressus*). Roebuck Bay is a Ramsar site and has a known population of snubfin dolphins (*Orcaella heinsohni*) (Figure 7-6). Other ecological values include pearl shell beds for pearl oysters and habitat for a range of EPBC Act listed threatened species (YRNTBC, 2014).

12.1.5.4 Bardi Jawi IPA

Bardi Jawi IPA is located 160 km north of Broome and covers 1269.9 km² of land and sea country (NIAA, n.d.-b). The main communities on Bardi country are Djarindjin, Lombadina and Ardyaloon (One Arm Point). Bardi people live on the mainland of the Dampier Peninsula and islands immediately offshore from Ardyaloon. Jawi people call the islands further east, including Iwany (Sunday Island), their traditional country. Today people live in outstations spread along the mainland Peninsula coastline (KLC/BJNAC RNTBC, 2013).

During the IPA consultation process, The Bardi Jawi rangers guided meetings with individual family groups to identify what they considered important to look after. An IPA steering committee was formed, who contributed cultural knowledge to the Bardi Jawi Indigenous Protected Area Management Plan (2013–2023). They were assisted by The Nature Conservancy in Conservation Action Planning (CAP). This plan highlights targets to be protected on country:

- marnany (fringing reefs)
- aarli (fish)
- odorr (dugong) and goorlil (turtle)
- significant sites, language, law and culture
- traditional oola (water) places
- indigenous plant resources (KLC/ BJNAC RNTBC, 2013).

Jardagarr (coastal country) is classed under IUCN Category 4, and Niimidiman (inland country) is classed under Category 6. Niimidiman harbours many plant and animal species of high cultural value. For example, Irrgil trees are used for making boomerangs and Marrga, Joolgirr and Bilimangard trees are used for making shields. Some Niimidiman areas feature traditional Oola (water) places and stories attached to these places are culturally important. Ecological values of the Jardagarr (coastal) country includes many species of native garrabal (birds), including eastern curlews and fork-tailed swifts (KLC/ BJNAC RNTBC, 2013).

12.1.5.5 Dambimangari IPA

Dambimangari IPA is located between Broome and Darwin, stretching east to the Prince Regent area. It covers 6,422.94 km² of landscape, including open grasslands, eucalyptus woodlands, intertidal flats and rocky reefs and shoals (NIAA, n.d.-c). Dambimangari is the traditional home of the Worrarra people. Dambimangari peoples' identity is interwoven with the sea and its reefs and islands. Reefs are important hunting grounds for jaya (saltwater fish) and warliny (dugong).

The targets for protection are identified in the Dambimangari Healthy Country Plan 2012–2022 as:

- cultural sites
- reefs, beaches and islands
- saltwater fish
- turtle and dugong
- whales and dolphins
- rivers, waterholes, waterfalls and wetlands (freshwater systems)
- culturally important native animals
- bush fruits and medicine plants
- right-way fire (DAC, 2012).

Jurluwarra (saltwater-turtle) and warliny (dugong) are culturally important to Dambimangari people as a food source. Cultural sites include rock art sites, stone arrangements, burial sites and important camping beaches that were used for resting when travelling through saltwater country (DAC, 2012).

12.1.5.6 Uunguu IPA

Stage one of the Uunguu IPA was declared on May 23, 2011, coinciding with the Native Title Determination and release of the Healthy Country Plan. The IPA covers 7,598.06 km². It has been home to the Wunambal Gaambera people for many thousands of years and is part of the Wanjina Wunggurr culture. Wunambal Gaambera people call their country Uunguu – 'our living home'. Two of the reserves extend to the low water mark at Bougainville Peninsula, Vansittart Bay, Anjo Peninsula, Napier Broome Bay and islands in Rothsay Water (WGAC, 2017). A Saltwater IPA Plan of Management was created in 2017 as a sub-plan for the Wunambal Gaambera Healthy Country Plan (WGAC, 2017)[21].

Ten targets identified in the Wunambal Gaambera Healthy Country Plan are:

- Wanjina Wunggurr Law – our culture,
- right way fire,
- aamba (kangaroos and wallabies) and other meat foods,
- Wulo (rainforest),
- Yawal (waterholes),
- bush plants,
- rock art,
- cultural places on islands,
- fish and other seafoods,
- mangguru (marine turtles) and balguja (dugong) (WGAC, 2010).

The Uunguu Rangers look after land and sea country through pest control, visitor management, cultural heritage conservation, monitoring flora and fauna and fire management (NIAA, n.d.-c).

[21] Marine areas were proposed to be added to the Uunguu IPA as an International Union for Conservation of Nature (IUCN) Category VI (Managed Resource) Protected Area, early in 2018.

12.1.5.7 Balanggarra IPA

The Balanggarra IPA was dedicated on August 7, 2013. The IPA spans over one million hectares of land and sea country in the Kimberley region and has been home to the Balanggarra people for thousands of years. The five big rivers of the north Kimberley intersect on Balanggarra country. These rivers include the King River, Forest River, Pentecost River, Durack River and Ord River. The region also borders the Cambridge Gulf and Timor Sea. Three species of vulnerable sawfish are found in the waters of this region (Kimberley Land Council, n.d).

Nine targets identified in the Balanggarra Healthy Country Plan 2012–2022 are:

- Balanggarra law and culture
- our gra or country (land, sea, rivers, islands)
- cultural sites (rock art sites, burial sites, heritage places)
- native animals
- accessible bush tucker / medicine plants
- right way fire
- freshwater (places and freshwater fish)
- saltwater fish and seafood
- migratory saltwater species (turtle, dugong, whales, dolphins).

The Balanggarra Rangers manage 1000 km of river and sea frontage on their country to manage and protect and enhance the unique biodiversity values of their country (Balanggarra Aboriginal Corporation, 2011).

12.1.5.8 Wilinggin IPA

The Wilinggin IPA spans over 2.4 million hectares of remote country in the central north Kimberley region and was declared in 2013. It included basalt ranges and sandstone cliffs which rise 250 m high. The area has wooded grasslands, pockets of rainforest, extensive mangrove systems, tidal mudflats, rivers, creeks and billabongs. The Ngarinyin people are the traditional owners of this area and have lived on Wilinggin country for thousands of years (NIAA, n.d-d). Wilinggin Country is mostly landlocked, apart from two small saltwater areas which include Walcott Inlet and Prince Frederick Harbour.

Seven targets identified in the Wilinggin Healthy Country Plan 2023–2032 are:

- becoming strong on country
- food and medicine plants
- bushfire
- law and culture sites
- law and culture
- freshwater places
- wildlife and bush meats.

The Wunggurr Rangers are caretakers of the unique natural and cultural values of Wilinggin country (Wilinggin Aboriginal Corporation, 2022).

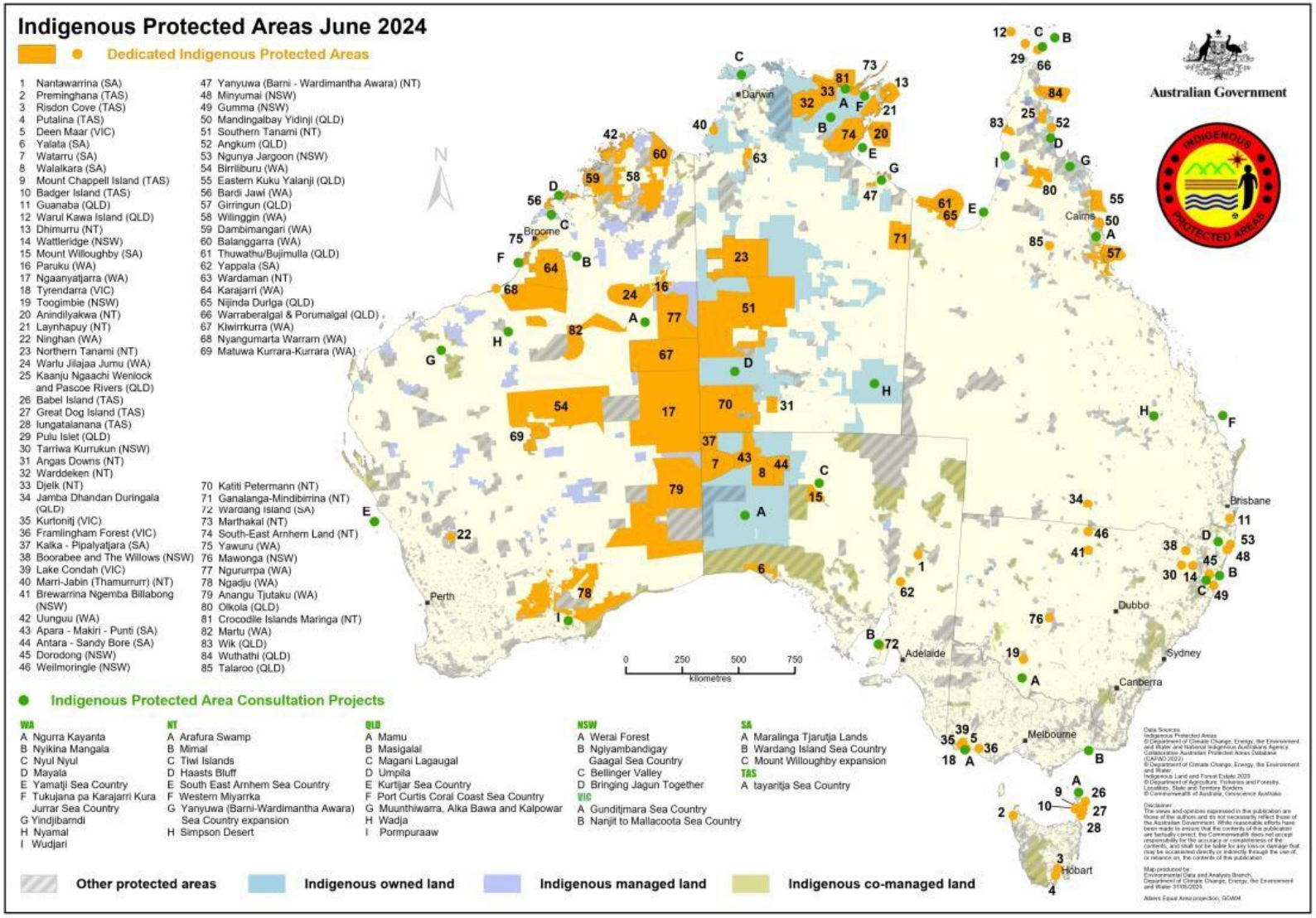


Figure 12-4: IPAs in Australia (data source: DCCEEW and NIAA, 2024)

12.1.6 First Nations Cultural Heritage

Woodside understands that communal cultural connection exists between Traditional Custodians and land and waters. It is understood from the onshore archaeological record that First Nations people have occupied the Australian continent for at least 65,000 years (Clarkson et al., 2017) and in many places maintain a strong continuing connection that is said to extend back in Indigenous cosmology to the beginning of time.

Archaeological sites identified onshore with the potential to exist in intertidal or submerged locations include petroglyphs, fish traps and artefact scatters or burials contained within sand dunes. As archaeological sites, these features have archaeological value which relates to the preservation of their fabric (i.e. the tangible features) and their context (i.e. their location and relationship to other archaeological and natural features). Archaeological sites may also have intangible dimensions (ICOMOS, 2013) cultural value that exist in addition to their archaeological or scientific value.

Intangible values are a living expression of cultural heritage that is prevalent across generations. These values can be traditional, and they can also be new and living at the same time. An understanding of the intangible cultural heritage of different First Nations communities helps with intercultural dialogue and encourages mutual respect (UNESCO, 2011). Intangible cultural heritage is safeguarded through practicing and passing on knowledge or expressions by the people to whom it belongs to (NNTC, n.d). Figure 12-5 provides context to common intangible themes that exist in First Nations communities.

Table 12-2: Intangible heritage values associated with Sea Country

Value	Details
Songlines	Oral songlines are often described by First Nations people as the law of the land and make up part of the Dreaming (Neale and Kelly, 2020:30). Songlines are viewed in Western academia as a framework for relating people to land and consist of a series of invisible, interconnected routes across the landscape that mark significant sites for First Nations people (Higgins, 2021:723). Songlines demonstrate First Nations peoples' strong connections to land by revealing sacred knowledge that is place-specific (Roberts, 2023:5). The land's physical features are instrumental in maintaining songlines because this is how ancestral spirits journeyed through, and interacted with, the physical landscape leaving sacred knowledge behind. The interconnection between the physical and spiritual is where songlines become intrinsically tied to significant places across Country. As a result, geographical landforms are recorded within songlines and become sacred places. Such landforms can include inter alia: rocks, mountains, rivers, caves and hills (Higgins, 2021:724). Songlines can become lost, fragmented or broken when there is a loss of Country or forced removal from Country (Neale and Kelly, 2020:30). Physical sites that have been identified as comprising a component of a songline are important to protect to prevent the fragmenting or breaking apart of songlines and loss of sacred cultural knowledge. In Australia, songlines can stretch thousands of kilometres, making up a complex and organic network of stories containing cultural knowledge of First Nations communities across the land (Neale and Kelly, 2020:35). Songlines can also extend out to Sea Country and contain cultural knowledge that is tied to geographic features, atmospheric phenomena and marine plants and animals. Often songlines containing references to a seascape or Sea Country make mention of mythical events occurring around marine life, fishing areas, submerged rocks or coral. Songlines that embody seascapes can reflect how a group may relate to, or value, Sea Country—for example, connections to nearby islands that they once inhabited in their songlines (Smyth and Isherwood, 2016:307). Songlines can also be used as proof of long-standing connection to land and support a legal entitlement to land rights (Higgins, 2021:74). Examples where songlines contain strong references to Sea Country are more common in Pacific Islander and Torres Strait Islander communities, who often refer to seascapes and skylines in their songlines in order to communicate sacred knowledge that assists in safe navigation of the ocean (Neale and Kelly, 2020:83-84).

Value	Details
Creation/dreaming sites, sacred sites and ancestral beings	The only published sources located by Woodside with detailed descriptions of the location of ancestral beings or creation/dreaming/sacred sites place these on land, or within inland water sources such as rivers or pools. However, some ancestral beings are noted to live within or originate from the sea generally, and some creation stories talk to the creation of features from or in the sea. Additionally, every place on shore or at sea must be assumed to have been created on some level in First Nations cosmology.
Cultural obligations to care for Country	Caring for Country collectively refers to the cultural obligations of individuals and groups, as well as rituals and ceremonies required for the physical and spiritual health of the environment. In the literature reviewed by Woodside, caring for Country was noted to include, but is not limited to, maintenance of the physical environment and ecosystem. It may also have cultural, spiritual and ritual dimensions such as caring for ancestral beings or ensuring cultural safety. Thalu are places where what are known as “increase ceremonies” are performed to enhance or maintain populations of plants, animals or phenomena. All mentions of active ceremonial sites were confined to onshore locations, though the values may extend offshore where e.g., a thalu relates to marine species populations.
Knowledge of Country/customary law and transfer of knowledge	Knowledge of and familiarity with the features of Sea Country is itself a value. The inherent potential for restricted or secret knowledge makes this difficult to assess even through consultation with Traditional Custodians. However, aspects such as limitations on access to sites or disruption/relocation of First Nations communities may have implications for the preservation of First Nations knowledge. Further, connection to Country may be damaged where people are displaced or disrupted (e.g. during colonisation) or where there is a loss of technical skills or environmental knowledge (McDonald and Phillips, 2021). Transfer of knowledge includes continuing traditional practices to pass on practical skills. This transfer of knowledge may be integral to managing a group’s intangible cultural heritage (UNESCO, 2003).
Connection to Country	Describes the multi-faceted relationship between First Nations people and the landscape, which is envisioned as having personhood and spirit. It is also an aspect of personal identity for many First Nations people. In the case of Sea Country this can mean identifying as a Saltwater person, where “essence of being a 'Saltwater' person is ontological… it is about how people relate spiritually to the sea and engage with spiritual forces that created it, the marine flora and fauna and people” (McDonald and Phillips, 2021).
Access to Country, including Sea Country	Access is necessary for the continuation of other values including caring for Country, carrying out cultural practices and the transfer of traditional knowledge. Being on Country can be an important way of expressing or maintaining connection to Country (Australian Indigenous HealthInfoNet, n.d.). Access is also a value in its own right, as a continuation of traditional Sea Country access and use.
Kinship systems and totemic species	Individuals may have kinship to specific species (Smyth, 2008; Juluwarlu, 2004) and/or a responsibility to care for species (Muller, 2008). Kinship arises from totemic associations within First Nations “skin group” systems. It is forbidden for an individual to kill or eat a species who is from the same “skin group” (Juluwarlu, 2004). They may also have certain obligations linked to the discussion of caring for Country above. It is assumed that marine species may have kinship/totemic relationships to Traditional Custodians, but it is understood that these relationships do not prohibit people outside of that “skin group” from hunting or eating that same species (Juluwarlu, 2004).
Resource collection	A number of marine species are identified through consultation and literature as important resources, particularly as food sources (see Section 12.1.4). In addition to their immediate value as sustenance, the gathering and preparation of these resources is informed by cultural knowledge, and an inability to use these resources may result in a loss of ability to transfer that knowledge to future generations.

On 15 November 2023, the *Aboriginal Heritage Act 1972* (WA) was restored as the legislation that manages Aboriginal heritage in Western Australia (DPLH, 2024). Under section 17 of that Act it is an offence to excavate, destroy, damage, conceal or alter any Aboriginal site without authorisation. Where there is a risk of injury or desecration to a significant Aboriginal area, even where permitted under the AHA, any Aboriginal person may apply to the federal Environment Minister for a declaration under sections 9 or 10 of the *Aboriginal and Torres Strait Islander Heritage Protection Act 1984 (Cth)* for the protection and preservation of that area.

12.1.6.1 Submerged Cultural Heritage

It is understood that the sea level has risen significantly during the 65,000 years of Indigenous occupation, and areas that were once inhabited are now submerged on the continental shelf (Veth et al., 2019; UWA, 2021). At its lowest level during Indigenous occupation, the sea level was between 125 m (O'Leary et al., 2020; Veth et al., 2019; Williams et al., 2018) and 130 m below current levels (Benjamin et al., 2020; Benjamin et al., 2023; UWA, 2021).

Archaeological material preserved on the Ancient Landscape has the potential to provide further information about the earliest periods of human occupation (Veth et al., 2019; UWA, 2021).

Recent archaeological discoveries demonstrate that the now submerged landscape was occupied and inhabited, and can retain archaeological material from this time (Benjamin et al., 2020; Benjamin et al., 2023; see Ward et al., 2022 for an opposing view).

Certain landscapes have been identified as archaeologically prospective on the submerged Ancient Landscape, including:

- submerged water sources (rivers, waterholes, tidal channels and seeps) which have an increased likelihood of use or habitation as past generations used the associated resources (UWA, 2021)
- submerged calcarenite ridges younger than human occupation of the continent which may have formed over and protected artefacts in-situ (Veth, 2019)
- prominent landscape features (e.g. hills, particularly of igneous rock formations) that may have been foci for cultural activity (UWA, 2021)
- karst depressions and other "catch points" where artefacts may accumulate following disturbances caused by inundation (UWA, 2021; Nutley, 2022; Nutley, 2023a)
- Madeleine Shoals has been specifically identified by Murujuga Aboriginal Corporation (MAC) as an archaeologically prospective feature due to its igneous rock formations which have the potential to contain petroglyphs.

The sites considered most likely to survive inundation, based on the review of existing literature, were logically the more robust forms including:

- midden and artefacts within cemented dunes, relict water holes, and beach rock deposits
- quarry outcrops, extraction pits, and associated reduction debris in fine-grained volcanic outcrops
- curvilinear stone structures and standing stones sitting on volcanic pavements and jammed into volcanic rock piles
- lag deposits of artefacts and possibly midden on hardpan in suitable landscape contexts with good preservation conditions (e.g. shallow declination shorelines in sheltered passages of the inner archipelago or on the leeward side of hard-rock/fringing reef cause-ways adjacent to the outer islands)
- small overhangs and shelters with preserved deposits, facing away from the dominant wave and wind action (Veth et al., 2019).

In recognition of this, Woodside considers the Ancient Landscape between the mainland and the ancient coastline KEF as an area where potential First Nations archaeological material may exist on the seabed, as this covers the full extent of this possible occupation. Known places including archaeological sites may be protected subject to declarations under the *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*, *Underwater Cultural Heritage Act 2018* or EPBC Act. However, these Acts only extend protection to First Nations heritage places specified by declaration or otherwise included on a statutory list. Woodside understands that there is currently no First

Nations archaeology known to exist anywhere within Commonwealth waters and no areas subject to declarations or prescriptions under these Acts.

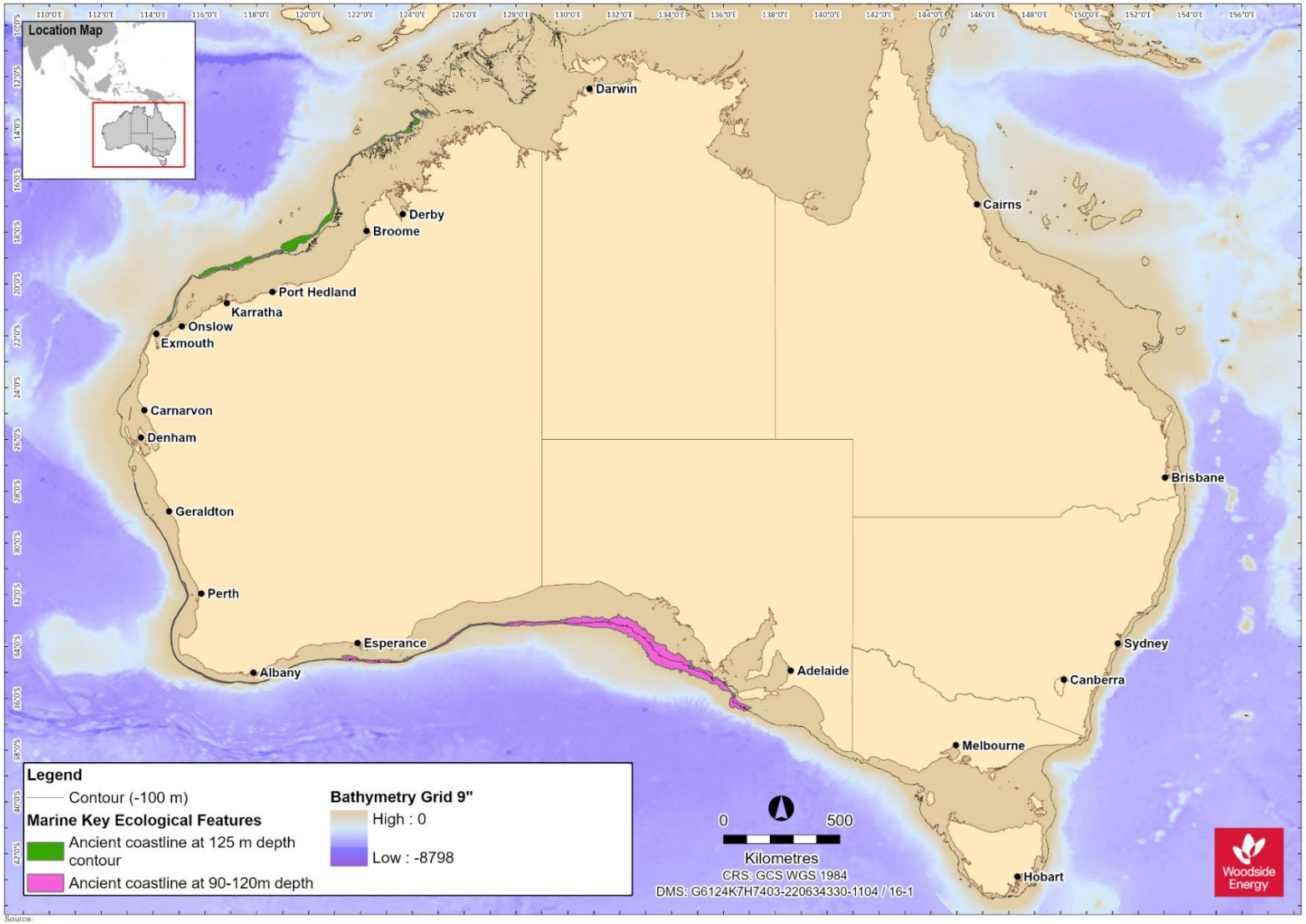


Figure 12-5: Indicative bathymetry of the ancient submerged landscape (data source: GA, 2024; DCCEEW, 2024d

12.1.6.2 First Nations Sites of Significance

Murujuga (the Burrup Peninsula) has a very high density of significant Indigenous heritage sites and places with tangible and intangible heritage values. The area has one of the largest, densest, and most diverse collections of rock art in the world. It is estimated that the peninsula and surrounding islands contain over a million petroglyphs (rock engravings) covering a broad range of styles and subjects. The landscape also contains quarries, middens, fish traps, rock shelters, ceremonial sites, artefact scatters, grinding patches and stone arrangements that evidence tens of thousands of years of human occupation. These places are linked to First Nations cosmology, Dreaming stories and songs through the stories, knowledge and customs that are still held by Traditional Custodians.

In 2007 the Dampier Archipelago (including the Burrup Peninsula) was included on the National Heritage List due to outstanding heritage values relating to Australia's cultural history contained in the large number, density, diversity, distribution and fine execution of rock art. Within the National Heritage Place, the Murujuga National Park covers 4913 ha and is co-managed by the Murujuga Aboriginal Corporation and the Department of Biodiversity, Conservation and Attractions. The Murujuga Cultural Landscape was also added to Australia's Tentative World Heritage List in 2020, with full World Heritage Listing anticipated in 2024.

The Department of Planning, Lands and Heritage maintains a register of registered sites and heritage places. There are over 1600 registered sites on Murujuga and the Dampier Archipelago with around 1100 other heritage places. This register is not comprehensive and will be complemented by heritage surveys where necessary. Protection of National and World Heritage values is also legislated through various provisions of the EPBC Act. Murujuga National Park is managed under the *Conservation and Land Management Act 1984* (WA).

12.1.7 Historic Sites of Significance

Places of historic cultural significance are protected under Commonwealth, State and local regimes. Places inscribed on the National or World Heritage list are protected through various provisions of the EPBC Act. Historic places may also be protected under the *Heritage Act 2018* (WA); under section 129 of this Act the prohibited alteration, demolition, damage, despoilment or removal of objects from a registered place may result in a fine of A$1 million. Protection of heritage by local government typically emanates from local planning schemes produced under Part 5 of the *Planning and Development Act 2005* (WA).

Historical sites of significance and heritage value are found along adjacent foreshores of the SWMR, NWMR and NWR.

12.1.8 Historic Underwater Heritage

The remains of vessels and aircraft in Commonwealth waters, along with any associated article, are automatically protected under the *Underwater Cultural Heritage Act 2018* (Cth) after 75 years. This is applicable whether the existence or location of the article is known or unknown, as per section 16 of the Act. Other articles of underwater cultural heritage may be declared for protection as outlined in section 17 of the Act. Remains and relics of any ship lost, wrecked or abandoned in Western Australian waters before 1900 are protected by the *Maritime Archaeology Act 1973* (WA).

There are no known National Heritage listed shipwrecks in the NWMR and NMR (Table 12-3 and Table 12-4). The only known National heritage listed shipwrecks are within the SWMR and include:

- the *HMAS Sydney II*
- the *HSK Kormoran*
- the *Batavia*.

Information on National Heritage listed shipwrecks in the SWMR can be found in Table 12-5.

Known historical shipwreck sites in Western Australian waters are listed in the WA Maritime Museum Shipwreck Database. Known historical shipwreck sites in Commonwealth waters are listed in Australasian Underwater Cultural Heritage Database. These databases only cover known historical sites. Known shipwrecks listed in these databases for the NWMR, NMR and SWMR are shown in Figure 12-6, Figure 12-7 and Figure 12-8 respectively.

12.1.9 World, National and Commonwealth Listed Heritage Places

The EPBC Act protects the heritage values of National Heritage Listed and World Heritage Listed places. Any action that will have or is likely to have a significant impact on the heritage values of these places are offences under Part 3, Division 1 of the EPBC Act unless the action is permitted under one of the mechanisms of the EPBC Act. These mechanisms include a number of exceptions set out in Part 4, approvals granted under Part 9 and ministerial decisions under Division 2 Part 7.

Australia's National Heritage Sites are those of outstanding natural, historic and/or Indigenous significance to Australia. Indigenous Protected Areas and National Heritage places classed as natural are discussed in Section 11.3. Historic and/or Indigenous National Heritage Listed Places of the NWMR and SWMR include:

- Dampier Archipelago (including Burrup Peninsula)
- Dirk Hartog Landing Site/Cape Inscription
- *HMAS Sydney II*, *HSK Kormoran* Shipwreck Sites
- *Batavia* Shipwreck Site and Survivor Camps Area 1629 – Houtman Abrolhos
- Cheetup Rock Shelter.

Commonwealth Heritage Places are a collection of sites recognised for their Indigenous, historical and/or natural values, which are owned or controlled by the Australian Government. A number of these sites are owned or controlled by the Department of Defence, as well as Government agencies relating to maritime safety, customs and communication. Commonwealth Heritage places classed as natural are discussed in Section 11.3. Listed Heritage Places in the NWMR are all natural with two related to defence activities which include:

- Yampi Defence Area (Table 11-6)
- Learmonth Air Weapons Range Facility (Table 11-6).

World Heritage Properties are those sites that hold universal value which transcends any value that may be held by any one nation. These sites and their qualities are detailed in the Convention concerning the Protection of the World Cultural and Natural Heritage (the World Heritage Convention), to which Australia is a founding member. The Protected Matters Search Report (Appendix A) lists two natural World Heritage Properties in the NWMR (refer Section 11.2). There are no cultural heritage listings located within the NWMR.

Summary tables of heritage places for NWMR, SWMR and NMR are presented in Table 12-3, Table 12-4, and Table 12-5.

Table 12-3: Heritage Places (Indigenous and historic) within the NWMR

Heritage Places	Woodside Activity Area			Class	Description	Conservation Values
	Browse	NWS/S	NW Cape			
National Heritage Properties						
Dampier Archipelago (including Burrup Peninsula)	-	✓	-	Indigenous	The Dampier Archipelago (including the Burrup Peninsula) contains one of the densest concentrations of rock engravings in Australia with some sites containing thousands or tens of thousands of images.	The rock engravings comprise images of avian, marine and terrestrial fauna, schematised human figures, figures with mixed human and animal characteristics and geometric designs. At a national level it has an exceptionally diverse and dynamic range of schematised human figures some of which are arranged in complex scenes. The fine execution and dynamic nature of the engravings, particularly some of the composite panels, exhibit a degree of creativity that is unusual in Australian rock engravings.
Dirk Hartog Landing Site 1616 – Cape Inscription Area	-	-	✓	Historic	Cape Inscription is the site of the oldest known landings of Europeans on the WA coastline.	The Cape Inscription area displays uncommon aspects of Australia's cultural history because of the cumulative effect its association with these explorers and surveyors had on growing knowledge of the great southern continent in Europe. The association of the site with these early navigators stimulated the development of the European view of the great southern continent at a time when they began to look at the world with a modern scientific outlook.
Commonwealth Heritage Properties						
None						

Table 12-4: Heritage Places (Indigenous and historic) within the NMR

Heritage Places	Class	Description	Conservation Values
National Heritage Properties			
None			
Commonwealth Heritage Properties			
None			

Table 12-5: Heritage Places (Indigenous and historic) within the SWMR

Heritage Places	Class	Description	Conservation Values
National Heritage Properties			
Cheetup Rock Shelter	Indigenous	Cheetup, meaning "place of the birds", is the name of a spacious rock shelter located in Cape Le Grand National Park, about 55 km east of Esperance in WA. First Nations people associated with the place identify themselves as Nyungar/Noongar, Ngadju (shortened from Ngadjunmaia) or Mirning.	Cheetup rock shelter provides outstanding evidence for the antiquity of processing and use of cycad seeds by First Nations people. The seeds of the cycad are extremely toxic and can cause speedy death if eaten fresh without proper preparation to remove the toxins. The presence of *Macrozamia riedlei* seeds in a pit lined with Xanthorrhoea (grass tree) leaf bases indicates that First Nations people in the Esperance region had the knowledge to remove the toxins of this important source of carbohydrate and protein at least 13,200 years ago.
Batavia Shipwreck Site and Survivor Camps Area 1629 – Houtman Abrolhos	Historic	The Batavia and its associated sites hold an important place in the discovery and delineation of the WA coastline. The wreck of the Batavia, and other Dutch ships like her, convinced the VOC (Dutch East India Company) of the necessity of more accurate charts of the coastline and resulted in the commissioning of Vlamingh's 1696 voyage.	Because of its relatively undisturbed nature the archaeological investigation of the wreck itself has revealed a range of objects of considerable value as well as to artefact specialists and historians.

Heritage Places	Class	Description	Conservation Values
HMAS Sydney II and HSK Kormoran Shipwreck Sites	Historic	The naval battle fought between the Australian warship HMAS Sydney II and the German commerce raider HSK Kormoran off the WA coast during World War II was a defining event in Australia's cultural history. HMAS Sydney II was Australia's most famous warship of the time and this battle has forever linked the stories of these warships to each other. The loss of HMAS Sydney II along with its entire crew of 645 following the battle with HSK Kormoran, remains as Australia's worst naval disaster.	The shipwreck sites of HMAS Sydney II and HSK Kormoran have outstanding heritage value to the nation because of their importance in a defining event in Australia's cultural history and for their part in development of the process of the defence of Australia.
Commonwealth Heritage Properties			
Cliff Point Historic Sites	Historic	Cliff Head is a limestone bluff on the east coast of Garden Island. Evidence of occupation has been reported from the beach just north of the head, the immediate hinterland, the ridge above and on the south face of the ridge.	The Cliff Point Historic Site, individually significant within the area of Garden Island, is important as the first site inhabited by Governor Stirling's party in 1829 when founding the colony of WA, and as WA's first official non-convict settlement. The site was occupied in the first instance by Captain Charles Fremantle before the arrival of Captain Stirling. The party occupied the site for two months before a move was made to the Swan River settlement on the mainland.
HMAS Sydney II and HSK Kormoran Shipwreck Sites	Historic	As above.	As above.
J Gun Battery	Historic	J Battery comprised two 155 mm long range guns, the other similar battery being at Cape Peron on the mainland at the entrance to Cockburn Sound. Located in the dune systems at the north-western corner of Garden Island, elements of the J Battery complex are now covered in part by sand.	J Gun Battery (1942) is individually significant within the area of Garden Island (Register No. 019544) and is historically important as the first gun battery constructed on Garden Island and as one of two long range gun batteries which played a strategic role in the coastal defences of Cockburn Sound and Fremantle following the entry of Japan into the Second World War (1939–45).

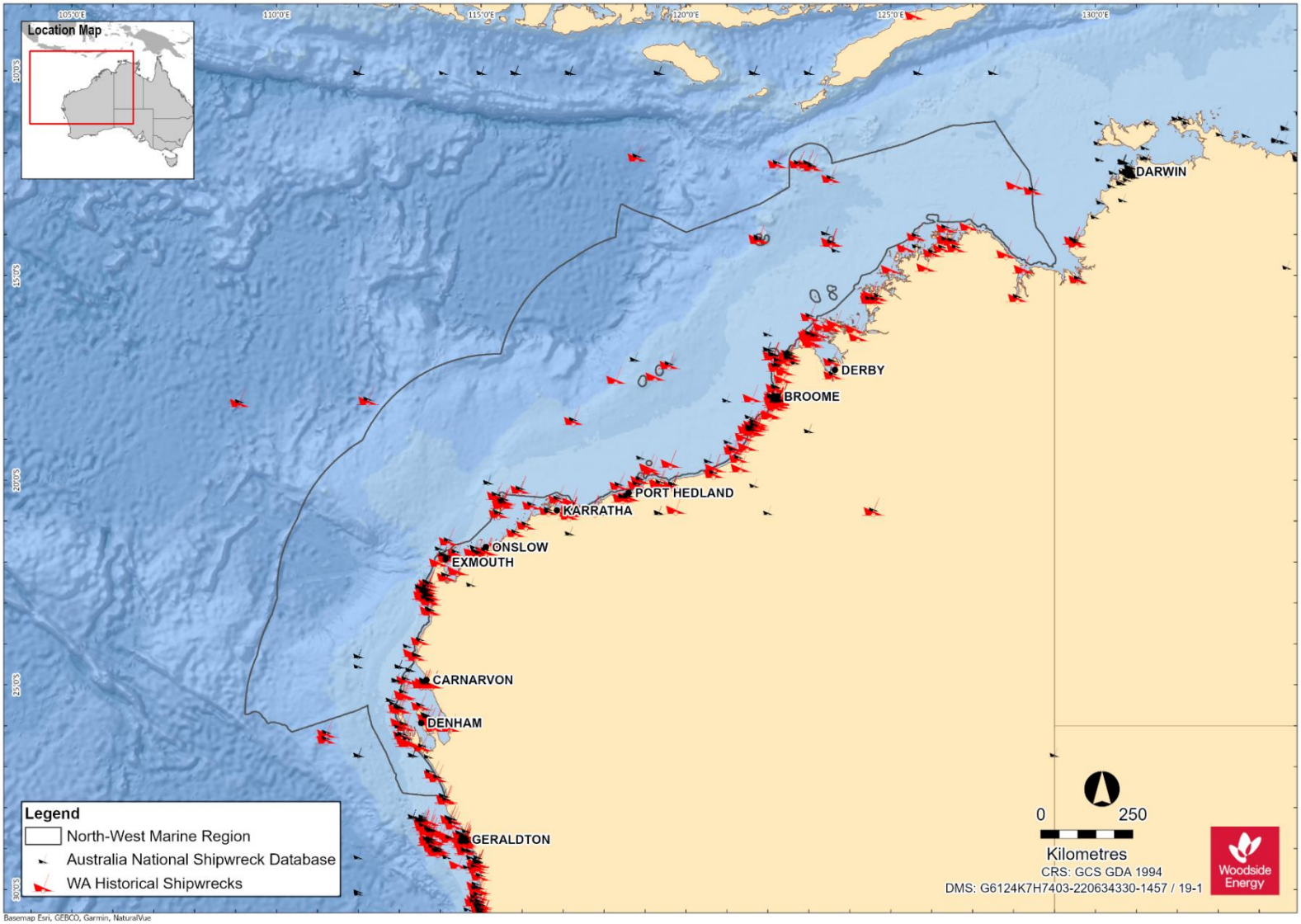


Figure 12-6: Shipwrecks in the NWMR (data source: WAM, 2018 and AODN, 2008)

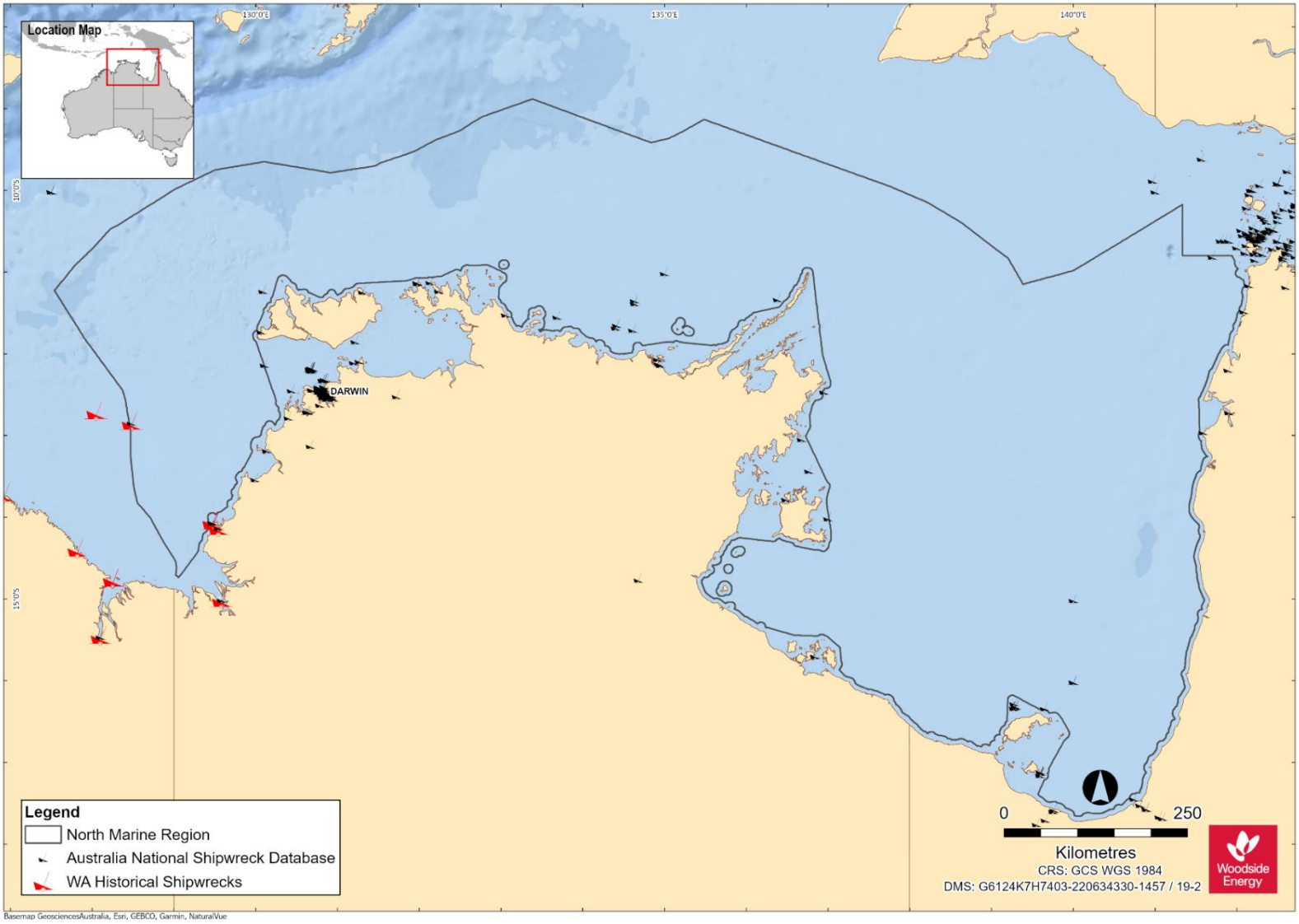


Figure 12-7: Shipwrecks in the NMR (data source: WAM, 2018 and AODN, 2008)

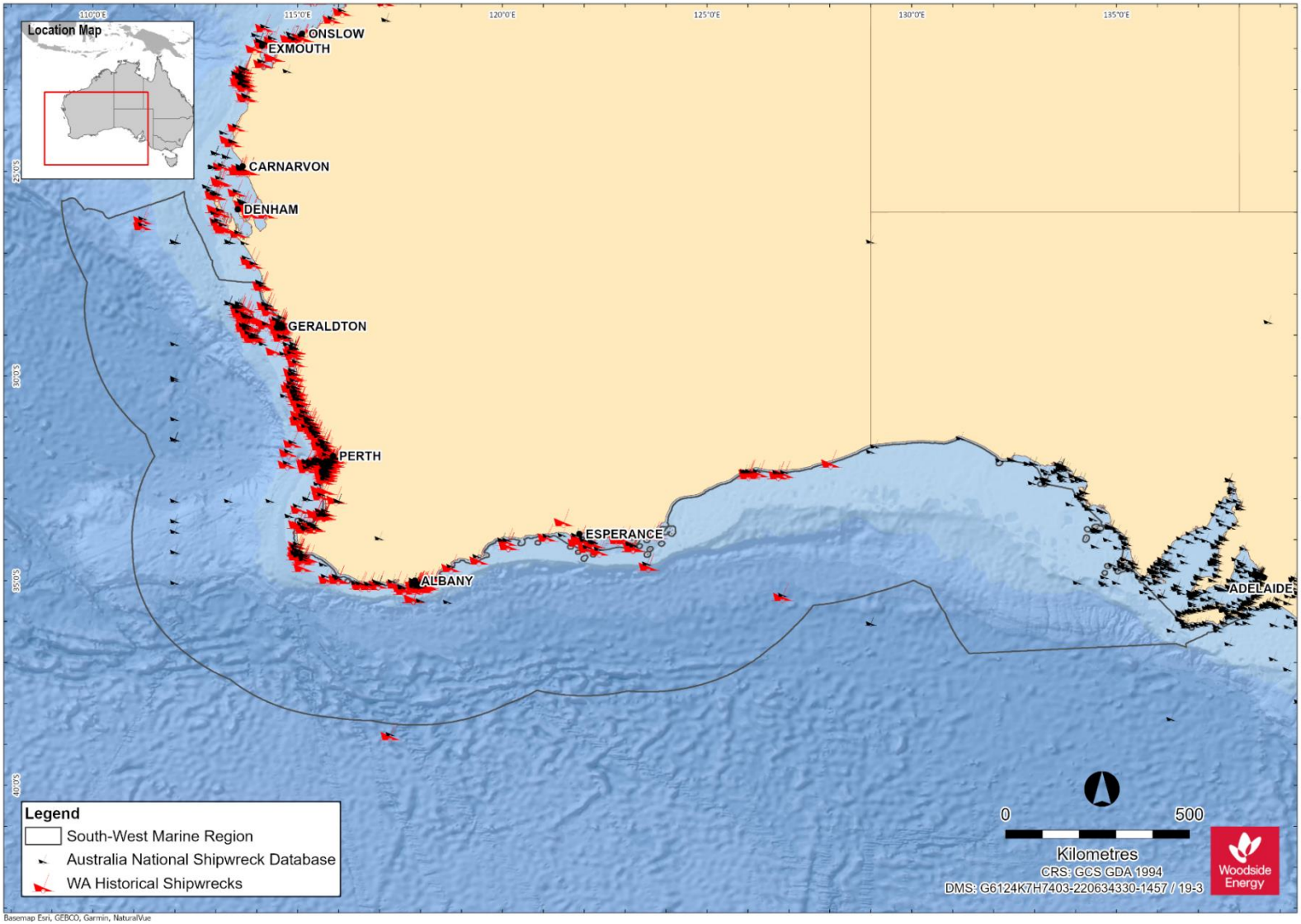


Figure 12-8: Shipwrecks in the SWMR (data source: WAM, 2018 and AODN, 2008)

12.2 Socio-Economic Values

Socio-economic values include commercial and traditional fishing, tourism and recreation, shipping, oil and gas activities and defense activities.

12.2.1 Commercial Fisheries – Commonwealth and State

The Australian Fisheries Management Authority (AFMA) manages fisheries on behalf of the Commonwealth Government and is bound by objectives under the *Fisheries Management Act 1991* (Cth).

WA State commercial fisheries are managed by the WA Department of Primary Industries and Regional Development (WA DPIRD) under the *Fish Resources Management Act 1994* (WA), *Fisheries Resources Management Regulations 1995* (WA), relevant gazetted notices and licence conditions, and applicable Fishery Management Plans.

Commonwealth and State managed fisheries that are licensed to operate within the NWMR are summarised in Table 12-6.

Table 12-6: Commonwealth and State managed fisheries

Fishery	Woodside Activity Area			Description			
	Browse	NWS/S	NWC				
Commonwealth Managed Fisheries							
Southern Bluefin Tuna Fishery	✓	✓	✓	**Management area:**	The Southern Bluefin Tuna Fishery covers the entire EEZ around Australia, out to 200 NM from the coast. They do not fish in the Woodside activity area.		
				Species targeted	**Fishing methods**	**Fishing depth**	
				Southern bluefin tuna (*Thunnus maccoyii*)	Longline, purse seine fishing, and minor line (troll and poling).	Southern bluefin tuna is a pelagic species which can be found to depths of 500 m (AFMA, 2021a).	
				Fishing effort	Most of the Australian fishing effort is by purse-seine vessels in the Great Australian Bight and waters off South Australia during summer months, and by longline off the New South Wales coastline during winter months (Patterson and Dylewski, 2023a). The Southern Bluefin Tuna Fishery is shared amongst countries. Australia currently has a 35% share of the total global allowable catch. Whilst wild capture fishing in Australia to sell directly to market can occur anywhere throughout the fisheries range, currently most of that quota is value-added through ranching (on-growing the wild captured fish for an extra five to six months). Ranching requires significant infrastructure, a resident labour force, plus proximity to a fishery able to supply a large quantity of natural feed/sardines (40,000+ tonnes). North-west WA is critically important regardless of how the quota is fished because of the proximity to the single spawning ground of this global roaming species. Young fish (one to four years of age) move from the spawning ground in the north-east Indian Ocean into the Australian EEZ and southwards along the Western Australian coast (Patterson and Dylewski, 2023). The stock is classified as not overfished (Patterson and Dylewski, 2023a). A total of 5972 t bluefin tuna catch was recorded for the 2021–22 fishing season, an increase from 5646 t in the 2020–21 period (Patterson and Dylewski, 2023a). Of the total catch, 4957 t were collected using purse seine and 1015 from pelagic longline.	
				Active licences/ vessels	Eight purse seine vessels and 22 longline vessels, an increase from seven purse seine vessels and 20 longline vessels in the 2020–21 period (Patterson and Dylewski, 2023a).		

Fishery	Woodside Activity Area			Description			
	Browse	NWS/IS	NWC				
Western Skipjack Tuna Fishery	✓	✓	✓	**Management area:**	The combined western and eastern skipjack tuna (*Katsuwonus pelamis*) fisheries encompass the entire Australian EEZ. The Western Skipjack Tuna Fishery extends westward from the SA/ Victorian border across the Great Australian Bight and around the west coast of WA to the Cape York Peninsula.		
				Species targeted		**Fishing methods**	**Fishing depth**
				Western skipjack tuna (*Katsuwonus pelamis*)		Fishers use purse seine gear (about 98% of catch) and sometimes pole and line when fishing for skipjack tuna.	Western skipjack tuna is a pelagic species that can be found to depths of 260 m (AFMA, 2021b).
				Fishing effort:	The Skipjack Tuna Fishery has not been actively fished since the 2008–09 fishing season (Patterson and Delewski, 2023b). The management arrangements for this fishery will be reviewed if active boats re-enter the fishery.		
				Active licences/ vessels:	No active vessels operating since 2009 (Patterson and Delewski, 2023b).		
Western Tuna and Billfish Fishery	✓	✓	✓	**Management area:**	The Western Tuna and Billfish Fishery extends to the Australian EEZ boundary in the Indian Ocean.		
				Species targeted		**Fishing methods**	**Fishing depth**
				Key species caught in the fishery are bigeye tuna (*Thunnus obesus*), yellowfin tuna (*T. albacares*) and swordfish (*Xiphias gladius*). Striped marlin (*Kajikia audax*) is a minor component of the catch. Catch of albacore (*T. alalunga*), a non-quota species, can approach levels similar to yellowfin tuna catch in some years (Blake et al., 2022a).		Fishers mainly use pelagic longline fishing gear to catch the targeted species. Minor line (including handline, troll, rod and reel) can also be used, and purse seine.	Species have a broad depth distribution, with tuna occurring at 150–300 m, striped marlin at 150 m and swordfish at up to 600 m (BRS, 2007).
				Fishing effort:	The fishery operates in Australia's EEZ and high seas of the Indian Ocean. Fishing effort in recent years has been concentrated off south-west WA, with occasional activity off SA (Patterson et al., 2023). A total of 145 t catch was landed in the 2021–22 seasons, a decrease from 252 t in the 2020–21 period (Patterson et al., 2023). The striped marlin, bigeye tuna, and yellowfin tuna are classified as subject to overfishing (Patterson et al., 2023).		

<table>
<tr><th rowspan="2">Fishery</th><th colspan="3">Woodside Activity Area</th><th colspan="4" rowspan="2">Description</th></tr>
<tr><th>Browse</th><th>NWS/IS</th><th>NWC</th></tr>
<tr><td></td><td></td><td></td><td></td><td>Active licences/ vessels:</td><td colspan="3">Two pelagic longline and 3 minor line vessels were active during the 2021-22 season (Patterson et al., 2023).</td></tr>
<tr><td rowspan="5">Western Deepwater Trawl Fishery</td><td rowspan="5"></td><td rowspan="5"></td><td rowspan="5">✓</td><td>Management area</td><td colspan="3">The Western Deepwater Trawl Fishery is in deep water off WA, from the line approximating the 200 m isobath to the edge of the Australian Fishing Zone (AFZ). (Blake et al., 2021).</td></tr>
<tr><td colspan="2">Species targeted</td><td>Fishing methods</td><td>Fishing depth</td></tr>
<tr><td colspan="2">More than 50 species, historically dominated by six commercial finfish species or species groups:
orange roughy (Hoplostethus atlanticus)
oreos (Oreosomatidae)
boarfish (Pentacerotidae)
eteline snapper (Lutjanidae: Etelinae)
apsiline snapper (Lutjanidae: Apsilinae)
sea bream (Lethrinidae).</td><td>Demersal trawl.</td><td>Water deeper than 200 m (Blake et.al., 2021).</td></tr>
<tr><td>Fishing effort:</td><td colspan="3">The number of vessels active in the fishery and total hours trawled have fluctuated from year to year. Notably, total hours trawled were relatively high for a brief period during the early 2000s when fishers targeted ruby snapper and deep-water bugs (Patterson et al., 2020).
Total trawl hours have been variable but relatively low since 2005–06. In 2021–22, 76 trawl-hours were recorded in the fishery, down from a recent peak of 1108 in 2017–18 (Keller et al., 2023).
The total catch was 12 t in the 2021–22 season, up from 5 t in the 2020–21 season and no deepwater bugs were caught between 2020 and 2022 (Keller et al., 2023). Ruby snapper made up 40% of the catch in 2021–22 and 31% in 2020–21 (Keller et al., 2023).
Ruby snapper and deepwater bugs stock are considered not subject to overfishing but the biomass status of deepwater bugs are classified as uncertain (Keller et al., 2023).</td></tr>
<tr><td>Active licences/ vessels:</td><td colspan="3">Since 2004–05, one to three vessels have been active in the fishery, with two active vessels in 2021–22 (Keller et al., 2023).</td></tr>
</table>

<table>
<tr><th rowspan="2">Fishery</th><th colspan="3">Woodside Activity Area</th><th colspan="4" rowspan="2">Description</th></tr>
<tr><th>Browse</th><th>NWS/IS</th><th>NWC</th></tr>
<tr><td rowspan="5">North-west Slope Trawl Fishery</td><td rowspan="5">✓</td><td rowspan="5">✓</td><td rowspan="5"></td><td>Management area:</td><td colspan="3">The North-west Slope Trawl Fishery extends from 114 °E to 125 °E, from the 200 m isobath to the outer limit of the AFZ (200 NM from the coastline, which is the boundary of the Australian EEZ).</td></tr>
<tr><td colspan="2">Species targeted</td><td>Fishing methods</td><td>Fishing depth</td></tr>
<tr><td colspan="2">Australian scampi (Metanephrops australiensis) and smaller quantities of velvet and Boschma’s scampi (M. velutinus and M. boschmai). A quantity of prawns is harvested each season, and squids are becoming an increasingly significant component of the catch.
Mixed snappers (Lutjanidae) and redspot emperor (Lethrinus lentjan) have historically been an important component of the catch Blake et al., 2021).</td><td>Fishing for scampi occurs over soft, muddy sediments or sandy habitats, using demersal trawl gear on the continental slope (Patterson et al., 2017).</td><td>Typically depths of 350 to 600 m (Patterson et al., 2017).</td></tr>
<tr><td>Fishing effort:</td><td colspan="3">The North-west Slope Trawl Fishery commenced in 1985 and the number of active vessels peaked at 21 in the 1986–87 season, decreasing to between 1 and 6 vessels per year since 2005-06 (Keller and Curtotti, 2023).
A total catch of 85.8 t was recorded in 2021–22, a decrease from 87.05 t in 2020–21 (Keller and Curtotti, 2023). Of the total catch, the Australian scampi species comprised of approximately 33% (29 t), down from 50% (44 t) in 2020–21.
The stock assessment of scampi in the fishery are classified as not subject to overfishing (Keller and Curtotti, 2023).</td></tr>
<tr><td>Active licences/ vessels:</td><td colspan="3">Three vessels were active in the 2021-22 season, decline from 4 in the 2021-22 season, and trawl-hours decreased from 4,420 in 2020-21 to 3,950 in 2021-22 (Keller and Curtotti, 2023).</td></tr>
</table>

<table>
<tr><th rowspan="2">Fishery</th><th colspan="3">Woodside Activity Area</th><th colspan="4" rowspan="2">Description</th></tr>
<tr><th>Browse</th><th>NWS/IS</th><th>NWC</th></tr>
<tr><td rowspan="5">Pilbara Fish Trawl (Interim) Managed Fishery</td><td rowspan="5"></td><td rowspan="5">✓</td><td rowspan="5"></td><td>Management area:</td><td colspan="3">The Pilbara Trawl (Interim) Managed Fishery is a high intensity fishery divided into two zones and an area governed by Schedule 5 (prohibited to trawling). In addition to the Prohibited Trawl Fishing area, no fish trawl units are allocated for use in Zone 1 or Areas 3 and 6 of Zone 2 (which comprises six management areas) (Newman et al., 2021a).</td></tr>
<tr><td colspan="2">Species targeted</td><td>Fishing methods</td><td>Fishing depth</td></tr>
<tr><td colspan="2">The fishery targets more than 50 scalefish species.
The main demersal scalefish species landed by the fisheries in the Pilbara region are bluespotted emperor, red emperor and rankin cod (Newman et al., 2021a). The key species caught by the Pilbara Trawl (Interim) Managed Fishery include crimson snapper, bluespotted emperor trevally and threadfin bream (DPIRD, 2020).</td><td>Demersal trawl. The fishery operates with standard stern trawling gear (single net with extension sweeps) (Newman et al., 2021a).</td><td>The fishery operates in waters between 50 and 200 m water depth (Allen et al., 2014; Newman et al., 2015).</td></tr>
<tr><td>Fishing effort:</td><td colspan="3">Based on State of the Fisheries annual reports provided by DPIRD, catch trends were seen to be increasing over the past reporting years, until the past two seasons.
The Pilbara Trawl (Interim) Managed Fishery catch was 1784 t in 2022,1928 t in 2021, 2087 t in 2020, 2142 t in 2019, 1996 t in 2018, 1780 t in 2017, 1529 t in 2016, 1172 t in 2015 and 1105 t in 2014 (Wakefield et al., 2023a). The fishery landed 72% of total commercial catches of the demersal scale fish in the Pilbara in 2022. Increasing catch rates and fishing mortality spawning biomass estimates indicate that imposed effort reductions since 2008 have resulted in increased fish abundance and stock rebuilding in the fishery (Wakefield et al., 2023a).
In 2021, the total catch of the indicator species red emperor in the Pilbara Demersal Scalefish Fisheries (includes trawl, trap and line sectors) was 192 t, which is within the acceptable catch range (Wakefield et al., 2023).
The biological stocks for the Pilbara Demersal Scalefish Fisheries are classified as sustainable-adequate (Wakefield et al., 2023a).</td></tr>
<tr><td>Active licences/ vessels:</td><td colspan="3">Four active vessels in the trawl sector in 2022 (Wakefield et al., 2023a).</td></tr>
</table>

<table>
<tr><th rowspan="2">Fishery</th><th colspan="3">Woodside Activity Area</th><th colspan="4" rowspan="2">Description</th></tr>
<tr><th>Browse</th><th>NWS/IS</th><th>NWC</th></tr>
<tr><td rowspan="5">Pilbara Trap Managed Fishery</td><td rowspan="5"></td><td rowspan="5">✓</td><td rowspan="5">✓</td><td>Management area:</td><td colspan="3">The Pilbara Trap Managed Fishery covers the area from Exmouth northwards and eastwards to the 120° line of longitude, and offshore as far as the 200 m isobath. Like the trawl fishery, the trap fishery is also managed using input controls in the form of individual transferable effort allocations monitored with a satellite-based vessel management system. The fishery includes six licences allocated to three vessels, operating principally from Onslow.</td></tr>
<tr><td colspan="2">Species targeted</td><td>Fishing methods</td><td>Fishing depths</td></tr>
<tr><td colspan="2">The catch is made up of around 45 to 50 different fish species.
The fishery generally targets long-lived, high-value demersal scalefish such as red emperor and Rankin cod but also lands significant catches of shorter-lived species such as blue spotted emperor (DPIRD, 2020).</td><td>Demersal fish traps.</td><td>Approximately 30 m isobath to 200 m isobath (DPIRD. n.d.).</td></tr>
<tr><td>Fishing effort:</td><td colspan="3">Previous years catch based on State of the Fisheries annual reports provided by DPIRD: The Pilbara Trap Managed Fishery caught 597 t in 2022, 662 t in 2021, 584 t in 2020, 680 t in 2019, 563 t in 2018, 573 t in 2017, 495 t in 2016, 510 t in 2015 and 268 t in 2014 (Wakefield et al., 2023a).
The total catch of 597 t in 2022 made up 24% of the total catch by the Pilbara Demersal Scale Fishery and exceeded the acceptable catch range for the total catch (Wakefield et al., 2023a).</td></tr>
<tr><td>Active licences/ vessels:</td><td colspan="3">Three active vessels in the trap sector in 2022 (Wakefield et al., 2023a).</td></tr>
</table>

Fishery	Woodside Activity Area			Description			
	Browse	NWS/IS	NWC				
Pilbara Line Managed Fishery		✓	✓	**Management area:**	The Pilbara Line Managed Fishery boat licences are permitted to operate anywhere within 'Pilbara water', bounded by a line commencing at the intersection of 21° 56'S latitude and the high-water mark on the western side of the North-west Cape on the mainland of WA; west along the parallel to the intersection of 21° 56'S latitude and the boundary of the AFZ and north to longitude 120°E.		
				Species targeted		**Fishing method**	**Fishing depths**
				The Pilbara Line Managed Fishery catch is made up around 45–50 different fish species. The fishery targets similar demersal species to the Pilbara Trap and Trawl fisheries, as well as some deeper offshore species such as ruby snapper and eightbar grouper (DPIRD, 2020).		Demersal long line.	Information not available.
				Fishing effort:	Based on State of the Fisheries annual reports provided by DPIRD, catch trends are as follows: The Pilbara Line Managed Fishery caught 104 t in 2022, 124 t in 2021, 167 t in 2020, 148 t in 2019, 93 t in 2018, 143 t in 2017, 126 t in 2016, 97 t in 2015 and 40 t in 2014 (Wakefield et al., 2023a). The total catch of 104 t in 2022 made up 4% of the total catch by the Pilbara Demersal Scalefish Fishery and was within the acceptable catch range (Wakefield et al., 2023a).		
				Active licences/ vessels:	Four active vessels in 2022 (Wakefield et al., 2023a).		
Mackerel Managed Fishery	✓	✓	✓	**Management area:**	The commercial fishery extends from the West Coast Bioregion to the WA/NT border. There are three managed fishing areas: Area 1: Kimberley (121º E to the WA/NT border); Area 2: Pilbara (114º E to 121º E) and Area 3: Gascoyne (27º S to 114º E) and West Coast (Cape Leeuwin to 27º S) (Lewis et al., 2020).		
				Species targeted		**Fishing methods**	**Fishing depth**
				Spanish mackerel (*Scomberomorus commerson*), grey mackerel (*S. semifasciatus*), other species from the genus *Scomberomorus*.		Trolling, baits or lures cast, jigging (Lewis et al., 2020).	Information not available.

<table>
<tr><th rowspan="2">Fishery</th><th colspan="3">Woodside Activity Area</th><th colspan="4" rowspan="2">Description</th></tr>
<tr><th>Browse</th><th>NWS/IS</th><th>NWC</th></tr>
<tr><td></td><td></td><td></td><td></td><td>Fishing effort:</td><td colspan="3">Most of the catch is taken from waters off the Kimberley and Pilbara coasts (Lewis et al., 2020), reflecting the tropical distribution of mackerel species (Molony et al., 2015). Most fishing activity occurs around the coastal reefs of the Dampier Archipelago and Port Hedland area, with the seasonal appearance of mackerel in shallower coastal waters most likely associated with feeding and gonad development before spawning (Mackie et al., 2003).
Previous years catch based on State of the Fisheries annual reports provided by DPIRD: 212 t in 2022, 310 t in 2021, 290 t in 2020, 291 t in 2019, 214 t in 2018 (the lowest on record (Lewis et al., 2020), 283 t in 2017, 276 t in 2016, 302 t in 2015 and 322 t in 2014 (Lewis and Rynvis, 2023).
The landed catch in 2021 was 238 t for Spanish mackerel and 10 t for grey mackerel (Lewis and Watt, 2023). The commercial landings for other large pelagic species, such as the amberjack and cobia were 19.7 t and 18.2 t, and other species contributed to the remaining <10 t of the total catch (Lewis and Watt, 2023).
All species stocks are sustainable-adequate (Lewis and Rynvis, 2023).</td></tr>
<tr><td></td><td></td><td></td><td></td><td>Active licences/ vessels:</td><td colspan="3">There were 16 vessels in 2022, primarily from May to November (Lewis and Rynvis, 2023).</td></tr>
<tr><td>Marine Aquarium Fish Managed Fishery</td><td>✓</td><td>✓</td><td>✓</td><td>Management area:</td><td colspan="3">The Marine Aquarium Fish Managed Fishery can operate throughout WA State waters. The fishery is typically more active in waters south of Broome and higher levels of effort around the Capes region, Perth, Geraldton, Exmouth, Dampier, and Broome (Newman et al., 2021b). There has been recent effort in the waters from Broome northwards to the NT border (Newman et al., 2023a).</td></tr>
<tr><td></td><td></td><td></td><td></td><td colspan="2">Species targeted</td><td>Fishing methods</td><td>Fishing depth</td></tr>
<tr><td></td><td></td><td></td><td></td><td colspan="2">Finfish, hard coral, soft coral, tridacnid clams, syngnathids (seahorses and pipefish), other invertebrates (including molluscs, crustaceans, echinoderms), algae, seagrasses and ‘live rock’.
The resource potentially includes over 1500 species of marine aquarium fishes (Newman et al., 2021b).</td><td>The fishery is diver-based, which typically restricts effort to safe diving depths (less than 30 m).</td><td>Information not available.</td></tr>
</table>

Fishery	Woodside Activity Area			Description			
	Browse	NWS/IS	NWC				
				Fishing effort:	Total catch for the Marine Aquarium Fish Managed Fishery in 2022 was 98,694 fishes and invertebrates, 17.83 t of coral, live rock, and living sand, and 39 L of marine plants and live feed. (Newman et al., 2023a). In 2021, the total catch for the Marine Aquarium Fish Managed Fishery was 92,227 fishes (including syngnathids, invertebrates and sponges), 27.97 t of coral, live rock and living sand, and 42 L of marine plants and live feed (Newman et al., 2023). In 2020 was 89,925 fishes, 32.12 t of coral, live rock and living sand and <20 L of marine plants and live feed (Newman et al., 2021b). Dominant fish species caught in 2022 include spotted blenny (*Istiblennius meleagris*), scribbled angelfish (*Chaetodontoplus duboulayi*), black-axil chromis (*Chromis atripectoralis*), stripey (*Microcanthus strigatus*), Vachell's glassfish (*Ambassis vachellii*), margined coralfish (*Chelmon marginalis*), black-axil chromis (*Chromis atripectoralis*), and blue and yellow wrasse (*Anampses lennardi*) (Newman et al., 2023a). The breeding stocks of landed species are classified as sustainable-adequate (Newman et al., 2023a)		
				Active licences/ vessels:	13 licences were active in 2022 across the Marine Aquarium Fish Managed Fishery and the Hermit Crab Fishery (Newman et al., 2023a).		
Western Australian Sea Cucumber Fishery (formerly Beche-de-mer Fishery)	✓	✓	✓	**Management area:**	Fishing occurs mostly in the northern half of WA from Exmouth Gulf to the NT border and is managed under Ministerial Exemptions. Shark Bay was fished for the first time in 2020 (Hart et al., 2023a) and again in 2021 (Newman et al., 2022).		
				Species targeted		**Fishing methods**	**Fishing depth**
				Two main species: sandfish (*Holothuria scabra*) and redfish (*Actinopyga echinites*).		Diving and wading. Collected by hand.	The targeted species typically inhabit nearshore in shallow depths.
				Fishing effort:	Previous years catch based on State of the Fisheries annual reports provided by DPIRD: The Western Australian Sea Cucumber Fishery caught 56.5 t in 2022, 41.3 t in 2021 3.6 t in 2020, 6.9 t in 2019, 62 t in 2018 (Gaughan and Santoro, 2020), 135 t in 2017, 93 t in 2016 and 38 t in 2015. In 2022, 45.2 t of the total catch consisted of sandfish (*Holothuria scabra*), 10.8 t deepwater redfish (*Actinopyga echinites*), and 0.5 t of black teatfish (*Holothuria whitmaei*) (Newman et al., 2023d). Sandfish were collected from the Kimberley only, which was last fished in 2017 (Hart et al., 2023). Deepwater redfish and black teatfish were harvested from Shark Bay (under an exception licence granted to native title holders), which was the second time this stock had been fished (Hart et al., 2023). The stock status of sandfish, in the Kimberly, and red fish species landed are considered to be sustainable- adequate, while the sandfish in the Pilbara are not sustainable – inadequate. (Hart et al., 2023f).		

Fishery	Woodside Activity Area			Description			
	Browse	NWS/IS	NWC				
				Active licences/ vessels:	Two operating vessels operating in 2022 (Hart et al., 2023f).		
Onslow Prawn Managed Fishery		✓		**Management area:**	The Onslow Prawn Managed Fishery encompasses a portion of the continental shelf off the Pilbara.		
				Species targeted		**Fishing methods**	**Fishing depth**
				Western king prawns (*Penaeus esculentus*), brown tiger prawns (*Penaeus esculentus*), blue endeavour prawns (*Metapenaeus endeavouri.*		Low opening, otter prawn trawl systems.	Fishery and or fishing activity overlaps the Beadon Creek dredging scope (Sporer et al., 2015).
				Fishing effort:	The total landings for the Onslow Prawn Managed Fishery in 2022 are not available due to data confidentiality (Wilkin, et al. 2023b). In 2021 were less than the target catch range of 60 t (Kangas et al.,2023a). 37 days of fishing took place in 2021, compared to 13 days in 2020 (Kangas et al., 2023a). The breeding stocks of banana, brown tiger, and western king prawns are considered sustainable-adequate (Kangas et al., 2023a).		
				Active licences/ vessels:	One vessel active in 2021 (Kangas et al., 2023a).		
Pearl Oyster Managed Fishery	✓	✓	✓	**Management area:**	The Pearl Oyster Managed Fishery is located in shallow coastal waters, designated by four zones extending from Exmouth to Kununurra and the seaward boundary demarcated by the 200 NM EEZ. The fishery is currently managed under the *Pearling Act 1990* (Hart et al., 2023b).		
				Species targeted		**Fishing methods**	**Fishing depth**
				Silver lipped pearl oysters (*Pinctada maxima*).		Drift diving.	Fishing effort is mostly focused in shallow coastal waters (10–15 m depth), with a maximum depth of 35 m (Lulofs et al., 2002).
				Fishing effort:	In 2021, catch was taken from Zones 2 and 3 only with no fishing in Zone 1, which has not been fished from 2017 to 2021 (Hart et al., 2023b). In 2022, the number of wild-caught pearl oysters was 756,531 (Hart et al., 2023d). Total dive hours increased in 2022 from 8175 hours in 2021 to 10,906 hours due to a 28% increase in harvest. (Hart et al., 2023d). Zones one to three are all considered to be sustainable – adequate (Hart et al., 2023b).		

Fishery	Woodside Activity Area			Description			
	Browse	NWS/IS	NWC				
				Active licences/ vessels:	Six active vessels in 2022 (Hart et al., 2023b).		
Pilbara Crab Managed Fishery		✓	✓	**Management area:**	The Pilbara Crab Managed Fishery covers inshore waters from Onslow to Port Hedland (between longitudes 115° 5’ 60” E and 120° E), with most activity around Nickol Bay (Johnston et al., 2020b). Areas of the fishery north and east of Exmouth and nearshore are currently closed as per Schedule 2 of the Draft Management Plan for the Pilbara Crab Managed Fishery (DPIRD, 2018b).		
				Species targeted		**Fishing methods**	**Fishing depth**
				Blue swimmer crab (*Portunus armatus)* (Johnston et al*.,* 2021).		Hourglass traps (Johnston et al., 2021).	Up to 50m deep (Johnston et.al., 2020a).
				Fishing effort:	Previous years catch based on State of the Fisheries annual reports provided by DPIRD: Catch for the Pilbara Crab Managed Fishery was 11.2 t in 2022, 9.7 t in 2021, 0.6 t in 2020 and 19.3 t in 2019 (Johnston et al., 2023a). The total catch in 2021 was a substantial increase from the 2.1 t caught in 2020, which was the lowest landed catch in 20 years (Johnston et al., 2023a). In 2022 the blue swimmer crab catch accounted for 2% of the State commercial catch, all taken by the fishery (Johnston et al., 2023a). The blue swimmer crab stock status is considered sustainable – adequate (Johnston et al., 2023a).		
				Active licences/ vessels:	No information available currently.		
South West Coast Salmon Managed Fishery	✓	✓	✓	**Management area:**	The South-west Coast Salmon Managed Fishery operates on various beaches south of the metropolitan area and includes all WA waters north of Cape Beaufort except Geographe Bay.		
				Species targeted		**Fishing methods**	**Fishing depth**
				Western Australian salmon (*Arripis truttaceus*).		Beach seine nets.	Information not available.
				Fishing effort:	No fishing occurs north of the Perth metropolitan area, despite the managed fishery boundary extending to Cape Beaufort (WA/Northern Territory border), as advised by WAFIC. The commercial catch for the entire West Coast Nearshore and Estuarine Finfish resource was 302.5 t in 2022. The total catch of Western Australian salmon was 82.9 t in 2022, a decrease from 88.5 t in 2021. The Western Australian Salmon stock status is considered sustainable – adequate. (Duffy et al., 2023c).		

<table>
<tr><th rowspan="2">Fishery</th><th colspan="3">Woodside Activity Area</th><th colspan="4" rowspan="2">Description</th></tr>
<tr><th>Browse</th><th>NWS/IS</th><th>NWC</th></tr>
<tr><td></td><td></td><td></td><td></td><td>Active licences/vessels:</td><td colspan="3">The number of active vessels or licences in 2021 is unknown, however there were approximately 12 commercial fishers employed in 2018 (Duffy et al., 2023)</td></tr>
<tr><td rowspan="5">Specimen Shell Managed Fishery</td><td rowspan="5">✓</td><td rowspan="5">✓</td><td rowspan="5">✓</td><td>Management area:</td><td colspan="3">The Specimen Shell Managed Fishery encompasses the entire WA coastline, but effort is concentrated in areas adjacent to the population centres such as Broome, Exmouth, Shark Bay, Geraldton, Perth, Mandurah, the Capes area and Albany (Hart et al., 2023c). There are several closed areas where the fishery is not permitted to operate. These include various marine parks and aquatic reserves, such as Ningaloo Marine Park. The Perth metropolitan area is also important because of its populations of two rare cowrie species (Hart et al., 2023c).</td></tr>
<tr><td colspan="2">Species targeted</td><td>Fishing methods</td><td>Fishing depth</td></tr>
<tr><td colspan="2">The Specimen Shell Managed Fishery targets the collection of specimen shells for display, collection, cataloguing and sale.
About 200 species of specimen shell are collected each year. There is some focus of effort on mollusc families that are most popular with shell collectors, such as cowries, cones, murexes and volutes (Hart et al., 2023c).</td><td>Collection is predominantly by hand when diving to wading in shallow, coastal waters, though in deeper water collection may be conducted by remotely operated vehicles (limited to one per licence).</td><td>For collection by hand, (diver-based) this typically restricts effort to safe diving depths (less than 30 m).
ROV collection could enable depths up to 300 m (Hart et al., 2023c).</td></tr>
<tr><td>Fishing effort:</td><td colspan="3">A total of 5074 specimen shells were collected in 2022, distributed over 200 species (Hart et al., 2023f). A total of 5443 specimen shells were collect distributed over 200 species in 2021 (Hart et al., 2023b). Total number of specimen shells collected in 2020 was 4258 shells, across 206 species (Hart et al., 2021c).
Stocks of landed species in the Specimen Shell Managed Fishery are classified as sustainable – adequate (Hart et al., 2023f).</td></tr>
<tr><td>Active licences/ vessels:</td><td colspan="3">An exemption for the trial of remotely operated underwater vehicles (limited to one per licence) was in place during 2021 (Hart et al., 2023c).
There was a total of 30 licences in the fishery, of which 16 licences were fished in 2022 (Hart et al., 2023f). Effort in 2022 was 388 days (Hart et al., 2023f).</td></tr>
</table>

Fishery	Woodside Activity Area			Description			
	Browse	NWS/IS	NWC				
West Australian Abalone Fishery	✓	✓	✓	**Management area:**	The Western Australian Abalone Managed Fishery includes all coastal waters from the WA and SA border to the WA and NT border. The fishery is concentrated on the south coast and the west coast. It is divided into eight management areas. The fishery for Greenlip and Brownlip abalone operates in areas 1–4 and the Roe's abalone fishery operates in areas 1, 2, 5, 6, 7 and 8 (DoF, 2011).		
				Species targeted		**Fishing methods**	**Fishing depth**
				Greenlip abalone (*Haliotis laevigata*), brownlip abalone (*Haliotis conicopora*), Roe's abalone (*Haliotis roei*).		Divers.	Distribution to 5 m depth for Roe's abalone and 40 m depth for greenlip/brownlip abalone (DOF, 2011).
				Fishing effort:	Previous years catch based on State of the Fisheries annual reports provided by DPIRD: The total catch for greenlip and brownlip abalone in 2022 was 40.1 t whole weight (26.6 t greenlip and 13.5 t brownlip), (Strain et al., 2023d), an increase from 2021 which was 39 t whole weight (greenlip 25.9 t and brownlip 13.1 t) (Strain et al., 2023a). The total catch in 2021 was the lowest catch recorded for greenlip/brownlip in 53 years (Strain et al., 2023d). The Roe's abalone resource catch for 2022 was 28.9 t, a 2.6% decrease from the previous season (Strain et al., 2023c). In 2021 was 29.7 t whole weight, an increase from 18.2 t whole weight in 2020 (Strain et al., 2023a). The stock status of greenlip abalone is considered inadequate and brownlip abalone is adequate (Strain et al., 2023a). The stock status of the Roe's abalone is considered adequate (Strain et al., 2023c).		
				Active licences/ vessels:	There were 16 registered vessels in 2022 for the Greenlip and Brownlip Abalone Fishery (Strain et al., 2023d) and 21 for Roe's, however only a small proportion were active (Strain et al., 2023c).		
Western Australia Joint Authority Northern Shark Fishery	✓			**Management area:**	The Western Australia Joint Authority Northern Shark Fishery extends from longitude 12'° 45'E to the Northern Territory border.		
				Species targeted		**Fishing methods**	**Fishing depth**
				Blacktip shark (*Carcharhinus tilstoni*), spot-tail shark (*Carcharhinus sorrah*).		Gillnets and longlines.	Information not available.
				Fishing effort:	Since 2005, 60% of the waters have been closed to finishing and limited on the number of fishing days. No catch has been reported since 2008/2009 (Braccini and Watt, 2023).		
				Active licences/ vessels:	Information not available.		

<table>
<tr><th rowspan="2">Fishery</th><th colspan="3">Woodside Activity Area</th><th colspan="4" rowspan="2">Description</th></tr>
<tr><th>Browse</th><th>NWS/IS</th><th>NWC</th></tr>
<tr><td rowspan="5">West Coast Deep Sea Crustacean Managed Fishery</td><td rowspan="5">✓</td><td rowspan="5">✓</td><td rowspan="5">✓</td><td>Management area:</td><td colspan="3">The West Coast Deep Sea Crustacean Managed Fishery extends north from Cape Leeuwin to the WA/NT border in water depths greater than 150 m within the AFZ.</td></tr>
<tr><td colspan="2">Species targeted</td><td>Fishing methods</td><td>Fishing depth</td></tr>
<tr><td colspan="2">The fishery targets deepwater crustaceans:
crystal (snow) crab (Chaceon albus)
giant (king) crab (Pseudocarcinus gigas)
champagne (spiny) crabs (Hypothalassia acerba).
Catches are dominated by crystal crabs of which 99% of their total allowable catch was landed in 2020 (How and Baudains, 2021).</td><td>Baited pots, or traps, are operated in long-lines which have between 80 and 180 pots attached to a main line marked by a float at each end.</td><td>Deeper than 150 m (and mostly at depths of between 500–800 m). Most of the commercial crystal crab catch is taken in depths of 500–800 m (WAFIC[22]).</td></tr>
<tr><td>Fishing effort:</td><td colspan="3">Previous years catch based on State of the Fisheries annual reports provided by DPIRD: The total landings were 133.5 t in 2022, 155.5 t in 2021, 156.1 t in 2020, 155.7 t in 2019 and 168 t in 2018.
The total landings of crustaceans in 2022 was dominated by crystal crabs (123.2 t). A further 10 t of champagne crabs and 0.1 t of giant crab were also landed in 2022 (How et al., 2023c).
The stock status for crystal crab is considered adequate. However, it is likely that the stock biomass is near or below its threshold level, but above its limit level (How and Wiberg, 2023a).</td></tr>
<tr><td>Active licences/ vessels:</td><td colspan="3">There were seven licence holders with five vessels active in 2022 (How et al., 2023c).</td></tr>
<tr><td rowspan="3">Abrolhos Islands and Mid-West Trawl Fishery</td><td></td><td></td><td rowspan="3">✓</td><td>Management area:</td><td colspan="3">The Abrolhos Islands and Mid-West Trawl Fishery operates around the Abrolhos Islands within the SWMR.</td></tr>
<tr><td colspan="2">Species targeted</td><td>Fishing methods</td><td>Fishing depth</td></tr>
<tr><td colspan="2">Saucer scallops (Ylistrum balloti, formerly Amusium balloti).</td><td>Otter trawl.</td><td>Saucer scallops occur in inshore waters around 40 m depth at the Abrolhos Islands (Kangas et.al., 2021a).</td></tr>
</table>

[22] https://www.wafic.org.au/fishery/west-coast-deep-sea-crustacean-fishery/

Fishery	Woodside Activity Area			Description			
	Browse	NWS/IS	NWC				
				Fishing effort:	Previous years catch based on State of the Fisheries annual reports provided by DPIRD: The Abrolhos Islands and Mid-West Trawl Fishery did not fish in 2022 due to the stock being environmentally limited. (Wilkin et al., 2023a) The fishery landed 123.1 t meat weight (615.1 t whole weight) in 2021, 238.6 t meat		
				Active licences/ vessels:	The number of vessels is unreported. There were 10 licences in 2021 (Kangas et al., 2023b).		
Broome Prawn Managed Fishery	✓			**Management area:**	The Broome Prawn Managed Fishery operates off Broome and forms part of the North Coast Prawn Fishery.		
				Species targeted		**Fishing methods**	**Fishing depth**
				Western king prawn (*Penaeus latisulcatus*), brown tiger prawns (*Penaeus esculentus*), blue endeavour prawns (*Metapenaeus endeavouri*).		Low opening, otter prawn trawl systems	Trawling is generally in waters between 30 and 60 m deep, however can occur down to 100 m (DOEH, 2004).
				Fishing effort:	The DPIRD state of State of the Fisheries annual reports indicate that no fishing efforts occurred in 2022 and extremely low fishing effort occurred in 2021, 2020 and 2019 (Wilkin et al., 2023b). The stock status of western king prawns is considered sustainable – adequate (Kangas et al., 2023a).		
				Active licences/ vessels:	No boats undertook trial fishing activities in 2022 (Wilkin et al., 2023b).		
Exmouth Gulf Prawn Managed Fishery			✓	**Management area:**	The Exmouth Gulf Prawn Managed Fishery operates within the sheltered waters of Exmouth Gulf. The fishery occupies a total area of 4000 km², with only half of this area being trawled (Fletcher and Santoro, 2015).		
				Species targeted		**Fishing methods**	**Fishing depth**
				Western king prawn (*Penaeus latisulcatus*), brown tiger prawn (*Penaeus esculentus*), blue endeavour prawn (*Metapenaeus endeavouri*), banana prawn (*Penaeus merguinensis*).		The fishery uses low opening, otter prawn trawl systems (Kangas et.al., 2021c).	Information not available.

<table>
<tr><th rowspan="2">Fishery</th><th colspan="3">Woodside Activity Area</th><th colspan="4" rowspan="2">Description</th></tr>
<tr><th>Browse</th><th>NWS/IS</th><th>NWC</th></tr>
<tr><td></td><td></td><td></td><td></td><td>Fishing effort:</td><td colspan="3">Previous years catch based on State of the Fisheries annual reports provided by DPIRD: The Exmouth Gulf Prawn Managed Fishery landed 898 t in 2022, 777 t in 2021, 673 t in 2020, 821 t in 2019, 880 t in 2018, 713 t in 2017 and 822 t in 2016 (Wilkin et al., 2023c).
The total catch comprised of 411 t of brown tiger prawns, 218 t of western king prawns, and 269 t of blue endeavour prawns (Wilkin et al., 2023c).
Stock status of landed species is considered sustainable – adequate (Kangas et al., 2023c).</td></tr>
<tr><td></td><td></td><td></td><td></td><td>Active licences/ vessels:</td><td colspan="3">The number of participation vessels is six. Approximately 126 people, including skippers and other crew were employed in 2022 (Wilkin et al., 2023c).</td></tr>
<tr><td rowspan="4">Gascoyne Demersal Scalefish Managed Fishery</td><td rowspan="4"></td><td rowspan="4"></td><td rowspan="4">✓</td><td>Management area:</td><td colspan="3">The Gascoyne Demersal Scalefish Managed Fishery is located between the southern Ningaloo Coast to south of Shark Bay with a closure area at Point Maud to Tantabiddi (WAFIC[23]).</td></tr>
<tr><td colspan="2">Species targeted</td><td>Fishing methods</td><td>Fishing depth</td></tr>
<tr><td colspan="2">Pink snapper (Chrysophrys auratus), goldband snapper (Pristipomoides multidens).
Other demersal species caught include:
• tropical snappers
• emperors
• cods
• mulloway trevallies.</td><td>Mechanised handlines.</td><td>The target species inhabit waters deeper than 20 m (Jackson et.al., 2021a).</td></tr>
<tr><td>Fishing effort:</td><td colspan="3">Previous years catch based on State of the Fisheries annual reports provided by DPIRD: The Gascoyne Demersal Scalefish Managed Fishery reported a total commercial catch of 166 t in 2022, 164 t in 2020–21, 207 t in 2019–20, 173 t in 2018–19 and 210 t in 2017–18.
The total of commercial catches comprised 42 t of pink snapper, 83 t goldband snapper, and 41 t of other mixed species (Jackson et al., 2023c).
The stock status for pink snapper is considered recovering, with goldband snapper considered sustainable – adequate (Jackson et al., 2023c).</td></tr>
</table>

[23] https://www.wafic.org.au/fishery/gascoyne-demersal-scalefish-fishery/

Fishery	Woodside Activity Area			Description			
	Browse	NWS/IS	NWC				
				Active licences/ vessels:	Ten vessels fished during 2022, six of which fished for more than 10 days during peak pink snapper season (Jackson et al., 2023c).		
Kimberley Crab Managed Fishery (formerly Kimberley Developing Mud Crab Fishery)	✓			**Management area:**	Kimberley Crab Managed Fishery is one of two small trap-based crab fisheries that exist in the North Coast Bioregion between Cambridge Gulf and Broome (Gaughan and Santoro, 2018). In November 2018, the fishery transitioned from developing to fully managed (Johnston et al., 2020b).		
				Species targeted		**Fishing methods**	**Fishing depth**
				Brown mud crab (*Scylla olivacea*), green mud crab (*Scylla serrata*).		Trap. Exemption holders use crab traps and drop nets in waters adjacent to native title lands (Johnston et al., 2023).	Information not available.
				Fishing effort:	Previous years catch based on State of the Fisheries annual reports provided by DPIRD: The total crab landed was 13.6 t in 2022, 9.7 t in 2021, 1.5 t in 2020, 3.2 t in 2018 and 7.4 t in 2019. In 2022, Kimberley Crab Managed Fishery landed a total catch of 2.4 t of brown mud crab represented the entire reported commercial mud crab catch (Johnston et al., 2023a). Mud crab species in the managed fishery is considered sustainable – adequate (Johnston et al., 2023a).		
				Active licences/ vessels:	There is an allocation of 1200 units (equivalent to 600 traps) to licence holders (Johnston et al., 2023). An equivalent allocation of 600 traps for commercial purposes was provided to Traditional Owner groups through the granting of non-transferable Instruments of Exemption under the *Fish Resources Management Act 1994*. Two people were employed in 2022 between August and October (Johnston et al., 2023a).		
Nickol Bay Prawn Managed Fishery		✓		**Management area:**	The Nickol Bay Prawn Managed Fishery operates in nearshore and offshore waters of the Pilbara region along the NWS. Trawling has been reported to occur at several locations along the Pilbara coast to the east of the Burrup Peninsula, including within the waters of Nickol Bay (Fletcher and Santoro, 2015).		
				Species targeted		**Fishing methods**	**Fishing depth**
				Banana prawn (*Penaeus merguiensis*), western king prawn (*Penaeus latisulcatus*), brown tiger prawn (*Penaeus esculentus*), blue endeavour prawn (*Metapenaeus endeavouri*).		Low opening, otter prawn trawl systems.	Information not available.

Fishery	Woodside Activity Area			Description			
	Browse	NWS/IS	NWC				
				Fishing effort:	Previous years catch based on State of the Fisheries annual reports provided by DPIRD: The Nickol Bay Prawn Managed Fishery landed 51 t in 2022, 123.4 t in 2021, 202.4 t in 2020, 254 t in 2019 and 81 t in 2018 (Wilkin et al., 2023b). Of the total landings in 2022, landings were dominated by 42 t banana prawns and 7 t brown tiger, and 2 t blue endeavour (Wilkin et al., 2023b). Fishing effort was 62 boat days, a decrease from 175 days in 2021 (Wilkin et al., 2023b). The banana prawn stock status within the Nickol Bay Prawn Managed Fishery is considered sustainable-adequate (Wilkin et al., 2023b).		
				Active licences/ vessels:	There were three participating vessels in 2022 (Wilkin et al., 2023b).		
Northern Demersal Scalefish Managed Fishery	✓			**Management area:**	The Northern Demersal Scalefish Managed Fishery is divided into two fishing areas: an inshore sector (Area 1) and an offshore sector (Area 2) (Newman et al., 2018). Area 1 permits line fishing only, between the high-water mark and the 30 m isobath. Area 2 permits handline, dropline and fish trap fishing methods and is further divided into zones. Zone A is an inshore area, Zone B comprises the area with most historical fishing activity, and Zone C is an offshore deep slope area representing waters deeper than 200 m (Fletcher et al., 2017).		
				Species targeted		**Fishing methods**	**Fishing depth**
				Goldband snapper (*Pristipomoides multidens*), blue-spotted emperor (*Lethrinus punctulantus*), red emperor (*Lutjanus sebae*), rankin cod (*Epinephelus multinotatus*).		Handline, dropline and fish trap.	Information not available.
				Fishing effort:	Previous years catch based on State of the Fisheries annual reports provided by DPIRD: The Northern Demersal Scalefish Managed Fishery landed 1458 t in 2022, 1544 t in 2021, 1419 t in 2020, 1507 t in 2019, and 1297 t in 2018. In 2022, the majority of the catch was landed from Zone B, with 1235 t in 2022. The 2022 catch of jobfish group (*Pristipomoides spp*.) was 552 t, 91% of which was goldband snapper (Wakefield et al., 2023a). The stock status of landed species in the managed fishery is classified as sustainable – adequate (Wakefield et al., 2023a).		
				Active licences/ vessels:	Eight active vessels in 2022 (Wakefield et al., 2023a).		

Fishery	Woodside Activity Area			Description			
	Browse	NWS/IS	NWC				
Octopus Interim Managed Fishery	-	-	-	**Management area:**	The Octopus Interim Managed Fishery operates from Kalbarri Cliffs in the north to Esperance in the south.		
				Species targeted		**Fishing methods**	**Fishing depth**
				Octopus djinda, which is closely related to *Octopus tetricus*.		Primary method is baited octopus trap (combination of active trapping via trigger mechanisms, and passive trapping – shelter traps) (Hart et al., 2023d).	In inshore waters to a depth of 70 m (DPIRD, 2018a).
				Fishing effort:	Previous years catch based on State of the Fisheries annual reports provided by DPIRD: Commercial catch for the Octopus Interim Managed Fishery was 744 t in 2022, 487 t in 2021, 254 t in 2020, 453 t in 2019, 314 t in 2018, 257 t in 2017 and 252 t in 2016 (Hart et al., 2023g). In 2022, the total catch of octopus was 744 t live weight, which was 53% higher than 2021 with a total catch of 487 t (Hart et al., 2023g). Octopus stock status in 2022 is considered sustainable-adequate (Hart et al., 2023g).		
				Active licences/ vessels:	27 active vessels in 2022 (Hart et al., 2023g).		
Shark Bay Beach Seine and Mesh Net Managed Fishery	-	-	-	**Management area:**	The Shark Bay Beach Seine and Mesh Net Managed Fishery operates from Denham.		
				Species targeted		**Fishing methods**	**Fishing depth**
				Whiting (yellowfin *Sillago schomburgkii*), sea mullet (*Mugil cephalus*), tailor (*Pomatomus saltatrix*), western yellowfin bream (*Acanthopagrus australis*).		Beach seine and mesh net.	Information not available.
				Fishing effort:	Previous years catch based on State of the Fisheries annual reports provided by DPIRD: Total catch was 131 t in 2022,135 t in 2021, 171 t in 2020, 175 t in 2019 and 176 t in 2018. Of the total catch in 2022, 78 t consisted of whiting, 25 t of sea mullet, 16 t of western yellowfin bream, 6 t of tailor, and 1.5 t of pink snapper (Jackson et al., 2023b). The stock status of targeted species is sustainable - adequate (Jackson et al., 2023b).		
				Active licences/ vessels:	Five vessels were active in 2022 (Jackson et al., 2023b).		

Fishery	Woodside Activity Area			Description			
	Browse	NWS/IS	NWC				
Shark Bay Crab Managed Fishery	-	-	-	**Management area:**	The Shark Bay Crab Managed Fishery operates within the NWMR. It is based primarily in Carnarvon but operates throughout the waters of Shark Bay.		
				Species targeted		**Fishing methods**	**Fishing depth**
				Blue swimmer crab (*Portunus armatus*)		Trap and trawl.	Information not available.
				Fishing effort:	Previous years catch based on State of the Fisheries annual reports provided by DPIRD: The fishery landed 401 t in 2022, 549 t in 2020–21, 638 t in 2019–20, 529 t in 2018–19 and 518 t in 2017–18. The fishery closed for a period of 18 months in 2012 and 2013 to promote stock recovery, following a series of adverse environmental conditions between 2010 and 2011 (Chandrapavan et al., 2023). Limited commercial fishing resumed under a national quota management system between 2013 and 2017 (Chandrapavan et al., 2023). The current stock status is sustainable-adequate (Chandrapavan et al., 2023).		
				Active licences/ vessels:	In the trawl sector in 2022 there were 10 licenced vessels based in Carnarvon with an additional eight vessels traveling to Carnarvon. There were three trap vessels (Chandrapavan et al., 2023a).		
Shark Bay Prawn and Scallop Managed Fishery	-	-	-	**Management area:**	The Shark Bay Prawn Managed Fishery is the highest producing WA fishery for prawns. The Shark Bay Scallop Managed Fishery is usually Western Australia's most valuable scallop fishery (Kangas et al., 2021b).		
				Species targeted		**Fishing methods**	**Fishing depth**
				Western king prawn (*Penaeus latisulcatus*), brown tiger prawn (*Penaeus esculentus*), endeavour prawns (*Metapenaeus endeavouri*), coral prawns (*Metapenaeopsis sp.*), saucer scallop (*Amusium balloti*).		Low-opening otter trawls.	Information not available.

<table>
<tr><th rowspan="2">Fishery</th><th colspan="3">Woodside Activity Area</th><th colspan="4" rowspan="2">Description</th></tr>
<tr><th>Browse</th><th>NWS/S</th><th>NWC</th></tr>
<tr><td></td><td></td><td></td><td></td><td>Fishing effort:</td><td colspan="3">Previous years catch based on State of the Fisheries annual reports provided by DPIRD: The Shark Bay Prawn Managed Fishery landed 831 t in 2022, 1,303 t in 2021, 1268 t in 2020, 1214 t in 2019, 1091 t in 2018 and 1608 t in 2017.
Of the total landings, 503 t comprised of western king prawn, 326 t of brown tiger prawn, and 2 t of blue endeavour prawn (Wilkin et al., 2023d).
The Shark Bay Scallop Managed Fishery has been managed under a quota management framework since the fishery reopened in 2015 (Kangas et al., 2021b). Scallop landings for Shark Bay were 35 t (177 t meat weight) in 2022, 123.6 t meat weight (618.2 t whole weight) in 2021, 177.1 t meat weight (885.5 t whole weight) in 2020 and 339 t meat weight (1,694 t whole weight) in 2019.
All stocks for target species are considered sustainable-adequate (Wilkin et al., 2023a).</td></tr>
<tr><td></td><td></td><td></td><td></td><td>Active licences/ vessels:</td><td colspan="3">In the trawl sector in 2022 there were 10 licenced vessels based in Carnarvon with an additional eight vessels traveling to Carnarvon (Wilkin et al., 2023d).
In the Shark Bay Scallop Managed Fishery there are boats licensed to take scallops (11 Class A licences) and boats that also fish for prawns (18 Class B licenses). There were eight vessels (Wilkin et al., 2023a).</td></tr>
<tr><td rowspan="4">South Coast Crustacean Managed Fishery</td><td rowspan="4">-</td><td rowspan="4">-</td><td rowspan="4">-</td><td>Management area:</td><td colspan="3">The South Coast Crustacean Managed Fishery comprises four fisheries: the Windy Harbour/Augusta Rock Lobster Managed Fishery, the Esperance Rock Lobster Managed Fishery, the Southern Rock Lobster Pot Regulation Fishery and the South Coast Deep-Sea Crab Fishery.</td></tr>
<tr><td colspan="2">Species targeted</td><td>Fishing methods</td><td>Fishing depth</td></tr>
<tr><td colspan="2">Southern rock lobster (Jasus edwardsii), western rock lobster (Panulirus cygnus), giant crab (Pseudocarcinus gigas), crystal crab (Chaceon albus), champagne crab (Hypothalassia acerba).</td><td>Pots.</td><td>Information not available.</td></tr>
<tr><td>Fishing effort:</td><td colspan="3">Previous years catch based on State of the Fisheries annual reports provided by DPIRD: The South Coast Crustacean Managed Fishery reported a total catch of 23.8 t in 2022, 27.4 t in 2020–21, 52.5 t in 2019–20, 67.5 t in 2018–19 and 101.2 t in 2017–18 season.
In 2022, the total crustacean landings comprised of champagne crabs (3.6 t), southern rock lobster (6.4 t), giant crabs (5.7 t), western rock lobster (5 t), and crystal crabs (3.1 t) (How et al, 2023d).
The stock status is sustainable – adequate (How and Wiberg, 2023b).</td></tr>
</table>

<table>
<tr><th rowspan="2">Fishery</th><th colspan="3">Woodside Activity Area</th><th colspan="4" rowspan="2">Description</th></tr>
<tr><th>Browse</th><th>NWS/IS</th><th>NWC</th></tr>
<tr><td></td><td></td><td></td><td></td><td>Active licences/ vessels:</td><td colspan="3">The South Coast Crustacean Managed Fishery is based on mobile vessels that employ a skipper and one to three crew. In 2022, there were nine participating vessels (How et al, 2023d).</td></tr>
<tr><td rowspan="4">South Coast Purse Seine Managed Fishery</td><td rowspan="4">-</td><td rowspan="4">-</td><td rowspan="4">-</td><td>Management area:</td><td colspan="3">The South Coast Purse Seine Managed Fishery is active in coastal waters between Cape Leeuwin and the South Australia border. Landings are primarily off Albany, Bremer Bay and Esperance (Norriss and Blazeski, 2020). The managed fishery has five management zones: centred on King George Sound (Zone 1), Albany (Zone 2), Bremer Bay (Zone 3), Esperance (Zone 4) and a developmental zone near Cape Leeuwin (Zone 5) where catches have been negligible (Norriss and Blazeski et al., 2023a).</td></tr>
<tr><td colspan="2">Species targeted</td><td>Fishing methods</td><td>Fishing depth</td></tr>
<tr><td colspan="2">Small pelagic finfish.
Australian sardine (pilchards, Sardinops sagax), yellowtail scad (Trachurus novaezelandiae), Australian anchovy (Engraulis australis), scaly mackerel (Sardinella lemuru), maray (Etrumeus jacksoniensis).
Entitled to take sandy sprat (Hyperlophus vittatus) and blue sprat (Spratelloides robustus), however not reported caught since 1993/94.</td><td>Purse seine nets from vessels.</td><td>Information not available.</td></tr>
<tr><td>Fishing effort:</td><td colspan="3">Previous years catch based on State of the Fisheries annual reports provided by DPIRD: The South Coast Purse Seine Managed Fishery landed 1636 t in 2022, 1255 t in 2020–21, 1498 t in 2019–20, 1064 t in 2018–19 and 2168 t in the 2017–18 season.
The total catch in 2022, consisted of >99% of Australian sardines (Norriss and Blazeski et al., 2023c). Fishing effort in 2022 was 576 boat days (Norriss and Blazeski et al., 2023c).
The stock status for the Australian sardine is considered sustainable – adequate (Norriss and Blazeski et al., 2023c).</td></tr>
<tr><td>Active licences/ vessels:</td><td colspan="3">Seven active vessels in 2022 (Norriss and Blazeski et al., 2023c).</td></tr>
</table>

Fishery	Woodside Activity Area			Description			
	Browse	NWS/IS	NWC				
South-west Trawl Managed Fishery	-	-	-	**Management area:**	The South-west Trawl Managed Fishery is a multi-species fishery and includes two of WA's smaller scallop fishing grounds at Fremantle and north of Geographe Bay (Fairclough and Walters, 2018).		
				Species targeted		**Fishing methods**	**Fishing depth**
				Scallops (*Ylistrum balloti,* formerly *Amusium balloti*) and associated by-products. In years of low scallop catches, licencees may use trawl gear to target fin-fish species.		Trawl.	Information not available.
				Fishing effort:	Catch levels are unavailable for recent years. The fishery was not active in 2015 or 2016 (Fairclough and Walters, 2018). Effort in the fishery is highly variable and typically fluctuates in response to recruitment variability in saucer scallops and prawns. In 2021 <1% of the allowable area was trawled in the South-west Trawl Managed Fishery (Kangas et al., 2023b). The stock status of scallops is considered sustainable-adequate (Wilkin et al., 2023a).		
				Active licences/ vessels:	One vessel fished in 2022 (Wilkin et al., 2023a).		
The South Coast Salmon Managed Fishery	-	-	-	**Management area:**	The South Coast Salmon Managed Fishery is one of two fisheries operating in the South Coast Bioregion that target nearshore and estuarine finfish.		
				Species targeted		**Fishing methods**	**Fishing depth**
				Western Australian salmon (*Arripis truttaceus*), southern school whiting (*Sillago bassensis*), Australian herring (*Arripis georgianus*), King George whiting (*Sillaginodes punctatus*), sea mullet (*Mugil cephalus*), estuary cobbler (*Cnidoglanis macrocephalus*), black bream (*Acanthopagrus butcheri*).		Beach seines, haul nets and gill nets.	Information not available.

Fishery	Woodside Activity Area			Description			
	Browse	NWS/IS	NWC				
				Fishing effort:	Previous years catch based on State of the Fisheries annual reports provided by DPIRD: Total catch for the South Coast Estuarine and Nearshore Scalefish and Invertebrates Resource was 267.6 t for 2022, 275.1 t in 2021 and 334 t in 2020. Of this, the South Coast Salmon Managed Fishery landed 48.5 t of Western Australian salmon in 2021, 76 t in 2020 and 56.5 t in 2019. The stock status of target species is sustainable-adequate (Duffy et al., 2023b).		
				Active licences/ vessels:	Catch was recorded against eight licences in 2022 (Duffy et al., 2023d).		
West Coast Beach (Beach Bait Fish Net) Managed Fishery	-	-	-	**Management area:**	Primarily active in the Bunbury areas in the SWMR, operates between 26º and 33º S.		
				Species targeted		**Fishing methods**	**Fishing depth**
				Whitebait.		Beach-based haul nets.	Information not available.
				Fishing effort:	Previous years catch based on State of the Fisheries annual reports provided by DPIRD: The total catch of whitebait in 2022 was 23.3 t, an increase from 21.3 t in 2021 (Duffy et al., 2023c). The fishery continues to be environmentally limited with stocks recovering from the 2010/11 marine heat wave (Duffy et al., 2023a). The stock status is inadequate – environmentally limited (Duffy et al., 2023c).		
				Active licences/ vessels:	The number of active vessels in 2021 is unknown, however five licensees reported landings of whitebait in 2011 (Smith et al., 2011)		
West Coast Demersal Gillnet and Demersal Longline (Interim) Managed Fishery	-	-	-	**Management area:**	The West Coast Demersal Gillnet and Demersal Longline (Interim) Managed Fishery is part of the Temperate Demersal Gillnet and Demersal Longline Fishery, which operates between 26° and 33° S, and the Joint Authority Southern Demersal Gillnet and Demersal Longline Managed Fishery, which operates from 33° S to the WA/SA border (Braccini and Blay, 2020).		
				Species targeted		**Fishing methods**	**Fishing depth**
				Gummy shark (*Mustelus antarcticus*), dusky shark (*Carcharhinus obscurus*), whiskery shark (*Furgaleus macki*). Sandbar shark (*C. plumbeus*) Scalefish are a byproduct.		Gillnet and longline.	Information not available.

<table>
<tr><th rowspan="2">Fishery</th><th colspan="3">Woodside Activity Area</th><th colspan="4" rowspan="2">Description</th></tr>
<tr><th>Browse</th><th>NWS/IS</th><th>NWC</th></tr>
<tr><td></td><td></td><td></td><td></td><td>Fishing effort:</td><td colspan="3">Catches of elasmobranchs and fishing effort for the Temperate Demersal Gillnet and Demersal Longline Fishery peaked during the late 1980s and early 1990s and have stabilised at lower levels in recent years (Braccini and Watt, 2021).
Previous years values from State of the Fisheries annual reports provided by DPIRD: Estimated annual value to the fishery was $0.23 million for 2021–22, $0.17 million for 2020–21, $0.11 million for 2019–20, $0.2 million for 2018–19 and $0.3 million for 2017–18.
Stock status for the gummy and whiskery shark is considered sustainable – adequate, with the dusky and sandbar shark status sustainable – recovering (Braccini and Rynvis, 2023).</td></tr>
<tr><td></td><td></td><td></td><td></td><td>Active licences/ vessels:</td><td colspan="3">Vessel and license data is not available. There were approximately 10 to 11 skippers and crew employed during 2020–22 period (Braccini and Rynvis, 2023).</td></tr>
<tr><td rowspan="5">West Coast Demersal Scalefish Interim Managed Fishery</td><td rowspan="5">-</td><td rowspan="5">-</td><td rowspan="5">-</td><td>Management area:</td><td colspan="3">The West Coast Demersal Scalefish Interim Managed Fishery is the main commercial fishery that targets demersal species in the West Coast Bioregion. It encompasses the waters from just south of Shark Bay down to just east of Augusta and extends seaward to the 200 NM boundary. The fishery is divided into four inshore management areas and one offshore management area.</td></tr>
<tr><td colspan="2">Species targeted</td><td>Fishing methods</td><td>Fishing depth</td></tr>
<tr><td colspan="2">The resource comprises over 100 species, including:
baldchin groper (Choerodon rubescens)
dhufish (Glaucosoma hebraicum)
pink snapper (Pagrus auratus).</td><td>Lines.</td><td>Information not available.</td></tr>
<tr><td>Fishing effort:</td><td colspan="3">Previous years catch based on State of the Fisheries annual reports provided by DPIRD: The West Coast Demersal Scalefish Interim Managed Fishery retained 240 t in 2022, 259 t in 2021, 227 t in 2020, 254 t in 2019 and 230 t in 2018.
Management commenced to recover stocks for the West Coast Demersal Scalefish Resource in 2008. Landings since 2008 have been below the stock recovery benchmark of 450 t (Fisher et al., 2023a).</td></tr>
<tr><td>Active licences/ vessels:</td><td colspan="3">30 licenced vessels operated in 2022 (Fisher et al., 2023a).</td></tr>
</table>

<table>
<tr><th rowspan="2">Fishery</th><th colspan="3">Woodside Activity Area</th><th colspan="4" rowspan="2">Description</th></tr>
<tr><th>Browse</th><th>NWS/IS</th><th>NWC</th></tr>
<tr><td rowspan="5">West Coast Purse Seine Managed Fishery</td><td rowspan="5">-</td><td rowspan="5">-</td><td rowspan="5">-</td><td>Management area:</td><td colspan="3">Most of the catch in the West Coast Purse Seine Managed fishery are taken from between Cape Leeuwin and Geraldton. This region is separated into three zones (Northern Development Zone, Perth Metropolitan, and Southern Development zone (Norriss and Blazeski, 2023b).</td></tr>
<tr><td colspan="2">Species targeted</td><td>Fishing methods</td><td>Fishing depth</td></tr>
<tr><td colspan="2">Small pelagic finfish such as:
scaly mackerel (Sardinella lemuru)
pilchards (Sardinops sagax)
Australian anchovy (Engraulis australis)
yellowtail scad (Trachurus novaezelandiae)
maray (Etrumeus teres)</td><td>Purse seine.</td><td>Information not available.</td></tr>
<tr><td>Fishing effort:</td><td colspan="3">Previous years catch based on State of the Fisheries annual reports provided by DPIRD: The total combined catch taken by the West Coast Purse Seine Managed Fishery and developmental licencees was 259 t in 2022, 504 t in 2021, 493 t in 2020, 527 t in 2019 and 340 t in 2018.
In 2022, the total catch consisted of 66% scaley mackerel and 31% Australian sardine (Norriss and Blazeski, 2023d).
Both the scaley mackerel and Australian sardine have a stock status classified as sustainable – adequate (Norriss and Blazeski, 2023d).</td></tr>
<tr><td>Active licences/ vessels:</td><td colspan="3">Five active vessels in 2022 (Norriss and Blazeski, 2023d).</td></tr>
<tr><td rowspan="3">West Coast Rock Lobster Managed Fishery</td><td></td><td></td><td>✓</td><td>Management area:</td><td colspan="3">The West Coast Rock Lobster Fishery operates from Shark Bay south to Cape Leeuwin. The fishery is managed using zones, seasons and total allowable catch. The recreational fishery targets the western rock lobsters using baited pots and by diving between North-west Cape and Augusta.</td></tr>
<tr><td colspan="2">Species targeted</td><td>Fishing methods</td><td>Fishing depth</td></tr>
<tr><td colspan="2">Western rock lobster (Panulirus cygnus).</td><td>Baited pots.</td><td>Information not available.</td></tr>
</table>

Fishery	Woodside Activity Area			Description	
	Browse	NWS/IS	NWC		
				Fishing effort:	Previous years catch based on State of the Fisheries annual reports provided by DPIRD: The total catch for the West Coast Rock Lobster Fishery was 6342 t in 2022 (De Lestang and Walsh, 2023). Due to COVID-19 related logistics and marketing issues, the 2020–21 season was extended from 12 to 18 months. Since the current extended season is still in progress, data has been reported on a 12-month period (15 Jan 2021 to 14 Jan 2022) (How and Wiberg, 2023a). Landings for the 12-month (2021–22) season was 6334 t and the 18-month 2020–21 season was 9132 t. Commercial landings over the traditional 12-month season (15 Jan 2020 to 14 Jan 2021) were 5696 t. The fishery landed 6397 t in 2019 and 6400 t in 2018 and 2017. The stock status for the western rock lobster is classified as sustainable – adequate (How and Wiberg, 2023a).
				Active licences/ vessels:	218 vessels were active in the 2022 season (De Lestang and Walsh, 2023).

12.2.2 Fish Habitat Protection Areas

Fish Habitat Protection Areas (FHPAs) are areas of special protection and management in Western Australian waters. They are established in areas identified as having a particular value for the protection of fish and their habitats, education and/or aquaculture and which is considered to require a higher level of protection than other parts of the marine environment (DPIRD, 2013). They are set under section 115 of the *Fish Resources Management Act 1994* (WA) for:

- the conservation and protection of fish, fish breeding areas, fish fossils or the aquatic eco-system
- the culture and propagation of fish and experimental purposes related to that culture and propagation, or
- the management of fish and activities relating to the appreciation or observation of fish.

Under the Act, fish can include a range of organisms including finfish, crustaceans, molluscs, corals, seagrass and algae at all stages of their life cycles. FHPAs and a marine reserve declared under the *Conservation and Land Management Act 1984* (WA) cannot exist in the same area (DPIRD, 2013).

Management of an FHPA is designed and carried out to achieve the purposes outlined in a Plan of Management. FHPAs may restrict non-fishing related activities, such as the use of anchors, if they are considered to be inconsistent with the purpose of the FHPA; for example, if there is a risk to damage of fragile marine formations such as coral reefs. Protection may also involve the management of human activities such as dredging, draining of wetlands, and fishing or diving near sensitive marine habitats (DPIRD, 2013). Western Australia has six FHPAs (four within the NWMR and two within the SWMR):

- Abrolhos Islands
- Kalbarri Blue Holes
- Miaboolya Beach
- Point Quobba
- Cottesloe Reef
- Lancelin Island Lagoon.

12.2.2.1 FHPAs Within the NWMR

Abrolhos Islands

The Houtman Abrolhos Islands (Abrolhos) is an archipelago of up to 210 small islands and associated reefs located approximately 65–90 km offshore from Geraldton, Western Australia (WA) (Evans et al., 2022). The Abrolhos FHPA includes all waters from the high-water mark of the Abrolhos Islands out to three nautical miles; an area of about 2500 km² (Evans et al., 2022).

The islands and waters of the Abrolhos are of significance for both land-based (e.g. seabird breeding, migratory shorebirds, carpet pythons, tammar wallabies, and significant flora and vegetation) and marine-based values (e.g. diverse and unique range of fish and marine aquatic species, significant commercial and recreational fisheries, aquaculture and marine tourism) (Evans et al., 2022). The reefs of the Abrolhos are extremely diverse, with approximately 184 species of coral, 295 species of marine algae and 389 species of fish (Evans et al., 2022).

The Abrolhos Includes specific regulations such as:

- temporal (seasonal) closures (e.g. closed season for baldchin groper, *Choerodon rubescens*, between 1 November and 31 January)

- spatial closures (e.g. Reef Observation Areas ~64.3km^2 or 2.6% of Abrolhos FHPA)
- recreational fishing specific bag and possession limits (Evans et al., 2022).

The marine state territorial waters of the Abrolhos continue to be managed by the Department of Primary Industries and Regional Development.

Kalbarri Blue Holes

The Blues Holes form part of an inshore coastal limestone reef system to the west of the town of Kalbarri. The northern boundary of the FHPA is located immediately west of the northern end of the Blue Holes car park and extends south from this point for approximately 420 m. The width of the FHPA varies from around 130 m wide at the southern end, to approximately 140 m wide at the northern end (DoF, 2007).

The Kalbarri Blue Holes FHPA includes part of a near-shore limestone reef system, which stretches intermittently from Red Bluff in the South to the Murchison River Mouth in the North (DoF, 2007). To First Nations people, access to the reef system – near to the river mouth – is likely to have made it a significant site for hunting fish and gathering seafood. The river mouth beside Kalbarri, is called 'Wudumalu' or 'Wutumalu' by the local Nhanda language group (DoF, 2014a).

The reef provides a base for a range of recreational activities including swimming, scuba diving and snorkelling. There is an abundance of finfish, shellfish, crustaceans, corals, seagrasses and sponges living there. There are up to 70 species of finfish, 10 types of sponge, and 11 species of coral found in the reef system (DoF, 2014a).

Regulations for protection of Kalbarri Blue Holes include:

- All marine life is protected, and no fishing activities are permitted.
- The use of all motorised vessels (boats and jet skis) is prohibited within the FHPA's waters (DoF, 2014a).

Miaboolya Beach

Miaboolya Beach is an area of the Gascoyne River delta near Carnarvon. The FHPA covers the nearshore waters and extends north to South Bejaling and south to the northern side of the Gascoyne River mouth. In addition, it includes the adjoining mangrove system, associated seasonal creeks and salt marshes (DoF, 2003).

The Miaboolya system has regional importance as a fish nursery and general fish habitat. Native fauna includes juvenile finfish species such as tailor (*Pomatomus saltatrix*), mulloway (*Argyrosomus spp.*) and sand whiting (*Sillago ciliata*), and various crab species including mud crabs, blue swimmer and green mud crabs (family *Portunidae*). The fish and crab stocks use this environment for breeding, growth and development. Resident and migratory populations of birds, marine turtles and dolphins also exist within the area and contribute to its environmental value (DoF, 2003).

The Miaboolya area is of important cultural and historical value to the Gnulli native title group. The area is a place for traditional food collection and gathering for social occasions (DoF, 2003).

Recreational fishing is permitted however there are restrictions in place by the Department of Fisheries (DoF, 2014b).

Point Quobba

The Point Quobba FHPA adjoins the well-known 'Blowholes' tourist attraction at Quobba Station, 75 km north-west of Carnarvon WA, at the northernmost point of Shark Bay (DoF, 2004).

The marine life and habitats of the area are of considerable scientific and recreational interest and are highly valued in the local community. However, the area is at risk from a high level of use and conflict between users, due to the area's proximity to popular tourism sites, the boat ramp, camping and settlement areas (DoF, 2004).

The marine habitat at Point Quobba is in a transition zone between tropical and temperate climatic zones and is therefore highly diverse. It contains a mix of endemic temperate south-west Australian species and tropical and temperate Indo-Pacific species. The FHPA provides relatively sheltered breeding and feeding habitat for more than 100 species (DoF, 2015)

Point Quobba lies within the traditional area of the Baiyungu people, who are members of the Gnulli Group. The Baiyungu people use the area regularly, sometimes to collect trochus for consumption at Point Quobba and Black Rock (DoF, 2004).

There is a designated 'restricted area' within the FHPA to protect vulnerable habitats and fish species from human activity. Within this area commercial and recreational fishing and jet-skiing are prohibited. Restrictions on fishing in the rest of the FHPA are defined by the Department of Fisheries (DoF, 2015).

12.2.2.2 FHPAs Within the SWMR

Cottesloe Reef

The Cottesloe reef system stretches intermittently for approximately 4.4 km from a point 300 m south of the artificial surfing reef at the Cable Station to North Street, Cottesloe. It is located on a limestone shelf, which is known locally as the Cottesloe Fringing Bank. This shelf extends approximately 1.5 km offshore from the beach. Limestone pinnacles, elevated platforms, and water-eroded limestone outcrops form most of the surface reef structure. In places, sea-grass patches and kelp beds occur within 100 m of the shoreline (DoF, 2001a).

The reef is readily accessible to the public and intensively used by locals and other Perth metropolitan residents and is therefore vulnerable to human impacts. The reef system and its waters are highly popular for recreational activities including surfing, windsurfing, swimming, paddle skiing, line fishing, spear fishing, snorkelling and scuba diving.

The Cottesloe Reef system contains a unique and diverse range of marine habitats. These include sand, sand with seagrass, limestone reef with large kelp and macroalgae, sponge beds and garden bottoms. In deeper water, corals, sea cucumbers and sponge gardens thrive and the slope of the reef platform at Mudurup Rocks provides habitat for animals such as feather stars and small molluscs, which are protected from heat and drying during low summer tides. An abundance of finfish can be found in and around the reef system, including herring, tailor, skipjack (silver trevally), whiting, morwong and tarwhine (silver bream). The reef is also a breeding ground for squid, Port Jackson sharks and other elasmobranchs including stingrays (DoF, 2001a; DoF 2010).

Regulations for protection of Cottesloe Reef include:

- Spearfishing is prohibited throughout the FHPA.
- Commercial fishing is prohibited throughout the FHPA.
- Recreational fishing (except net fishing) for fish such as tailor, herring, whiting, skipjack and garfish is permitted in the FHPA, subject to recreational fishing rules for the West Coast region.
- Anchoring of any craft in the FHPA is prohibited.
- Five yellow moorings have been provided within the FHPA for use by boats up to 12 m. These moorings are removed during winter (April–November) to prevent damage from winter storms (DoF, 2010).

Lancelin Island Lagoon

Lancelin Island is an emergent limestone feature of the coastal marine environment of the mid-west coast of Western Australia. The island is located approximately 110 km north of Perth and 800 m offshore from the Lancelin town site (DoF, 2001b).

The Lancelin Island Lagoon is a small area of reef habitat on the western side of Lancelin Island and

a popular snorkelling and diving destination. Water depth ranges from less than 0.3 m on the intertidal reefs to less than 3 m on the sand or seagrass-covered bottom. The area has a diverse array of benthic marine habitat. During a marine survey of the area, over 200 flora and fauna species were positively identified, with more remaining unidentified due to the diversity of species (DoF, 2001a).

The management strategy for the Lancelin Island Lagoon includes the following regulations:

- Prohibit all recreational and commercial fishing, aquaculture and collecting in the FHPA.
- Prohibit boat anchorage within the FHPA.
- Investigate the means to prohibit mining and exploration within the FHPA and in adjacent areas where the environmental values of the FHPA may be compromised (DoF, 2001a).

12.2.3 Aquaculture

Aquaculture operations in the northwest are typically restricted to inland and shallow coastal waters.

12.2.3.1 West Coast Bioregion

Aquaculture activities in the West Coast bioregion, defined by the Department of Primary Industries and Regional Development (DPIRD) (as the government body responsible management of primary industries in WA) are focused on blue mussels and edible oysters (mainly in Cockburn Sound) and marine algae for production of beta-carotene, used as a food additive and as a nutritional supplement. Offshore marine finfish production is also being developed, initially focusing on yellowtail kingfish near Geraldton.

There is also an emerging black pearl industry (from the *Pinctada margaritifera* oyster) in the Abrolhos Islands. As well as expansion in the production of Akoya pearls (small white pearls from *Pinctada fucata martensi*), *Pinctada albina* (small, yellow pearls) and *Pteria penguin*, which are often used to produce half (mabe) pearls in pink and bluish shades.

Aquaculture licences for producing coral and live rock (pieces of old coral reefs colonised by marine life, such as beneficial bacteria, for aquariums) at the Abrolhos Islands have also been issued and other applications are being assessed (DPIRD, 2023).

12.2.3.2 Gascoyne Coast Bioregion

In the Gascoyne Coast bioregion, aquaculture activities are focused on the blacklip oyster (*Pinctada margaritifera*) and Akoya pearl oyster (*Pinctada imbricata*) (Gaughan and Santoro, 2020). Several hatcheries supply P. margaritifera juveniles to the region's developing black pearl farms.

Other aquaculture developments in the Gascoyne Coast bioregion include emerging producers of coral and live rock species for aquariums (DPIRD, 2023).

12.2.3.3 North Coast Bioregion

Aquaculture activities in the North Coast bioregion is dominated by the production of pearls (from the *Pinctada margaritifera* oyster). A large number of pearl oysters for seeding are obtained from wild stocks and supplemented by hatchery produced oysters, with major hatcheries operating at Broome and around the Dampier Peninsula (DPIRD, 2023). Primary spawning of the pearl oyster occurs from mid-October to December. A smaller secondary spawning occurs in February and March (Gaughan and Santoro, 2020).

Finfish aquaculture in the Kimberley region is dominated by Barramundi located in the Kimberley Aquaculture Development Zone which lies approximately 200 km north-east of Broome. Rock oyster trials are nearing completion near Karratha in the Pilbara region, however there is no commercial production of the species in this region at this stage (DPIRD, 2023).

There is one indigenous project at One Arm Point that operates a marine hatchery that focuses on a variety of ornamental and edible marine species (DPIRD, 2023).

12.2.3.4 South Coast Bioregion

Aquaculture activities in the South Coast bioregion is dominated by the production of edible oysters (Akoya and rock oysters) and mussels within King George Sound in Albany. Other forms of private aquaculture in the region include sea cage farming of abalone, which are restricted to the South Coast near Augusta (Flinders Bay) and Esperance (Wylie Bay) (DPIRD, 2023).

12.3 Fisheries – Traditional

Traditional or customary fisheries are typically restricted to shallow coastal waters and/or areas with structures such as reef. The Western Australia Recreational Fishing Guide (2024) states that First Nations people do not need a recreational fishing licence in any waters if it is in accordance with continuing tradition and for individual or familial consumption, not for a commercial purpose.

Dugong, fish and marine turtles that move between coastal and Commonwealth waters are important components of the First Nations people's culture and diet. First Nations people continue to actively manage their sea country in coastal waters of WA in order to protect and manage the marine environment, its resources and cultural values.

Indonesian fishers can fish within designated areas under the Australia-Indonesia Memorandum of Understanding regarding the Operations of Indonesian Traditional Fishermen in Areas of the Australian Fishing Zone and Continental Shelf – 1974 (MoU 74). Traditional fishing is allowed within the MoU Box (Figure 12-9), which encompasses: Ashmore Reef (Pulau Pasir), Cartier Island (Pulau Baru), Seringapatam Reef (Afringan), Scott Reef (Pulau Dato) and Browse Island (Berselan). Restrictions have since been introduced around Ashmore Reef and Cartier Island following their designation as Nature Reserves under the Commonwealth's *National Parks and Wildlife Conservation Act 1975* in 1983 and 2000, respectively.

The MoU allows Indonesian fishers to fish in designated areas using traditional methods only. These methods include reef gleaning, free-diving, hand lining and other non-mechanised methods. Scott Reef is currently the principal reef in the MoU 74 Box and is utilised seasonally by Indonesian fishers to harvest trepang, trochus shells and other reef species. The peak season is July to October due to more favourable wind conditions, and to allow fishers to sun dry their catch on their boat decks (ERM, 2009). Browse Island is also frequently visited by shark fishers who mostly fish along the eastern margin of the MoU 74 Box.

The Agreement between the Government of Australia and the Government of the Republic of Indonesia Relating to Cooperation in Fisheries (*1992 Fisheries Cooperation Agreement*) provides the framework for fisheries and marine cooperation between Australia and Indonesia. Cooperation under the Agreement today takes place under the auspices of the Working Group on Marine Affairs and Fisheries. Research reports on reef top species in the MoU Box indicate that stocks in the area are severely depleted. In 2009 the Working Group on Marine Affairs and Fisheries agreed to a Roadmap for MoU Box Cooperative Management (DAWE, 2020a).

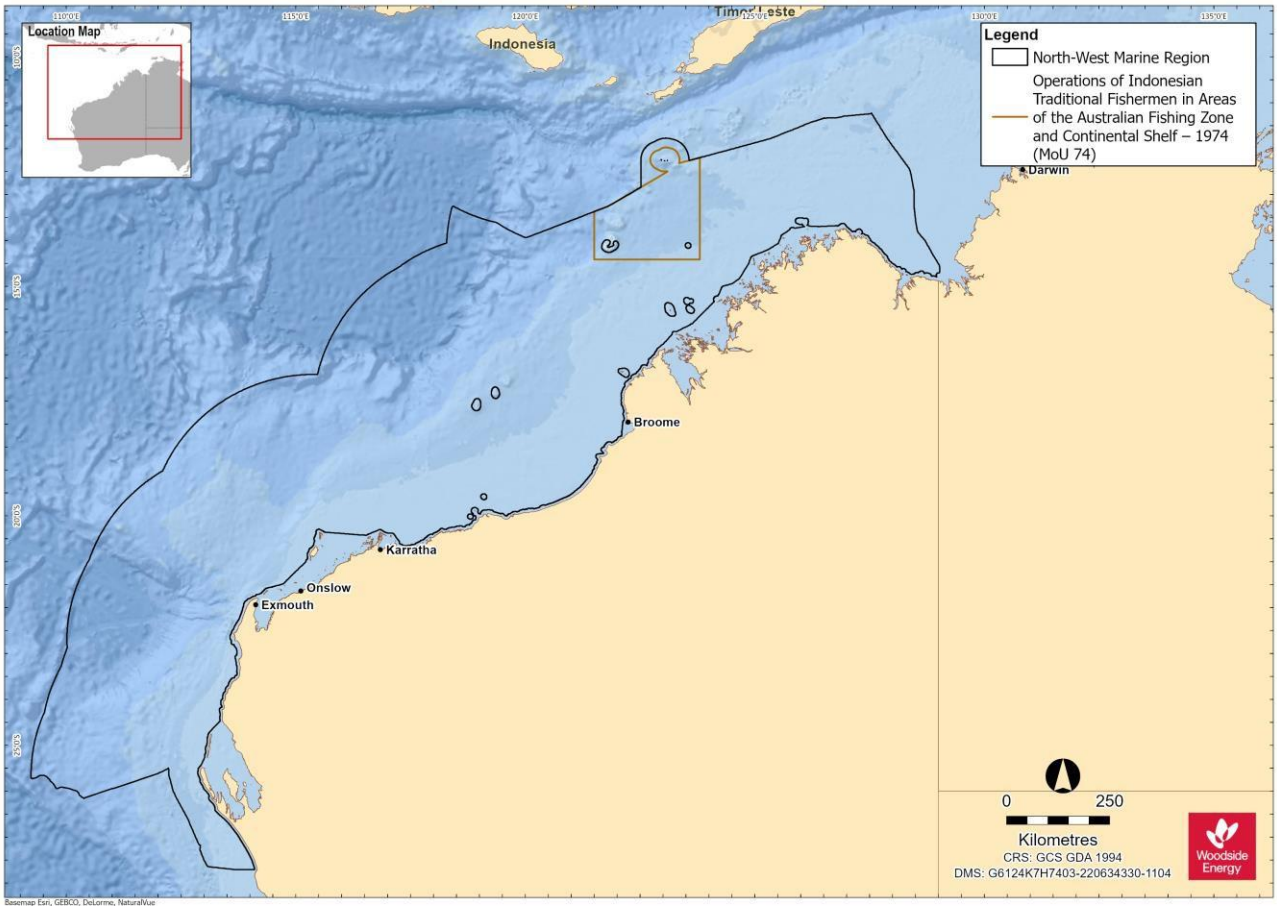


Figure 12-9: MOU 74 Box: operations of Indonesian traditional fishermen in areas of the Australian Fishing Zone and Continental Shelf – 1974

12.4 Tourism and Recreation

Western Australia's tourism sector is important to industry and the economy. In 2022–23, tourism accounted for 6.8% of WA's total jobs and generated a gross total value added of $11.9 billion (Tourism Western Australia, 2024a).

The Kimberley, Pilbara and Gascoyne regions are popular visitor destinations for Australian and international tourists. Tourism is concentrated in the vicinity of population centres. including Broome, Dampier, Exmouth, Coral Bay and Shark Bay. Recreational and tourism activities include charter fishing, recreational fishing, diving, snorkelling, marine fauna watching, and yachting (Tourism Western Australia, 2024b).

Australia's Coral Coast and North West had a 27% and 22% growth respectively, in intrastate spend compared to 2019. The state's highest intrastate spend on record occurred with WA residents spending $9.3 billion on trips within the state (Tourism Western Australia, 2024b).

12.4.1 Gascoyne Region

Tourism has the fourth largest economic output of all the major industries of the Gascoyne region (GDC, 2023). It contributes significantly to the local economy in terms of both income and employment. In 2022, the region had over 271,100 overnight visitors and tourism had an average economic output of $182 million between 2021 and 2022 (GDC, 2023).

The COVID-19 pandemic disrupted the tourism industry of the Gascoyne region in previous years, particularly by reducing availability of the overseas workforce. However, the phasing out of restrictions has increased interstate and international travel, and visitor numbers have remained high

with inter-state tourism numbers increasing in 2021 in comparison to 2020 (GDC, 2022). The main attraction of the coastline for tourists is the quality of marine life. The region supports extensive scuba diving, snorkelling and fishing and specialised eco-tourism activities include whale shark and manta ray observation at Ningaloo, and dolphin and dugong viewing in Shark Bay (Newman et al., 2023b). In 2018–19, the Ningaloo region (Ningaloo Reef and the surrounding coastal region Exmouth Gulf, communities of Exmouth and Coral Bay, and adjacent proposed southern coastal reserves and pastoral leases) contributed an estimated $110 million in value added to the WA economy (DCBA, 2020). Ningaloo's economic contribution to WA is attributed to four key types of economic activity, tourism expenditure by international, interstate and WA visitors to the Ningaloo region, commercial fishing in the Exmouth Gulf, recreation activity involving the Reef by residents of the Ningaloo region and management and research relating to the Reef (DCBA, 2020). More than 90% of this value added is attributed to the domestic and international tourists who visit Ningaloo each year (DCBA, 2020). Dark sky tourism flourished in 2023 with an influx of visitors coming together in Exmouth to witness a rare hybrid solar eclipse (GDC, 2023). The natural phenomena brought thousands of visitors both interstate and international to the region in April 2023.

The first Cultural Tourism experience was launched in 2022 on the Ningaloo Coast. Departing from Coral Bay, the Cultural Tour provides visitors the opportunity to experience a unique perspective on the coastline's rich cultural heritage and unique environment. The main marine nature-based tourist activities are concentrated around and within the Ningaloo WHA (GDC, 2022). The Aboriginal AstroTourism Project was launched where First Nations people were consulted on night sky constellations and trained in dark sky tourism. Through this program star gazing experiences were successfully delivered to approximately 665 visitors over 10 nights during the Ningaloo Eclipse (GDC, 2023).

12.4.2 Pilbara Region

Recreation and tourism activities within the Pilbara are of high social value. Tourism is a key economic driver for the Pilbara with more than 1 million visitors to the region every year. Tourism visitation continued to grow in 2022, with the number of visitors to Karajini National Park in 2022 having doubled in comparison to 2020 (PDC, 2022). Multi-year tourism infrastructure development funding has been provided for the Niminjarra Highway to provide easier access to the Karlamilyi National Park and enhance cultural tourism opportunities and to the Whim Creek Hotel to re-establish a tourism destination between Karratha and Hedland (PDC, 2023).

Recreational fishing within the Pilbara region tends to be concentrated in State waters adjacent to population centres. Recreational fishing is known to occur around the Dampier Archipelago with boats launched from boat ramps around Dampier and Karratha. Once at sea, charter vessels may also frequent the waters surrounding the Montebello Islands (Williamson et al., 2006).

12.4.3 Kimberley Region

Tourism is one of the main industries in the Kimberley region, alongside resources, construction, agriculture and retail (KDC, 2022).

Recreation and tourism activities in the Kimberley region occur predominantly in WA State waters (extending offshore 3 NM from the mainland), adjacent to coastal population centres (e.g. Broome), with a peak in activity during the winter months (dry season). These activities include recreational fishing, diving, snorkelling, wildlife watching and boating (Newman et al., 2023b).

Primary dive locations in the Kimberley region include the Rowley Shoals, including Mermaid Reef AMP, Scott Reef, Seringapatam Reef, Ashmore Reef AMP and Cartier Island (Newman et al., 2023b).

12.5 Shipping

Commercial shipping traffic is high within the NWMR with vessel activities including commercial

fisheries, tourism such as cruises, international shipping and oil and gas operations. There are 12 ports adjacent to the NWMR, including the major ports of Dampier, Port Hedland and Broome, which are operated by their respective port authorities. These ports handle large tonnages of iron ore and petroleum exports in addition to salt, manganese, feldspar chromite and copper (DEWHA, 2008).

Heavy vessel traffic exists within the Pilbara Port Authority management area which recorded 9594 vessel movements in the Port of Dampier, 6,786 vessel movements in the Port of Port Hedland, and 807 vessel movements in the Port of Ashburton in the 2022/23 reporting period (PPA, 2023). Twenty-six designated anchorages for bulk carriers, petroleum and gas tankers, drilling rigs, offshore platforms, and pipelay vessels are located offshore of Rosemary Island.

In 2012, AMSA established a network of shipping fairways off the northwest coast of Australia. The shipping fairways, while not mandatory, aim to reduce the risk of collision between transiting vessels and offshore infrastructure. The fairways are intended to direct large vessels such as bulk carriers and LNG ships trading to the major ports into pre-defined routes to keep them clear of existing and planned offshore infrastructure (AMSA, 2013).

12.6 Petroleum Basins

The NWMR supports a number of industries including petroleum exploration and production.

Within the NWMR there are seven sedimentary petroleum basins: Northern and Southern Carnarvon basins, Perth, Browse, Roebuck, Offshore Canning and Bonaparte basins (GA, 2023). Of these, the Northern Carnarvon, Browse and Bonaparte basins hold large quantities of gas and comprise most of Australia's reserves of natural gas (DEWHA, 2008), which is reflected by the level of development in the area. In addition to existing facilities, there are proposed developments in the region. This includes proposals to develop gas and condensate from a number of fields within the NWMR.

In addition to the oil and gas industry, other land-based industries depend upon the marine environment in the nearshore area. These include ports, salt mines such as Karratha and Onslow, LNG onshore processing facilities such as Burrup Hub, Thevenard Island, Barrow Island, Varanus Island, and small-scale desalination plants at Barrow Island, Burrup, Cape Preston and Onslow.

12.7 Defence

Key Australian Department of Defence (DoD) operational areas and facilities areas of the NWMR for training and operational activities, include:

- An operating logistics base has been established in Dampier to support vessels patrolling the waters around offshore oil and gas facilities. A dedicated navy administrative support facility is also being constructed at the nearby township of Karratha (DEWHA, 2008).
- The Taylor Barracks are the headquarters of the Pilbara regiment, one of three Regional Force Surveillance Units conducting surveillance and reconnaissance of remote areas of northern Australia. This base is located in Karratha (DoD, n.d.).
- The Royal Australian Air Force currently maintains two 'bare bases' in remote areas of WA that are used for military exercises. One of these is the Royal Australian Air Force Base in Learmonth. The Royal Australian Air Force maintains the Commonwealth Heritage listed Learmonth Air Weapons Range Facility, which is located between Ningaloo Station and the Cape Range National Park. The air training area associated with the Learmonth base extends over the offshore region.
- The Royal Australian Air Force Base Curtin is located on the north coast of WA, south-east of Derby and 170 km east of Broome. It provides support for land, air and sea operations aimed to support Australia's northern approaches.

- The Naval Communications Station Harold E. Holt is located ~6 km north of Exmouth. The main role of the station is to communicate at very low frequencies (19.8 kHz) with Australian and United States submarines and ships in the eastern Indian Ocean and the western Pacific Ocean (DEWHA, 2008).
- Areas may be subject to Unexploded Ordnance (UXO) as a result of military activities. These are offshore sites where ammunition and explosives have been dumped, or which have been used as live bombing or firing ranges. Defence maintains a record of sites confirmed as, or reasonably suspected of being affected by UXO. There are several suspected UXO sites in the NWMR (Australian Government Defence, n.d.).

13. REFERENCES

[ABARES] Australian Bureau of Agricultural and Resource Economics and Sciences as part of the Australian Government Department of Agriculture, Fish, and Forestry 2021. Fishery Status Reports Map Data. Available at: Fishery status report – map data – DAFF (agriculture.gov.au). Access date, June 2022.

[AFMA] Australian Fisheries Management Authority 2014. Orange Roughy (*Hoplostethus atlanticus*) Stock Rebuilding Strategy 2014. Australian Government.

[AFMA] Australian Fisheries Management Authority 2021a. Southern Blue Fin Tuna. Accessed 3 June 2021 www.afma.gov.au/fisheries-management/species/southern-bluefin-tuna.

[AFMA] Australian Fisheries Management Authority 2021b. Western Skipjack Tuna. Accessed 3 June 2021 www.afma.gov.au/fisheries-management/species/skipjack-tuna.

[AIMS] Australian Institute of Marine Science 2014. AIMS 2013 Biodiversity Survey of Glomar Shoal and Rankin Bank. Report prepared by the Australian Institute of Marine Science for Woodside Energy Ltd. Australian Institute of Marine Science, Townsville, Queensland, July 2014 Rev 0, 153 pp.

[AMSA] Australian Maritime Safety Authority 2013. Australian Government Maritime Safety Authority Annual Report 2012/13. Available at: https://www.amsa.gov.au/sites/default/files/amsa191-annual-report-2012-13.pdf.

[AODN] Australian Ocean Data Network 2008. National Shipwreck Database. Available from: https://researchdata.edu.au/national-shipwreck-database/689517 [Accessed 15/08/2024].

[BOM] Bureau of Meteorology 2021a. Climatology of tropical cyclones in Western Australia.

Australian Government. http://www.bom.gov.au/cyclone/climatology/wa.shtml [Accessed 05 May 2021].

[BOM] Bureau of Meteorology 2023a. Climate statistics for Troughton Island, monthly climate statistics. Australian Government. http://www.bom.gov.au/climate/averages/tables/cw_001007.shtml [Accessed 27 July 2023].

[BOM] Bureau of Meteorology 2023b. Climate statistics for Learmonth Airport, monthly climate statistics. Australian Government. http://www.bom.gov.au/climate/averages/tables/cw_005007_All.shtml [Accessed 27 July 2023].

[BOM] Bureau of Meteorology 2023c. Average annual & monthly maximum, minimum, & mean temperature. Australian Government. http://www.bom.gov.au/jsp/ncc/climate_averages/temperature/index.jsp. [Accessed 23 August 2023].

[BRS] Bureau of Rural Sciences 2007. Fishery Status Reports 2007. Status of Fish Stocks Managed by the Australian Government. Australian Government Department of Agriculture, Fisheries and Forestry, Bureau of Rural Sciences. 304 pp.

[CALM] Department of Conservation and Land Management 1992. Marmion Marine Park Management Plan 1992-2002, Management Plan No 23. Department of Conservation and Land Management. https://library.dbca.wa.gov.au/FullTextFiles/014385.pdf.

[CALM] Department of Conservation and Land Management 1996. Shark Bay Marine Reserves Management Plan 1996-2006. Department of Conservation and Land Management.

[CALM] Department of Conservation and Land Management 1999. Swan Estuary Marine Park and Adjacent Nature Reserves Management Plan 1999-2009, Management Plan No 41. Department of Conservation and Land Management.

[CALM] Department of Conservation and Land Management 2003a. Eighty-mile Beach, Western Australia. Information Sheet on Ramsar Wetlands.

https://www.environment.gov.au/water/topics/wetlands/database/pubs/34-ris.pdf.

[CALM] Department of Conservation and Land Management 2003b. Roebuck Bay, Western Australia. Information Sheet on Ramsar Wetlands. https://www.environment.gov.au/water/topics/wetlands/database/pubs/33-ris.pdf.

[CALM] Department of Conservation and Land Management 2003c. Forrestdale and Thomsons Lakes Ramsar. Information Sheet on Ramsar Wetlands. https://www.environment.gov.au/water/topics/wetlands/database/pubs/35-ris.pdf.

[CALM] Department of Conservation and Land Management 2003d. Peel – Yalgorup System Ramsar. Information Sheet on Ramsar Wetlands. https://www.environment.gov.au/water/topics/wetlands/database/pubs/36-ris.pdf.

[CALM] Department of Conservation and Land Management 2005a. Management Plan for the Ningaloo Marine Park and Muiron Islands Marine Management Area 2005–2015. Department of Conservation and Land Management.

[CALM] Department of Conservation and Land Management 2005b. Jurien Bay Marine Park Management Plan 2005-2015, Management Plan No 49. Department of Conservation and Land Management.

[DAC] Dambimangari Aboriginal Corporation 2012. Dambimangari Healthy Country Plan 2012–2022.

[DAWE] Department of Agriculture, Water and the Environment. 2004. Garden Island, WA, Australia. Australian Heritage Database, Australian Government. Available from: http://www.environment.gov.au/cgi-bin/ahdb/search.pl?mode=search_results;list_code=CHL;legal_status=35.

[DAWE] Department of Agriculture, Water and the Environment 2019. Directory of Important Wetlands. https://www.environment.gov.au/cgi-bin/wetlands/search.pl?smode=DOIW.

[DAWE] Department of Agriculture, Water and the Environment 2020a. Indonesia- Australia Fisheries Cooperation. Available at: https://www.awe.gov.au/agriculture-land/fisheries/international/cooperation/indonesia#:~:text=Established%20in%202001%2C%20the%20Working,the%20Arafura%20and%20Timor%20seas.

[DAWE] Department of Agriculture, Water and the Environment 2020b. National Recovery Plan for the Australian Fairy Tern (*Sternula nereis nereis*). 47 pp. https://www.dcceew.gov.au/sites/default/files/documents/national-recovery-plan-australian-fairy-tern.pdf [Accessed on 15/08/2024].

[DAWE] Department of Agriculture, Water and the Environment 2022. Listing Advice *Megaptera novaeangliae* Humpback Whale. Prepared under the *Environment Protection and Biodiversity Conservation Act 1999.* Canberra: Department of Agriculture, Water and the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/38-listing-advice-26022022.pdf.

[DBCA] Department of Biodiversity Conservation and Attractions 2020. Economic contribution of Ningaloo: one o' Australia's best kept secrets. Deloitte Access Economics. June 2020. 58 pp.

[DBCA] Ningaloo Turtle Program Annual Conservation and Attractions 2021a. Department of Biodiversity, Ningaloo Turtle Program, Exmouth, Western Australia.

[DBCA] Department of Biodiversity Conservation and Attractions 2021b. Proposed marine parks in the Buccaneer Archipelago and surrounds. Department of Biodiversity Conservation and Attractions, Government of Western Australia.

[DBCA] Department of Biodiversity, Conservation and Attractions 2022a. Bardi Jawi Gaarra Marine Park joint management plan 2022. https://www.dbca.wa.gov.au/management/plans/bardi-jawi-gaarra-marine-park.

[DBCA] Department of Biodiversity, Conservation and Attractions 2022b. Lalang-gaddam Marine Park joint management plan 2022. https://www.dbca.wa.gov.au/management/plans/lalang-gaddam-marine-park.

[DBCA] Department of Biodiversity, Conservation and Attractions 2022c. Mayala Marine Park joint management plan 2022. https://www.dbca.wa.gov.au/management/plans/mayala-marine-park.

[DBCA] Department of Biodiversity, Conservation and Attractions 2023. Swan Estuary Marine Park. About this park. Parks and Wildlife Service. Explore Parks WA. https://exploreparks.dbca.wa.gov.au/park/swan-estuary-marine-park [Accessed 28 Sep 2023].

[DBCA] Department of Biodiversity, Conservation and Attractions 2023a. 'Ningaloo Turtle Program Annual Report 2022-2023'. Department of Biodiversity, Conservation and Attractions and the Ningaloo Turtle Program, Exmouth, Western Australia. https://ningalooturtles.org.au/wp-content/uploads/2023/08/NTP-Annual-Report-2022_23-FINAL.pdf [Accessed 16 Aug 2024].

[DBCA] Department of Biodiversity Conservation and Attractions 2024. South Coast Marine Park. Government of Western Australia. https://www.dbca.wa.gov.au/management/parks/plan-our-parks/south-coast-marine-park [Accessed 18/12/2024].

[DCCEEW] Department of Climate Change, the Environment, Energy and Water 2019a. Ord River Floodplain. Australian Wetlands Database. Ramsar Wetlands. https://www.environment.gov.au/cgi-bin/wetlands/ramsardetails.pl?refcode=31 [Accessed 27 Sep 2023].

[DCCEEW] Department of Climate Change, the Environment, Energy and Water 2019b. Directory of Important Wetlands in Australia – Information Sheet. http://www.environment.gov.au/cgi-bin/wetlands/report.pl [Accessed 27 Sep 2023].

[DCCEEW] Department of Climate Change, Energy, the Environment and Water 2021a. Australian Convict Sites. Australian Government. Available from: https://www.dcceew.gov.au/parks-heritage/heritage/places/world/convict-sites#more-information.

[DCCEEW] Department of Climate Change, Energy, the Environment and Water 2021b. Marine Bioregional Plans. Australian Government. Available from https://www.dcceew.gov.au/environment/marine/marine-bioregional-plans [Accessed 20/08/2024].

[DCCEEW] Department of Climate Change, Energy, the Environment and Water 2022. National Recovery Plan for albatrosses and petrels. Commonwealth of Australia. https://www.dcceew.gov.au/sites/default/files/documents/national-recovery-plan-albatrosses-and-petrels-2022.pdf [Accessed 13 August 2024].

[DCCEEW] Department of Climate Change, Energy, the Environment and Water 2023a. 'Species Threats and Profile Database'. Department of Climate Change, Energy, the Environment and Water. https://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl [Accessed 26 July 2023].

[DCCEEW] Department of Climate Change, the Environment, Energy and Water 2023b. Sea Country Indigenous Protected Areas Program - Grant Opportunity. https://www.dcceew.gov.au/environment/land/indigenous-protected-areas/sea-country-grant-opportunity [Accessed 21/07/24].

[DCCEEW] Department of Climate Change, Energy, the Environment and Water 2023c. Conservation Advice for *Varanus mitchelli* (Mitchell's water monitor). Canberra: Department of Climate Change, Energy, the Environment and Water. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/1569-conservation-advice-21122023.pdf [Accessed 15/08/24].

[DCCEEW] Department of Climate Change, the Environment, Energy and Water 2023d. National Light Pollution Guidelines for Wildlife. Available from: https://www.dcceew.gov.au/environment/biodiversity/publications/national-light-pollution-guidelines-wildlife [Accessed on 13 Aug 2024].

[DCCEEW] Department of Climate Change, Energy, the Environment and Water 2023e. Conservation Advice for *Numenius madagascariensis* (far eastern curlew). Canberra: Department of Climate Change, Energy, the Environment and Water. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/847-conservation-advice-18122023.pdf [Accessed 21/08/2024].

[DCCEEW] Department of Climate Change, Energy, the Environment and Water 2023f. Conservation Advice for *Calidris ferruginea* (curlew sandpiper). Canberra: Department of Climate Change, Energy, the Environment and Water. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/856-conservation-advice-18122023.pdf http://www.environment.gov.au/biodiversity/threatened/species/pubs/847-conservation-advice-18122023.pdf [Accessed 21/08/2024].

[DCCEEW] Department of Climate Change, Energy, the Environment and Water 2023g. Conservation Advice for *Charadrius leschenaultii* (greater sand plover). Canberra: Department of Climate Change, Energy, the Environment and Water. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/877-conservation-advice-18122023.pdf [Accessed 21/08/2024].

[DCCEEW] Department of Climate Change, the Environment, Energy and Water n.d.-a. Mermaid Reef – Rowley Shoals, Broome, WA, Australia Place Details. Australian Heritage Database. https://www.dcceew.gov.au/parks-heritage/heritage/places/commonwealth-heritage-list [Accessed 27 Sep 2023].

[DCCEEW] Department of Climate Change, the Environment, Energy and Water n.d.-b. Learmonth Air Weapons Range Facility, Learmonth, WA, Australia Place Details. Australian Heritage Database. https://www.dcceew.gov.au/parks-heritage/heritage/places/commonwealth-heritage-list [Accessed 27 Sep 2023].

[DCCEEW] Department of Climate Change, the Environment, Energy and Water n.d.-c. Yampi Defence Area, Koolan Island, WA, Australia Place Details. Australian Heritage Database. https://www.dcceew.gov.au/parks-heritage/heritage/places/commonwealth-heritage-list [Accessed 27 Sep 2023].

[DCCEEW] Department of Climate Change, the Environment, Energy and Water n.d.-d. Ashmore Reef National Nature Reserve, Timor Sea, EXT, Australia Place Details. Australian Heritage. Database. Available from: https://www.dcceew.gov.au/parks-heritage/heritage/places/commonwealth-heritage-list. [Accessed 27 Sep 2023].

[DCCEEW] Department of Climate Change, the Environment, Energy and Water n.d.-e. Scott Reef and Surrounds, Timor Sea, EXT, Australia Place Details. Australian Heritage Database. Available from: https://www.dcceew.gov.au/parks-heritage/heritage/places/commonwealth-heritage-list [Accessed 27 Sep 2023].

[DCCEEW] Department of Climate Change, the Environment, Energy and Water n.d.-f. Ningaloo Marine Area, Commonwealth Waters, Ningaloo, WA, Australia Place Details. Australian Heritage Database. https://www.dcceew.gov.au/parks-heritage/heritage/places/commonwealth-heritage-list. [Accessed 27 Sep 2023].

[DCCEEW] Department of Climate Change, the Environment, Energy and Water 2024a. National Recovery Plan for the Southern Right Whale *Eubalaena australis*. Department of Climate Change, Energy, the Environment and Water, Canberra. Available from: http://www.dcceew.gov.au/environment/biodiversity/threatened/recovery-plans/southern-right-whale [Accessed on 13 Aug 2024].

[DCCEEW] Department of Climate Change, the Environment, Energy and Water 2024b. Biologically Important Areas of Regionally Significant Marine Species. COPYRIGHT Commonwealth of Australia, Australian Government Department of Climate Change, Energy, the Environment and Water.

Available from: https://fed.dcceew.gov.au/datasets/e8e7a7c233a44cf099817b2f4dff29c7_0/about [Accessed 16 Aug 2024].

[DCCEEW] Department of Climate Change, the Environment, Energy and Water 2024c. Indigenous Protected Areas. Accessed at https://www.dcceew.gov.au/environment/land/indigenous-protected-areas.

[DCCEEW] Department of Climate Change, the Environment, Energy and Water 2024d. Marine Key Ecological Features (dataset). Available from: https://fed.dcceew.gov.au/datasets/551d6e7fae514a0386f0043186599754_0/about [Accessed 16/08/2024].

[DCCEEW] Department of Climate Change, the Environment, Energy and Water 2024e. Conservation Advice for *Limosa lapponica menzbieri* (Yakutian bar-tailed Godwit). Canberra: Department of Climate Change, Energy, the Environment and Water. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/86432-conservation-advice-05012024.pdf. [Accessed 21/08/2024].

[DCCEEW] Department of Climate Change, the Environment, Energy and Water 2024f. Conservation Advice for *Calidris canutus* (red knot). Canberra: Department of Climate Change, Energy, the Environment and Water. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/855-conservation-advice-05012024.pdf [Accessed 21/08/2024].

[DCCEEW] Department of Climate Change, the Environment, Energy and Water 2024g. Conservation Advice for *Calidris tenuirostris* (great knot). Canberra: Department of Climate Change, Energy, the Environment and Water. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/862-conservation-advice-05012024.pdf [Accessed 21/08/2024].

[DCCEEW] Department of Climate Change, the Environment, Energy and Water 2024h. Conservation Advice for *Limosa limosa* (black-tailed godwit). Canberra: Department of Climate Change, Energy, the Environment and Water. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/845-conservation-advice-05012024.pdf [Accessed 21/08/2024].

[DCCEEW] Department of Climate Change, the Environment, Energy and Water 2024i. Conservation Advice for *Tringa nebularia* (common greenshank). Canberra: Department of Climate Change, Energy, the Environment and Water. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/832-conservation-advice-05012024.pdf [Accessed 21/08/2024].

[DCCEEW] Department of Climate Change, the Environment, Energy and Water 2024j. Conservation Advice for *Limnodromus semipalmatus* (Asian dowitcher). Canberra: Department of Climate Change, Energy, the Environment and Water. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/843-conservation-advice-05012024.pdf [Accessed 21/08/2024].

[DCCEEW] Department of Climate Change, the Environment, Energy and Water 2024k. Conservation Advice for *Arenaria interpres* (ruddy turnstone). Canberra: Department of Climate Change, Energy, the Environment and Water. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/872-conservation-advice-05012024.pdf [Accessed 21/08/2024].

[DCCEEW] Department of Climate Change, the Environment, Energy and Water 2024l. Conservation Advice for *Calidris acuminata* (sharp-tailed sandpiper). Canberra: Department of Climate Change, Energy, the Environment and Water. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/874-conservation-advice-

05012024.pdf [Accessed 21/08/2024].

[DCCEEW] Department of Climate Change, the Environment, Energy and Water 2024m. Conservation Advice for *Xenus cinereus* (terek sandpiper). Canberra: Department of Climate Change, Energy, the Environment and Water. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/59300-conservation-advice-05012024.pdf [Accessed 21/08/2024].

[DCCEEW] Department of Climate Change, the Environment, Energy and Water 2024n. Conservation Advice for *Pluvialis squatarola* (grey plover). Canberra: Department of Climate Change, Energy, the Environment and Water. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/865-conservation-advice-05012024.pdf [Accessed 21/08/2024].

[DCCEEW] Department of Climate Change, the Environment, Energy and Water 2024o. Conservation Advice for *Aipysurus fuscus* (dusky sea snake). Canberra: Department of Climate Change, Energy, the Environment and Water. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/1119-conservation-advice-04092024.pdf. [Accessed 10/12/2024].

[DCCEEW, NIAA] Department of Climate Change, the Environment, Energy and Water & National Indigenous Australians Agency 2024. Indigenous Protected Areas June 2024 (map). Available from: https://www.dcceew.gov.au/sites/default/files/documents/ipa-national-map.pdf.

[DEC] Department of Environment and Conservation 2007a. Rowley Shoals Marine Park Management 2007–2017 Management Plan No. 56. Department of Environment and Conservation, Perth, Western Australia.

[DEC] Department of Environment and Conservation 2007b. Management Plan for the Montebello/Barrow Islands Marine Conservation Reserves 2007–2017. Management Plan No 55. Department of Environment and Conservation, Perth, Western Australia.

[DEC] Department of Environment and Conservation 2007c. Shoalwater Islands Marine Park Management Plan 2007–2017, Management Plan No 58. Department of Environment and Conservation, Perth, Western Australia.

[DEC] Department of Environment and Conservation 2008. Shark Bay World Heritage Property Strategic Plan 2008–2020. Department of Environment and Conservation.

[DEC] Department of Environment and Conservation 2009a. Walpole and Nornalup Inlets Marine Park Management Plan 2009–2019, Management Plan No 62. Department of Environment and Conservation, Perth, Western Australia.

[DEC] Department of Environment and Conservation 2009b. Ecological Character Description of the Lake Warden System Ramsar Site: A Report by the Department of Environment and Conservation. Prepared by G. Watkins, Department of Environment and Conservation, Perth, Western Australia. https://rsis.ramsar.org/RISapp/files/55262733/documents/AU485ECD.pdf.

[DEC] Department of Environment and Conservation 2013. Ngari Capes Marine Park management plan 2013–2023, Management plan number 74. Department of Environment and Conservation.

[DEWHA] Department of Environment, Water, Heritage and the Arts 2007a. A characterisation of the marine environment of the North-west Marine Region. A summary of an expert workshop convened in Perth, Western Australia, 5–6 September 2007. Prepared by the North-west Marine Bioregional Planning section, Marine and Biodiversity Division, Department of the Environment, Water, Heritage and the Arts. 47 pp.

[DEWHA] Department of Environment, Water, Heritage and the Arts 2007b. Characterisation of the marine environment of the North Marine Region. Outcomes of an Expert Workshop, Darwin, Northern Territory, 2–3 April 2007. Prepared by the North Marine Bioregional Planning Section, Marine Division, Department of the Environment, Water, Heritage and the Arts. 37 pp.

[DEWHA] Department of Environment, Water, Heritage and the Arts 2008. The North-west Marine Bioregional Plan, Bioregional Profile. A Description of the Ecosystems, Conservation Values and Uses of the North-west Marine Region. Prepared by the Marine Bioregional Planning – North-west, Marine and Biodiversity Division. Department of the Environment, Water, Heritage and the Arts. 288 pp.

[DEWHA] Department of Environment, Water, Heritage and the Arts 2009. Threat Abatement Plan to reduce the impacts of exotic rodents on biodiversity on Australian offshore islands less than 100,000 hectares. 24 pp.

[DEWR] Department of the Environment and Water Resources 2007. A characterisation of the marine environment of the South-west Marine Region: A summary of an expert workshop convened in Perth, Western Australia, September 2006. 40 pp.

[DNP] Director of National Parks 2018a. North-west Marine Parks Network Management Plan 2018, Director of National Parks, Canberra.

[DNP] Director of National Parks 2018b. South-west Marine Parks Network Management Plan 2018, Director of National Parks, Canberra.

[DNP] Director of National Parks 2018c. North Marine Parks Network Management Plan 2018, Director of National Parks, Canberra.

[DoD) Department of Defence. Base locations. Australian Government. Available from: https://www.defence.gov.au/about/base-locations.

[DOE] Department of the Environment 2014. Recovery Plan for the Grey Nurse Shark (*Carcharias taurus*). Canberra, ACT: Department of the Environment. Available from: http://www.environment.gov.au/resource/recovery-plan-grey-nurse-shark-carcharias-taurus.

[DOE] Department of the Environment 2015a. Conservation Advice *Numenius madagascariensis* eastern curlew. Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/847-conservation-advice.pdf.

[DOE] Department of the Environment 2015b. Conservation Advice *Calidris ferruginea* curlew sandpiper. Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/856-conservation-advice.pdf.

[DOE] Department of the Environment (2015c). Threat abatement plan for predation by feral cats. Canberra, ACT: Commonwealth of Australia. 50 pp.

[DOEE] Department of the Environment and Energy 2017. EPBC Act Policy Statement 3.21 – Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species. Commonwealth of Australia. https://www.dcceew.gov.au/sites/default/files/documents/bio4190517-shorebirds-guidelines.pdf.

[DOEE] Department of the Environment and Energy 2018. Threat abatement plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans. Commonwealth of Australia. https://www.dcceew.gov.au/sites/default/files/documents/tap-marine-debris-2018.pdf.

[DOEH] Department of Environment and Heritage 2004. Assessment of the Onslow and Nickol Bay Prawn Managed Fisheries, November 2004. 24 pp.

[DOF] Department of Fisheries 2001a. Plan of Management for the Cottesloe Reef Fish Habitat Protection Area. Fisheries Management Paper No. 155, Department of Fisheries, Perth, Western Australia.

[DOF] Department of Fisheries 2001b. Plan of Management for the Lancelin Island Lagoon Fish Habitat Protection Area. Fisheries Management Paper No. 149, Australian Marine Conservation Society Friends of Lancelin Island, Department of Fisheries, Perth, Western Australia.

[DOF] Department of Fisheries 2003. Miaboolya Beach Fish Habitat Protection Area, Department of

Fisheries, Perth, Western Australia.

[DOF] Department of Fisheries 2004. Plan of Management for the Point Quobba Fish Habitat Protection Area. Fisheries Management Paper No. 185, Department of Fisheries, Perth, Western Australia.

[DOF] Department of Fisheries 2007. Plan of Management for the Kalbarri Blue Holes Fish Habitat Protection Area. Fisheries Management Paper No. 188, Department of Fisheries, Perth, Western Australia.

[DOF] Department of Fisheries 2010. Cottesloe Reef Fish Habitat Protection Area. Department of Fisheries, Perth, Western Australia.

[DOF] Department of Fisheries 2011. State of the Fisheries and Aquatic Resources Report 2010/11. Fletcher, W.J. and Santoro, K. (eds), Department of Fisheries, Perth, Western Australia.

[DOF] Department of Fisheries 2014a. Kalbarri Blue Holes Fish Habitat Protection Area, Department of Fisheries, Perth, Western Australia.

[DOF] Department of Fisheries 2014b. Plan of Management for the Miaboolya Beach Fish Habitat Protection Area, Fisheries Management Paper No. 161, Department of Fisheries, Perth, Western Australia.

[DOF] Department of Fisheries 2015. Point Quobba Fish Habitat Protection Area, Department of Fisheries, Perth, Western Australia.

[DPAW] Department of Parks and Wildlife 2014a. Eighty Mile Beach Marine Park Management Plan 2014-2024. Management Plan No. 80. Department of Parks and Wildlife, Perth, Western Australia.

[DPAW] Department of Parks and Wildlife 2014b. Becher Point Wetlands. Information Sheet on Ramsar Wetlands. https://www.environment.gov.au/water/topics/wetlands/database/pubs/54-ris.pdf.

[DPAW] Department of Parks and Wildlife 2014b. Vasse-Wonnerup System. Information Sheet on Ramsar Wetlands. https://rsis.ramsar.org/RISapp/files/RISrep/AU484RIS_1407_en.pdf.

[DPAW] Department of Parks and Wildlife 2016a. North Kimberley Marine Park Joint Management Plan 2016 Uunguu, Balanggarra, Miriuwung Gajerrong and Wilinggin management areas, Number Plan 89. Department of Parks and Wildlife, Perth.

[DPAW] Department of Parks and Wildlife 2016b. Yawuru Nagulagun / Roebuck Bay Marine Park joint management plan 2016. Department of Parks and Wildlife, Perth.

[DPAW] Department of Parks and Wildlife 2016c. Marmion Marine Park. Visitor Guide. [DPIRD] Department of Primary Industries and Regional Development. No date. Fisheries Research Report No. not provided. Unpublished Draft Resource Assessment Report for the North Coast Demersal Scalefish Resource. Available from: Microsoft Word - North Coast Demersal Scalefish RAR_13_220620 [Accessed: June 2022].

[DPIRD] Department of Primary Industries and Regional Development 2013. Fish habitat protection areas. Available from: https://www.fish.wa.gov.au/Sustainability-and-Environment/Aquatic-Biodiversity/Marine-Protected-Areas/Pages/Fish-Habitat-Protection-Areas.aspx.

[DPIRD] Department of Primary Industries and Regional Development 2018a. Western Australian Marine Stewardship Council Report Series No. 14. Resource Assessment Report Western Australian Octopus Resource.

[DPIRD] Department of Primary Industries and Regional Development 2018b. Draft Management Plan for the Pilbara Crab Managed Fishery. Fisheries Management Paper No. 290. Government of Western Australia.

[DPIRD] Department of Primary Industries and Regional Development 2020. Fisheries Research Report. Draft Resource Assessment Report North Coast Demersal Scalefish Resource. Western

Australia.

[DPIRD] Department of Primary Industries and Regional Development 2023. Fisheries Guide - Consolidated Management Plans. Available from: Fisheries Guide - Consolidated Management Plans (–PIRD-062) – Datasets - data.wa.gov.au [Accessed: August 2023].

[DPIRD] Department of Primary Industries and Regional Development 2023. Status Reports of the Fisheries and Aquatic Resources of Western Australia 2021/22: The State of the Fisheries. Department of Primary Industries and Regional Development, Western Australia. https://www.fish.wa.gov.au/Documents/sofar/status_reports_of_the_fisheries_and_aquatic_resources_2021-22.pdf.

[DPIRD] Department of Primary Industries and Regional Development 2024. Recreational fishing guide 2024. Department of Primary Industries and Regional Development, Western Australia. https://www.fish.wa.gov.au/Documents/recreational_fishing/rec_fishing_guide/recreational_fishing_guide.pdf.

[DPLH] Aboriginal Cultural Heritage Reform 2022. Department of Planning, Lands and Heritage, Perth, Western Australia. Available from: https://www.wa.gov.au/organisation/department-of-planning-lands-and-heritage/aboriginal-cultural-heritage-reform.

[DPLH] Department of Primary Industries and Regional Development. Aboriginal Heritage Act in Western Australia. Government of Western Australia, Perth, Western Australia. Accessed: July 2024. Available from: https://www.wa.gov.au/organisation/department-of-planning-lands-and-heritage/aboriginal-heritage-act-western-australia.

[DSEWPAC] Department of Sustainability, Environment, Water, Population and Communities 2011a. Approved Conservation Advice for *Aipysurus apraefrontalis* (Short-nosed Sea Snake). Canberra, ACT: Department of Sustainability, Environment, Water, Population and Communities. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/1115-conservation-advice.pdf.

[DSEWPAC] Department of Sustainability, Environment, Water, Population and Communities 2011b. Approved Conservation Advice for *Aipysurus foliosquama* (Leaf-scaled Sea Snake). Canberra, ACT: Department of Sustainability, Environment, Water, Population and Communities. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/1118-conservation-advice.pdf.

[DSEWPAC] Department of Sustainability, Environment, Water, Population and Communities 2011c. National recovery plan for threatened albatrosses and giant petrels 2011–2016. Commonwealth of Australia, Hobart. Available from: http://www.environment.gov.au/biodiversity/threatened/recovery-plans/national-recovery-plan- threatened-albatrosses-and-giant-petrels-2011-2016.

[DSEWPAC] Department of Sustainability, Environment, Water, Population and Communities 2011d. Approved Conservation Advice for *Sternula nereis nereis* (Fairy Tern). Canberra, ACT: Department of Sustainability, Environment, Water, Population and Communities. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/82950-conservation-advice.pdf.

[DSEWPAC] Department of Sustainability, Environment, Water Population and Communities 2012a. Marine bioregional plan for the North-west Marine Region. Prepared under the *Environment Protection and Biodiversity Conservation Act 1999.* 269 pp.

[DSEWPAC] Department of Sustainability, Environment, Water Population and Communities 2012b. Marine bioregional plan for the South-west Marine Region. Prepared under the *Environment Protection and Biodiversity Conservation Act 1999.* 216 pp.

[DSEWPAC] Department of Sustainability, Environment, Water Population and Communities 2012c. Marine bioregional plan for the North Marine Region. Prepared under the *Environment Protection and Biodiversity Conservation Act 1999.* 200 pp.

[DSEWPAC] Department of Sustainability, Environment, Water, Populations and Communities 2012d. Species group report card – seabirds and migratory shorebirds. Supporting the marine bioregional plan for the North-west Marine Region.

[DSEWPAC] Department of Sustainability, Environment, Water, Population and Communities 2013a. Recovery Plan for the Australian Sea Lion (*Neophoca cinerea*) 2013. Department of Sustainability, Environment, Water, Population and Communities. Available from: http://www.environment.gov.au/system/files/resources/1eb9233c-8474-40bb-8566-0ea02bbaa5b3/files/neophoca-cinerea-recovery-plan.pdf.

[DSEWPAC] Department of Sustainability, Environment, Water, Population and Communities 2013b. Recovery Plan for the White Shark (*Carcharodon carcharias*). Department of Sustainability, Environment, Water, Population and Communities. Available from: http://www.environment.gov.au/biodiversity/threatened/recovery-plans/recovery-plan-white-shark-carcharodon-carcharias.

[DSEWPaC] Department of Sustainability, Environment, Water, Population and Communities 2013c. Conservation Advice for Subtropical and Temperate Coastal Saltmarsh.

Canberra: Department of Sustainability, Environment, Water, Population and Communities. Available from: http://www.environment.gov.au/biodiversity/threatened/communities/pubs/118-conservation-advice.pdf. [Accessed 20 July 2023].

[DSEWPaC] Department of Sustainability, Environment, Water, Population and Communities 2013d. Approved Conservation Advice for the Monsoon vine thickets on the coastal sand dunes of Dampier Peninsula. Canberra, ACT: Department of Sustainability, Environment, Water, Population and Communities. Available from: http://www.environment.gov.au/biodiversity/threatened/communities/pubs/105-conservation-advice.pdf.

[DWER] Department of Water and Environmental Regulation 2023. Exmouth Gulf Taskforce – Interim report to the Minister for Environment. Joondalup, Western Australia. https://www.wa.gov.au/system/files/2024-05/exmouth-gulf-taskforce-interim-report-september-2023.pdf [Accessed on 16 Aug 2024].

[EPA] Environment Protection Authority 2022. Potential cumulative impacts of the activities and developments proposed for Exmouth Gulf. https://www.epa.wa.gov.au/potential-cumulative-impacts-activities-and-developments-proposed-exmouth-gulf [Accessed 23/07/2024].

[ERM] Environmental Resources Management 2009. Browse LNG Development: Social Study on Indonesian Fishers (Phase 2) 2008. Report produced for Woodside Energy Limited.

[GA] Geoscience Australia 2023. Petroleum Geology of Offshore Basins. Australian Government.

Available from: https://www.ga.gov.au/scientific-topics/energy/province-sedimentary-basin-geology/petroleum.

[GA] Geoscience Australia 2024. Australian Marine Spatial Information System Advanced Map Viewer. Available from: https://www.arcgis.com/apps/webappviewer/index.html?id=eee105ff33d2435a819bcff994eb1b9a. [Accessed on 15/08/2024].

[GDC] Gascoyne Development Commission 2022. Annual Report 2021-2022, supported by Department of Primary Industries and Regional Development, Western Australia. https://www.gdc.wa.gov.au/Profiles/gdc/Assets/ClientData/GDC_Annual_Report_21-22.pdf.

[GDC] Gascoyne Development Commission 2023. Annual Report 2022-2023, supported by Department of Primary Industries and Regional Development, Western Australia. https://www.gdc.wa.gov.au/Profiles/gdc/Assets/ClientData/GDC_Annual_Report_22-23_WEB.pdf.

[KDC] Kimberley Development Commission 2022. 2021-2022 Annual Report, Government of

Western Australia, Kununurra. https://www.kdc.wa.gov.au/wp-content/uploads/2022/11/KDC-Annual-Report-2021-2022.pdf.

[KLC/ BJNAC RNTBC] Kimberley Land Council / Bardi Jawi Niimidiman Aboriginal Corporation RNTBC 2013. Bardi Jawi Indigenous Protected Area Management Plan 2013-2023. Broome.

[KTLA] Karajarri Traditional Lands Association 2014a. Karajarri Healthy Country Plan 2013–2023. Funded by the Department of Sustainability, Environment, Water, Population and Communities and the PEW Environment Trust and Nature Conservancy.

[KTLA] Karajarri Traditional Lands Association 2014b. Karajarri Indigenous Protected Area. Available from: https://www.ktla.org.au/karajarri-indigenous-protected-area.

[NIAA] National Indigenous Australians Agency n.d. Karajarri IPA and Rangers. Australian Government. Available from: https://www.niaa.gov.au/indigenous-affairs/environment/karajarri-ipa-and-rangers.

[NIAA] National Indigenous Australians Agency n.d.-a. Yawuru IPA and Rangers. Australian Government. Available from: https://www.niaa.gov.au/indigenous-affairs/environment/yawuru-ipa-and-rangers.

[NIAA] National Indigenous Australians Agency n.d.-b. Bardi Jawi IPA and Rangers. Australian Government. Available from: https://www.niaa.gov.au/indigenous-affairs/environment/bardi-jawi-ipa-and-rangers.

[NIAA] National Indigenous Australians Agency n.d.-c. Uunguu IPA and Rangers. Australian Government. Available from https://www.niaa.gov.au/indigenous-affairs/environment/uunguu-ipa-and-rangers.

[NIAA] National Indigenous Australians Agency n.d-d. Wilinggin IPA and Wunggurr Rangers. Australian Government. https://www.niaa.gov.au/indigenous-affairs/environment/wilinggin-ipa- and-wunggurr-rangers. [Accessed 17 August 2023].

[NIAA] National Indigenous Australians Agency 2023. Indigenous Protected Areas. Australian Government. https://www.niaa.gov.au/indigenous-affairs/environment/indigenous-protected- areas-ipas. [Accessed 17 August 2023].

[NWAC & YMAC] Nyangumarta Warrarn Aboriginal Corporation & Yamatji Marlpa Aboriginal Corporation. 2015. Nyangumarta Warrarn Indigenous Protected Area, Plan of Management, 2015 to 2020. Prepared by Dr Nicholas Smith, South Hedland, WA.

[PDC] Pilbara Development Commission 2022. 2021–2022 Annual Report, Government of Western Australia, Karratha. Available from: https://www.pdc.wa.gov.au/Profiles/pdc/Assets/ClientData/Documents/PDC_Annual_Report_2012-2022.pdf.

[PDC] Pilbara Development Commission 2022. 2021-2022 Annual Report, Government of Western Australia, Karratha. Available from: https://www.pdc.wa.gov.au/Profiles/pdc/Assets/ClientData/PDC-Annual-Report-2022-2023-_single-page_.pdf.

[PPA] Pilbara Ports Authority 2023. Annual Report 2022–2023. https://www.pilbaraports.com.au/about-pilbara-ports/publications/forms-and-publications/forms-and-publications/handbook/2023/september/2023-annual-report-(1) [Accessed 23/07/2024].

[WAM] Western Australian Museum 2018. Shipwrecks (WAM-002). Available from: https://catalogue.data.wa.gov.au/dataset/shipwrecks [Accessed 16/08/2024].

[WGAC] Wunambal Gaambera Aboriginal Corporation 2010. Wunambal Gaambera Healthy Country Plan – Looking after Wunambal Gaambera Country 2010–2020.

[WGAC] Wunambal Gaambera Aboriginal Corporation 2017. Uunguu Indigenous Protected Area: Wundaagu (Saltwater) Country, Plan of Management 2016–2020.

[YRNTBC] Yawuru Registered Native Title Body Corporate 2014. Yawuru IPA – Plan of management 2016–2026. Broome, WA: Yawuru Registered Native Title Body Corporate.

Abascal, F.J., Quintans, M., Ramos-Cartelle, A. and Mejuto, J. 2011. Movements and environmental preferences of the shortfin mako, *Isurus oxyrinchus*, in the southeastern Pacific Ocean. Marine Biology 158: 1175–1184.

Abdul Wahab, M.A., Radford, B., Cappo, M., Colquhoun, J., Stewar, M., Depczynski, M., Miller, K. and Heyward, A. 2018. Biodiversity and spatial patterns of benthic habitat and associated demersal fish communities at two tropical submerged reef ecosystems. Coral Reefs 37: 327–343. https://doi.org/10.1007/s00338-017-1655-9.

Allen, G.R. and Swainston, R. 1988. The Marine Fishes of North-Western Australia. A Field Guide for Anglers and Divers. Published by the Western Australian Museum, Perth, WA 6000.

Allen, S.J., Cagnazzi, D.D., Hodgson, A.J., Loneragan, N.R. and Bejder, L. 2012. Tropical inshore dolphins of north-western Australia: Unknown populations in a rapidly changing region. Pacific Conservation Biology 18: 56–63. https://doi.org/10.1071/PC120056.

Allen, S.J., Tyne, J.A., Kobry, H.T., Bejder, L., Pollock, K.H. and Lonergan, N.R. 2014. Patterns of Dolphin Bycatch in a North-Western Australian Trawl Fishery. PLoS ONE 9(4): e93178. https://doi.org:10.1371/journal.pone.0093178.

Anderson, P.K. and Prince, R.I.T. 1985. Predation on dugongs: attacks by killer whales. Journal of Mammalogy 66(3): 554–556.

Andrzejaczek, S., Gleiss, A.C., Jordan, L.K.B. Pattiaratchi, C.B., Howey, L.A., Brooks, E.J. and Meekan, M.G. 2018. Temperature and the vertical movements of oceanic whitetip sharks, *Carcharhinus longimanus*. Scientific Reports 8, 8351. https://doi.org/10.1038/s41598-018-26485-3.

Atlas of Living Australia, 2006. Preserved specimen of *Eubalaena australis* (Desmoulins, 1822) | Southern Right Whale. Occurrence Record. https://biocache.ala.org.au/occurrences/9e6b09a4-8b4a-46c8-8bcc-6812c8edce96.

Aulich, M.G., Mccauley, R.D., Miller, B.S., Samaran, F., Giorli, G., Saunders, B.J. and Erbe, C., 2022. Seasonal distribution of the fin whale (*Balaenoptera physalus*) in Antarctic and Australian waters based on passive acoustics. Frontiers in Marine Science, 9, p.864153.

Austin R. E., De Pascalis F., Votier S.C., Haakonsson J., Arnould J. P. Y., Ebanks-Petrie G., Newton J., Harvey J. and Green J. A. 2021. Interspecific and intraspecific foraging differentiation of neighbouring tropical seabirds. Movement Ecology 9:27.

Australian Government Defence. n.d. Unexploded Ordnance Site Information. https://uxo.defence.gov.au/unexploded-ordnance-site-information [Accessed 23/07/2024].

Baker, C., Potter, A., Tran, M. and Heap, A.D. 2008. Sedimentology and Geomorphology of the North-west Marine Region of Australia. Geoscience Australia, Canberra. 24 pp.

Balance LT, Ainley DG, Hunt GL. 2008. Seabird Foraging Ecology. In: Steele J., Thorpe SA, Turekian KK, editors. Encyclopedia of Ocean Science. 2nd ed. [place unknown]: Elsevier Ltd. p. 2636–2644.

Balanggarra Aboriginal Corporation and Kimberley Land Council. 2011. Balanggarra Healthy Country Plan. https://www.klc.org.au/s/balanggarra-healthy-country-plan-2012-2022.pdf.

Bamford, M., Watkins, D., Bancroft, W., Tischler, G. and Wahl, J. 2008. Migratory shorebirds of the East Asian-Australasian flyway: population estimates and internationally important sites. Wetlands International – Oceania, Canberra.

Bannister, J., Kemper, C.M. and Warneke, R.M. 1996. The action plan for Australian cetaceans. Australian Nature Conservation Agency, Canberra.

Bannister, J.L. and Hedley, S.L. 2001. Southern Hemisphere group IV humpback whales: their status from recent aerial survey. Memoirs of the Queensland Museum 47(2): 587–98.

Barber, M. and Jackson, S. 2011. Water and Indigenous People in the Pilbara, Western Australia: A Preliminary Study. Bejder, L., Videsen, S., Hermannsen, L., Simon, M., Hanf, D. and Madsen, P.T. 2019. Low energy expenditure and resting behaviour of humpback whale mother-calf pairs highlights conservation importance of sheltered breeding areas. Scientific Reports 9: 771. https://doi.org/10.1038/s41598-018-36870-7.

Bateman, R.L., Morgan, D.L., Wueringer, B.E., McDavitt, M. and Lear, K.O. 2024. Collaborative methods identify a remote global diversity hotspot of threatened, large-bodied rhino rays. Aquatic Conservation: Marine and Freshwater Ecosystems: 34(1). Bejder, L., Videsen, S., Hermannsen, L., Simon, M., Hanf, D. and Madsen, P.T. 2019. Low energy expenditure and resting behaviour of humpback whale mother-calf pairs highlights conservation importance of sheltered breeding areas. Scientific Reports, 9(1), p.771.

Batler, I., Patterson, H., Bromhead, D., Galeano, D., Timmiss, T., Woodhams, J., Curtotti, R., 2023. Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra. pp.70-77. https://doi.org/10.25814/vgp4-xr81.

Bayliss P and Hutton M (2017). Integrating Indigenous knowledge and survey techniques to develop a baseline for dugong (Dugong dugon) management in the Kimberley: Final Report of project 1.2.5 of the Kimberley. Marine Research Program Node of the Western Australian Marine Science Institution, WAMSI, Perth, Western Australia, 98 pp. Final-Report-WAMSI-KMRP-Dugong-Developing-a-Baseline-for-Dugong-Management-Bayliss-Hutton-1.pdf

Benjamin, J., O'Leary, M., McDonald, J., Wisemen, C., McCarthy, J., Beckett, E., Morrison, P., Stankiewicz, F., Leach, J., Hacker, J., Baggaley, P., Jerbic, K., Fowler, M., Fairweather, J., Jefferies, P., Ulm, S., and Bailey, G. 2020. Aboriginal artefacts on the continental shelf reveal ancient drowned cultural landscapes in northwest Australia. PLoS ONE 15(7): e0233912. https://doi.org/10.1371/journal.pone.0233912.

Benjamin, J., O'Leary, M., McCarthy, J., Reynen, W., Wiseman, C., Leach, J., Bobeldyk, S., Buchler, J., Kermeen, P., Langley, M., Black, A., Yoshida, H., Parnum, I., Stevens, A., Ulm, S., McDonald, J., Veth, P., and Bailey, G. 2023 Stone artefacts on the seabed at a submerged freshwater spring confirm a drowned cultural landscape in Murujuga, Western Australia. Quaternary Science Reviews 313: 108190. https://doi.org/10.1016/j.quascirev.2023.108190.

Bertolero, A., Oro, D., Martínez Vilalta, A., and Àngel López, M. 2005. Selection of foraging habitats by Little Terns *Sterna albifrons* at the Ebro Delta. Revista Catalana d'Ornitologia 21:37–42.

BirdLife International 2021. Important Bird Areas factsheet: Bedout Island. Downloaded from http://www.birdlife.org on 12/10/2021.

Birds Australia 2005. Personal Communication, August 2005. Referenced in Species Profile and Threats Database *Sula dactylatra bedouti* — Masked Booby (eastern Indian Ocean). Accessed 12 August 2024.

Blake, I., Butler, I. and Dylewski, M. 2021. Chapter 6: North West Slope Trawl Fishery. In: *Fishery status reports 2021*, Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra. CC BY 4.0.

Blake, S., Bromhead, D, Patterson, H. and Dylewski, M. 2022a. Western Tuna and Billfish Fishery. In: Fishery Status Reports 2022. Patterson, H., Bromhead, D., Galeano, D., Larcombe, J., Timmiss, T., Woodhams, J. and Curtotti, R. Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra. pp. 326–339.

Blue Planet Marine 2020. Australian Blue Whale Species Assessment Report (No. v4). Unpublished report to Woodside Energy Ltd.

BMT WBM 2010. Ecological Character Description for Kakadu National Park Ramsar Site. Prepared for the Australian Government Department of Sustainability, Environment, Water, Population and Communities. https://www.dcceew.gov.au/sites/default/files/documents/2-ecd.pdf.

BMT WBM 2011. Ecological Character Description for Cobourg Peninsula Ramsar Site. Prepared for the Australian Government, Canberra. https://www.dcceew.gov.au/sites/default/files/documents/1-ecd_0.pdf.

Botle A., Swann G., Willing T., Gale T., Collison L. (2004) Adele Island Bird Survey Report: 19th to 24th November 2004. https://library.dbca.wa.gov.au/FullTextFiles/070853.pdf.

Bouchet, P.J., Thiele, D., Marley, S.A., Waples, K., Weisenberger, F., Balangarra Rangers, Bardi Jawi Rangers, Dambimangari Rangers, Nyamba Buru Yawuru Rangers, Nyul Nyul Rangers, Uunguu Rangers and Raudino, H. 2021. Regional assessment of the conservation status of Snubfin Dolphins (*Orcaella heinsohni*) in the Kimberley Region, Western Australia. Frontiers in Marine Science 7:article 614852.

Braccini, M. and Blay, N. 2020. Temperate Demersal Gillnet and Demersal Longline Fisheries Resource Status Report 2020. In: *Status Reports of the Fisheries and Aquatic Resources of Western Australia 2019/20*: The State of the Fisheries eds. D.J. Gaughan and K. Santoro. Department of Primary Industries and Regional Development, Western Australia. pp. 214–220.

Braccini, M. and Watt, M. 2021. Temperate Demersal Gillnet and Demersal Longline Fisheries Resource Status Report 2021. In*: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2020/21:* The State of the Fisheries eds. B.S. Wise, D.J. Gaughan, K.G. Santoro and S.J. Newman. Department of Primary Industries and Regional Development, Western Australia. pp. 217–223.

Braccini, M. and Watt, M. 2023. Temperate Demersal Gillnet and Demersal Longline Fisheries Resource Status Report. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2019/20: The State of the Fisheries eds. D.J. Gaughan and K. Santoro. Department of Primary Industries and Regional Development, Western Australia. pp. 227–232.

Braccini, M. and Rynvis, L. 2023. Temperate Demersal Gillnet and Demersal Longline Fisheries Resource Status Report. In: Newman, S.J., Santoro, K.G. and Gaughan, D.J. (eds). 2023. Status Reports of the Fisheries and Aquatic Resources of Western Australia 2022/23: The State of the Fisheries. Department of Primary Industries and Regional Development, Western Australia. pp 238–244.

Brewer, D., Lyne, V., Skewes, T. and Rothlisberg, P. 2007, Trophic Systems of the North West Marine Region, Report to the Department of the Environment and Water Resources, CSIRO Marine and Atmospheric Research, Cleveland. 167 pp.

Brown, A., Bejder, L., Cagnazzi, D., Parra, G.J. and Allen, S.J. 2012. The North West Cape, Western Australia: a potential hotspot for Indo-Pacific humpback dolphins *Sousa chinensis*? Pacific Conservation Biology 18: 240−246.

Brown, A.M., Bejder, L., Pollock, K.H. and Allen, S.J. 2016. Site-specific assessments of the abundance of three inshore dolphin species to inform conservation and management. Frontiers in Marine Science https://doi.org/10.3389/fmars.2016.00004.

Brown, A.M., Kopps, A.M., Allen, S.J., Bejder, L., Littleford-Colquhoun, B., Parra, G.J., Cagnazzi, D., Thiele, D., Palmer, C. and Frère, C.H. 2014. Population differentiation and hybridisation of Australian snubfin (*Orcaella heinsohni*) and Indo-Pacific humpback (*Sousa chinensis*) dolphins in north-western Australia. PLoS ONE 9: e101427.

Bruce, B.D., Stevens, J.D., and Malcolm, H. 2006. Movements and swimming behaviour of white sharks (*Carcharodon carcharias*) in Australian waters. Marine Biology 150: 161–172.

Bruce, B.D. 2008. The biology and ecology of the white shark, *Carcharodon carcharias*. In: Camhi, M.D., Pikitch, E.K., Babcock, E.A. (eds.), Sharks of the Open Ocean: Biology, Fisheries and Conservation. Blackwell Publishing Limited, Oxford, pp. 69–81.

Bulman, C. 2006. Trophic webs and modelling of Australia's North West Shelf. North West Shelf Joint Environmental Management Study (NWSJEMS) Technical Report No. 9. CSIRO Marine and

Atmospheric Research, Hobart. 49 pp.

Burbidge, A.A., Johnstone, R.E., and Fuller. P.J. 1996. The status of seabirds in Western Australia. In: Ross, G.J.B., K. Weaver & J.C. Greig, eds. The Status of Australia's Seabirds: Proceedings of the National Seabird Workshop, Canberra, 1–2 November 1993. Page(s) 57-–71. Canberra: Biodiversity Group, Environment Australia.

Burbidge, A.A., Fuller, P., Lane, A.K. and Moore, S. 1987. Counts of Nesting Boobies and Lesser Frigate-birds in Western Australia. Emu 87:128–129.

Burger J, Gochfeld M, and Bonan, A. 1996. Gulls, Terns, Skimmers (Laridae). In: del Hoyo J, Elliott A, Sargatal J, Christie DA, de Juana E, editors. Handbook of the Birds of the World Alive Vol 3. Barcelona: Lynx Edicions.

Campana, S. and Joyce, W. 2004. Temperature and depth associations of porbeagle shark (*Lamna nasus*) in the northwest Atlantic. Fisheries Oceanography 13 (1): 52–64.

Campana, S.E., Joyce, W. and Fowler, M. 2010. Subtropical pupping ground for a cold-water shark. Canadian Journal of Fisheries and Aquatic Sciences 67: 769–773.

Campana, S.E., Marks, L. and Joyce, W. 2005. The biology and fishery of shortfin mako sharks (*Isurus oxyrinchus*) in Atlantic Canadian waters. Fisheries Research 73: 341–352.

Cannell, B., Allen, P.J.D., Wiley, E.M., Radford, B., Surman, C.A., and Ridley, A. 2022. The diet of brown boobies at a globally significant breeding ground is influenced by sex, breeding, sub-colony and year. Marine Ecology Progress Series. 10.3354/meps13895.

Cannell, B. and Surman A. 2021. Ashmore reef: seabirds and shorebirds, pages 122–148, in Keesing, J.K., Webber, B.L., Hardiman, L.K. (Eds). Ashmore Reef Marine Park Environmental Assessment. Report to Parks Australia. CSIRO, Crawley Australia.

Cannell, B., Hamilton, S. and Driessen, J. 2019. Wedge-tailed shearwater foraging behaviour in the Exmouth Region. BirdLife Australia and University of Western Australian study. Available from: https://www.birdlife.org.au/documents/wedge-tailed%20shearwater%20foraging%20behaviour.pdf.

Carruthers, T.J.B., Dennison, W.C., Kendrick, G., Waycott, M., Walker, D.I. and Cambridge, M. 2007. Seagrasses of south west Australia: a conceptual synthesis of the world's most diverse and extensive seagrass meadows. Journal of Experimental Marine Biology & Ecology 350: 21–45.

Catry T, Ramos JA, Le Corre M, Phillips RA. 2009. Movements, at-sea distribution and behaviour of a tropical pelagic seabird: the wedge-tailed shearwater in the western Indian Ocean. Mar Ecol Prog Ser 391:231–242. https://doi.org/10.3354/meps07717.

Ceccarelli, D., McCrea, I., Collis, M. and Nicoll, R. 2011. Australia's Last Great Whale Haven – Cetacean distribution and conservation needs in the north-west marine region. International Fund for Animal Welfare, November 2011. 72 pp.

Cerchio, S., Yamada, T.K., and Brownell Jr, R.L. 2019. Global Distribution of Omura's Whales (*Balaenoptera omurai*) and Assessment of Range-Wide Threats. *Fronteris in Marine Science*, 6 (67). DOI:10.3389/fmars.2019.00067.

Chandrapavan, A., Wilkin, S., Breheny, N., Grounds, G. Cavalli, P. 2023. Shark Bay Blue Swimmer Crab Resource Status Report. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2019/20: The State of the Fisheries eds. D.J. Gaughan and K. Santoro. Department of Primary Industries and Regional Development, Western Australia. pp. 112–117.

Chandrapavan, A., Wilkin, S., and Brown, S. 2023a. Shark Bay Blue Swimmer Crab Resource Status Report. In: Newman, S.J., Santoro, K.G. and Gaughan, D.J. (eds). 2023. Status Reports of the Fisheries and Aquatic Resources of Western Australia 2022/23: The State of the Fisheries. Department of Primary Industries and Regional Development, Western Australia pp 114–119.

Charlton, C., Ward, R., McCauley, R.D., Brownell, Jr R.L., Kent, C.S. and Burnell, S. 2019. Southern

Right Whale (*Eubalaena Australis*), Seasonal Abundance and Distribution at Head of Bight, South Australia. Aquatic Conservation 29, 4, 576-588. DOI: https://doi.org/10.1002/aqc.3032.

Chevron Australia 2010. Draft Environmental Impact Statement/Environmental Review and Management Programme for the Proposed Wheatstone Project. Appendix Q7 – Baseline water quality assessment report. Chevron Australia, Perth, Western Australia. Available from: https://australia.chevron.com/our-businesses/wheatstone-project/environmental-approvals [Accessed 14 May 2021].

Chevron Australia 2019. Jansz-Io Soundscape Monitoring Marine fauna acoustic detections 1 Jan to 31 Dec 2019. Chevron Energy Technology Pty Ltd, Perth, Western Australia.

Chiaradia, A., Dann, P., Jessop, R. and Collins, P., 2002. The diet of crested tern (*Sterna bergii*) chicks on Phillip Island, Victoria, Australia. Emu, 102(4), pp.367–371.

Chidlow, J., Gaughan, D. and McAuley, R. 2006. Identification of Western Australian Grey Nurse Shark Aggregation Sites: Final Report to the Australian Government, Department of the Environment and Heritage. In: Fisheries Research and Development Corporation (ed.), Fisheries Research Report, Perth, Department of Fisheries, Perth.

Christiansen, F., Vivier, F., Charlton, C., Ward, R., Amerson, A., Burnell, S. and Bejder, L. 2018. Maternal Body Size and Condition Determine Calf Growth Rates in Southern Right Whales. Marine Ecology Progress Series 592, 267–281.Fisheries Research Report, Perth, Department of Fisheries, Perth.

Christiansen, F., Uhart, M.M., Bejder, L., Clapham, P., Ivashchenko, Y., Tormosov, D., Lewin, N. and Sironi, M. 2022. Fetal Growth, Birth Size and Energetic Cost of Gestation in Southern Right Whales. The Journal of Physiology 600, 9, 2245–2266.

Clarke, R.H. 2010. The Status of Seabirds and Shorebirds at Ashmore Reef and Cartier and Browse Islands: Monitoring program for the Montara Well release – Pre-impact Assessment and First Post-impact Field Survey. Prepared on behalf of PTTEP Australasia and the Department of the Environment, Water, Heritage and the Arts, Australia (now the Department of Sustainability, Environment, Water, Population and Communities).

Clarke R.H., Carter M., Swann G., Thomson J. 2011. The status of breeding seabirds and herons at Ashmore Reef, off the Kimberley coast, Australia. Journal of the Royal Society of Western Australia, 94: 365–376.

Clarke, R.H. and Herrod, A. 2016. The status of seabirds and shorebirds at Ashmore Reef, Cartier Island & Browse Island. Final impact assessment for the Montara Oil Spill. Prepared on behalf of PTTEP Australasia and the Department of the Environment. Monash University, Melbourne, Australia.

Clarkson, C., Jacobs, Z., Marwick, B., Fullagar, R., Wallis, L., Smith, M., Roberts, R., Hayes, E., Lowe, K., Carah, X., Florin, S., McNeil, J., Cox, D., Arnold, L., Hua, Q., Huntley, J., Brand, H., Manne, T., Fairbairn, A., Shulmeister, J., Lyle, L., Salinas, M., Page, M., Connell, K., Park, G., Norman, K., Murphy, T. and Pardoe, C. 2017. Human occupation of northern Australia by 65,000 years ago. Nature (547) 306–310. Doi: https://doi.org/10.1038/nature22968.

Cleguer, C. and Marsh, H. 2023. An inventory of dugong aerial surveys in Australia. Report to the National Environmental Science Program. Centre for Tropical Water and Aquatic Ecosystem Research (TropWATER), Report 23/15, James Cook University. pp. 48. https://www.nespmarinecoastal.edu.au/wp-content/uploads/2023/09/Project-1.20-Final-report-dugongs.pdf [Accessed on 18/08/24].

Clarke, R.H. and Herrod, A. 2016. The status of seabirds and shorebirds at Ashmore Reef, Cartier Island & Browse Island. Final impact assessment for the Montara Oil Spill. Prepared on behalf of PTTEP Australasia and the Department of the Environment. Monash University, Melbourne, Australia.

Cliff, G. and Wilson, G. 1994. Natal sharks board's guide to sharks and other marine animals. Natal Sharks Board, 33 pp.

Commonwealth of Australia 2002a. Ningaloo Marine Park (Commonwealth Waters) Management Plan. Environment Australia, Canberra.

Commonwealth of Australia 2002b. Ashmore Reef National Nature Reserve and Cartier Island Marine Reserve (Commonwealth Waters) Management Plans. Environment Australia, Canberra.

Commonwealth of Australia 2006. A guide to the Integrated Marine and Coastal Regionalisation of Australia (IMCRA) version 4.0. Department of Environment and Heritage, Canberra, Australia. 16 pp.

Commonwealth of Australia 2010. Inclusion of a place in the National Heritage List, The Ningaloo Coast. Gazette Special. Published Wednesday, 6 Jan 2010. https://www.dcceew.gov.au/sites/default/files/env/pages/96f9d558-fd97-4022-9e63-82c0e18349a1/files/10588104.pdf.

Commonwealth of Australia 2011. Inclusion of a place in the National Heritage List, The West Kimberley. Gazette Special. Published 31 Aug 2011. https://www.environment.gov.au/heritage/laws/publicdocuments/pubs/106063_gazette_place_inclusion_20110831.pdf.

Commonwealth of Australia 2015a. Conservation Management Plan for the Blue Whale: A Recovery Plan under the *Environment Protection and Biodiversity Conservation Act 1999* 2015-2025. Canberra, ACT: Commonwealth of Australia. Available from: http://www.environment.gov.au/biodiversity/threatened/publications/recovery/blue-whale-conservation-management-plan.

Commonwealth of Australia 2015b. Sawfish and River Sharks Multispecies Recovery Plan. Canberra, ACT: Commonwealth of Australia. Available from: http://www.environment.gov.au/biodiversity/threatened/publications/recovery/sawfish-river-sharks-multispecies-recovery-plan.

Commonwealth of Australia 2015c. Wildlife Conservation Plan for Migratory Shorebirds. Canberra, ACT: Commonwealth of Australia. Available from: https://www.environment.gov.au/system/files/resources/9995c620-45c9-4574-af8e-a7cfb9571deb/files/widlife-conservation-plan-migratory-shorebirds.pdf.

Commonwealth of Australia 2017. Recovery Plan for Marine Turtles in Australia. Australian Government, Canberra. Available from: http://www.environment.gov.au/marine/publications/recovery-plan-marine-turtles-australia-2017.

Commonwealth of Australia 2018. Threat abatement plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans. Canberra, ACT: Commonwealth of Australia. Available from: https://www.environment.gov.au/biodiversity/threatened/publications/tap/marine-debris-2018.

Commonwealth of Australia 2020a. Wildlife Conservation Plan for Seabirds. Canberra, ACT: Commonwealth of Australia. Available from: https://www.dcceew.gov.au/environment/biodiversity/publications/wildlife-conservation-plan-seabirds-2022.

Commonwealth of Australia 2020b. National recovery Plan for the Australian Fairy Tern (*Sternula nereis nereis*). Department of Agriculture, Water and the Environment, Canberra. http://www.dcceew.gov.au/environment/biodiversity/threatened/publications/recovery/fairy-tern-2022.

Commonwealth of Australia 2021. Indian Ocean Territories Marine Parks. Parks Australia. Available from: https://parksaustralia.gov.au/marine/parks/indian-ocean-territories/.

Condie, S.A, Andrewartha, J., Mansbridge, J. and Waring, J.R. 2006. Modelling circulation and connectivity on Australia's North West Shelf, Technical Report No. 6, North West Shelf Joint

Environmental Management Study, CSIRO Marine and Atmospheric Research, Hobart, Tasmania.

Corrigan, S., Lowther, A.D., Beheregaray, L. B, Bruce, B.D., Cliff, G., Duffy, C.A, Foulis, A., Francis, M.P., Goldsworthy, S.D., Hyd, J. R., Jabado, R.W, Kacev, D., Marshall, L., Mucientes G.R., Naylor, G.J.P., Pepperell, J.G., Queiroz, N., Whit, W.T, Wintner, S. P., Rogers, P.J. 2018. Population Connectivity of the Highly Migratory Shortfin Mako (*Isurus oxyrinchus Rafinesque* 1810) and Implications for Management in the Southern Hemisphere. Conservation and Restoration Ecology 6.

Crawford, R., Cooper, J. Dyer, B., Upfold, L. Venter, AD., Whittington, P., Williams, AJ Wolfaardt, A. 2002. Longevity, inter-colony movements and breeding of Crested Terns in South Africa. Emu. 102. 10.1071/MU01009.

Currey-Randall LM, Galaiduk R, Stowar M, Vaughan BI, Miller KJ. 2021. Mesophotic fish communities of the ancient coastline in Western Australia. PLoS ONE 16(4): e0250427. https://doi.org/10.1371/journal.pone.0250427.

D'Alberto, D.M., Chin, A., Smart, J.J., Baje, L., White, W.T. and Simpfendorfer, C.A. 2017. Age, growth and maturity of oceanic whitetip shark (*Carcharhinus longimanus*) from Papua New Guinea. Marine and Freshwater Research 68: 1118–1129.

D'Anastasi, B., Simpfendorfer, C.A. and van Herwerden, L. 2013. In: The IUCN Red List of Threatened Species. Version 2013.2. *Anoxypristis cuspidata* (Narrow Sawfish). http://www.iucnredlist.org/details/39389/0.

Davies, C.L., Tothill, T., Meeuwig, J.J. and Kyne, P.M., 2022. Garig Gunak Barlu National Park Green Sawfish (*Pristis zijsron*) aggregation surveys. https://researchers.cdu.edu.au/en/publications/garig-gunak-barlu-national-park-green-sawfish- ipristis-zijsroni-a.

D'Cruz, A., Salgado Kent, C., Waples, K., Brown, A. M., Marley, S. A., Thiele, D., and Raudino, H. C. 2022. Ranging Patterns and Site Fidelity of Snubfin Dolphins in Yawuru Nagulagun/Roebuck Bay, Western Australia. Frontiers in Marine Science, 8. https://doi.org/10.3389/fmars.2021.758435.

Dawson, C.E. 1985. Indo-Pacific pipefishes (Red Sea to the Americas). Gulf Coast Research Laboratory, Ocean Springs, Mississippi, USA.

De Lestang, S., and Walsh, A. 2023. West Coast Rock Lobster Resource Status Report 2023. In: Newman, S.J., Santoro, K.G. and Gaughan, D.J. (eds). 2023. Status Reports of the Fisheries and Aquatic Resources of Western Australia 2022/23: The State of the Fisheries. Department of Primary Industries and Regional Development, Western Australia pp. 41–46.

Debens, H.A., McCorry, D., Sidenko, E., Erbe, C., Collet, O., Pevzner, R. and Gurevich, B. 2024. Whale detection and microseismic monitoring via Das using submarine telecommunications cables – a case study from the NWS, Western Australia. Australian Energy Producers Journal 64 (S1), S481-486. https://doi.org/10.1071/EP23268.

del Hoyo, J., A. Elliott, D.A. Christie and J. Sargatal 1996. Handbook of the Birds of the World: Hoatzin to Auks. Barcelona: Lynx Edicions.

Director of National Parks 2016. Kakadu National Park Management Plan 2016–2026.

Done, T.J., Williams, D.McB., Speare, P.J., Davidson, J., DeVantier, L.M., Newman, S.J. and Hutchins, J.B. 1994. Surveys of coral and fish communities at Scott Reef and Rowley Shoals., Australian Institute of Marine Science, Townsville.

Double, M., Gales, N., Jenner, K., Jenner, M., 2010. Satellite tracking of south-bound female humpback whales in the Kimberley region of Western Australia. Australian Marine Mammal Centre, Hobart.

Double, M., Jenner, K., Jenner, M., Ball, I., Childerhouse, S., Loverick, S. and Gales, N. 2012. Satellite tracking of northbound humpback whales (*Megaptera novaeangliae*) off Western Australia. Australian Marine Mammal Centre, Hobart.

Double, M.C., Andrews-Goff, V., Jenner, K.C.S., Jenner, M.N., Laverick, S.M., Branch, T.A. and Gales, N.J., 2014. Migratory movements of pygmy blue whales (*Balaenoptera musculus brevicauda*) between Australia and Indonesia as revealed by satellite telemetry. PLoS One, 9(4), p.e93578.

Duffy, R., Quinn, A., Brooks, B. and Blazeski, S. 2023a. West Coast Nearshore and Estuarine Finfish Resource Status Report. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2021/2022: The State of the Fisheries eds. Newman, S.J., Wise, B.S., Santoro, K.G. and Gaughan, D.J. Department of Primary Industries and Regional Development, Western Australia. pp. 63–70.

Duffy, R., Harris, D., Brooks, B., Blazeski, S. and Quinn, A. 2023b. South Coast Estuarine and Nearshore Scalefish and Invertebrate Resource Status Report. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2021/2022: The State of the Fisheries eds. Newman, S.J., Wise, B.S., Santoro, K.G. and Gaughan, D.J. Department of Primary Industries and Regional Development, Western Australia. pp. 213–221.

Duffy, R., Harris, D., Brooks, B., Blazeski, S. and Quinn, A. 2023c. West Coast Nearshore and Estuarine Finfish Resource Status Report. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2022/2023: The State of the Fisheries eds. Newman, S.J., Wise, B.S., Santoro, K.G. and Gaughan, D.J. Department of Primary Industries and Regional Development, Western Australia. pp. 63–71.

Duffy, R., Harris, D., Brooks, B., McKinley, S. and Quinn, A. 2023d. South Coast Estuarine and Nearshore Scalefish and Invertebrate Resource Status Report. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2022/2023: The State of the Fisheries eds. Newman, S.J., Wise, B.S., Santoro, K.G. and Gaughan, D.J. Department of Primary Industries and Regional Development, Western Australia. pp. 224–233.

Dunlop, J.N. 1997. Foraging ranges marine habitat and diet of bridled terns breeding in Western Australia. Corella. 21 (3): 77-82.

Dunlop, J. N. 2018. Fairy Tern (*Sternula nereis*) conservation in south-western Australia. Second Edition. Conservation Council (WA): Perth.

Dunlop J.N., Surman C.A., Wooller R.D. 2001. The marine distribution of seabirds from Christmas Island, Indian Ocean, Emu - Austral Ornithology, 101:1, 19–24.

Dunlop, J.N. and McNeill S. 2017. Local movements, foraging patterns, and heavy metals exposure in Caspian Terns *Hydroprogne caspia* breeding on Penguin Island, Western Australia. Marine Ornithology. 45:115–120.

Dunlop, J.N. and Greenwell, C. 2022. A long tern view: distribution of small terns (*Sternula*) in Western Australia and implications for their conservation. Pacific Conservation Biology doi:10.1071/PC22016.

Evans, S.N., Konzewitsch, N., & Bellchambers, L.M. 2022. Houtman Abrolhos Islands Fish Habitat Protection Area: A Summary of Marine Resource Use and Ecological Attributes. Fisheries Research Report No. 321. Department of Primary Industries and Regional Development, Western Australia. 174pp.

Fairclough, D. and Walters, S. 2018. West Coast Demersal Scalefish Resource Status Report 2018. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2017/18: The State of the Fisheries eds. D.J. Gaughan and K. Santoro. Department of Primary Industries and Regional Development, Western Australia. pp. 56–62.

Falkner, I., Whiteway, T., Przeslawski, R. and Heap, A.D. 2009. Review of ten key ecological features (KEFs) in the North-west Marine Region. Record 2009/13, Geoscience Australia, Canberra.

Fayet, A.L., Sanchez, C. and Appoo, J.2023. Marked differences in foraging area use and susceptibility to predation between two closely-related tropical seabirds. Oecologia 203, 167– 179 (2023). https://doi.org/10.1007/s00442-023-05459-x.

Ferreira, L.C., Thums, M., Fossette, S., Wilson, P., Shimada, T., Tucker, A.D., Pendoley, K., Waayers, D., Guinea, M.L., Loewenthal, G., King, J., Speirs, M., Rob, D. and Whiting. S.D. 2021. Multiple satellite tracking datasets inform green turtle conservation at a regional scale. Diversity and Distributions 27(2): 249–266. https://doi.org/10.1111/ddi.13197.

Ferreira, L.C., Davenport, A., Jenner, M., Jenner, C. and Thums, M. 2024. Technical note: cetacean sightings and observations made during the 2023 pygmy blue whale field work off Western Australia. A document prepared for Woodside Energy Ltd. Australian Institute of Marine Science, Perth (8 pp.).

Field, I.C., Charters, R., Buckworth, R.C., Meekan, M.G. and Bradshaw, C.J.A. 2008. Distribution and abundance of *Glyphis* and sawfishes in northern Australia and their potential interactions with commercial fisheries. Report to Australian Government, Department of the Environment, Water, Heritage and the Arts. Canberra. 39 pp.

Fletcher, W.J. and Santoro, K. (eds) 2009. State of the fisheries report 2008/09. Western Australian Department of Fisheries, Perth.

Fletcher, W.J. and Santoro, K. (eds) 2015. Status Reports of the Fisheries and Aquatic Resources of Western Australia 2014/15: The State of the Fisheries. Department of Fisheries, Western Australia.

Fletcher, W.J., Mumme, M.D. and Webster, F.J. (eds) 2017. *Status Reports of the Fisheries and Aquatic Resources of Western Australia 2015/16: The State of the Fisheries*. Department of Fisheries, Western Australia.

Fisher, E., Fairclough, D. and Walters, S. 2023. West Coast Demersal Scalefish Resource Status Report. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2021/2022: The State of the Fisheries eds. Newman, S.J., Wise, B.S., Santoro, K.G. and Gaughan, D.J. Department of Primary Industries and Regional Development, Western Australia. pp. 75–84.

Fisher, E., Fairclough, D. and Walters, S. 2023a. West Coast Demersal Scalefish Resource Status Report. In: Newman, S.J., Santoro, K.G. and Gaughan, D.J. (eds). 2023. Status Reports of the Fisheries and Aquatic Resources of Western Australia 2022/23: The State of the Fisheries. Department of Primary Industries and Regional Development, Western Australia pp 76–84.

Fossette, S., Ferreira, L. C., Whiting, S. D., King, J., Pendoley, K., Shimada, T., Speirs, M., Tucker, A. D., Wilson, P. and Thums, M. 2021a. Movements and distribution of hawksbill turtles in the Eastern Indian Ocean. Global Ecology and Conservation. 29. https://doi.org/10.1016/j.gecco.2021.e01713.

Fossette S, Loewenthal G, Peel LR, Vitenbergs A, Hamel MA, Douglas C, Tucker AD, Mayer F, Whiting SD. 2021b. Using Aerial Photogrammetry to Assess Stock-Wide Marine Turtle Nesting Distribution, Abundance and Cumulative Exposure to Industrial Activity. Remote Sensing. 13(6):1116. https://doi.org/10.3390/rs13061116.

Francis, M., Natanson, L. and Campana, S. 2002. The Biology and Ecology of the Porbeagle Shark, *Lamna nasus*. In: Camhi, M., E. Pikitch and E. Babcock, eds. Sharks of the Open Ocean: Biology, Fisheries and Conservation: 105–113.

Gaughan, D.J. and Santoro, K. (eds), 2018. *Status Reports of the Fisheries and Aquatic Resources of Western Australia 2016/17: The State of the Fisheries*. Department of Primary Industries and Regional Development, Western Australia.

Gaughan, D.J. and Santoro, K. (eds). 2020. *Status Reports of the Fisheries and Aquatic Resources of Western Australia 2018/19: The State of the Fisheries*. Department of Primary Industries and Regional Development, Western Australia.

Gelsleichter, J., Musick, J.A. and Nichols, S. 1999. Food habits of the smooth dogfish, *Mustelus canis*, dusky shark, *Carcharhinus obscurus*, Atlantic sharpnose shark, *Rhizoprionodon terraenovae*, and the sand tiger, *Carcharias taurus*, from the northwest Atlantic Ocean. Environmental Biology of Fishes 54: 205–217.

Gilmour, J.P., Smith, L.D., Heyward, A.J., Baird A.H. and Pratchett, M.S. 2013. Recovery of an isolated coral reef system following severe disturbance. Science 340(6128): 69–71.

Gilmour, J.P., Cook, K.L., Ryan, N.M., Puotinen, M.L., Green, R.H., Shedrawi, G., Hobbs, J.P.A., Thomson, D.P., Babcock, R.C., Buckee, J. and Foster, T. 2019. The state of Western Australia's coral reefs. Coral Reefs, 38: 651–667.

Gilmour, J., Sahin, D., Ryan, N. and Birt, M. 2023. Long Term Monitoring of Coral and Fish Communities at Scott Reef and Rowley Shoals: 2021. Report prepared for Woodside Energy Limited. Australian Institute of Marine Science, Perth (50 pp).

Goldsworthy, S.D., Shaughnessy, P.D., MacKay, A.I., Bailleul, F., Holman, D., Lowther, A.D., Page, B., Waples, K., Raudino, H., Bryars, S. and Anderson, T. 2021. Assessment of the status and trends in abundance of a coastal pinniped, the Australian sea lion, *Neophoca cinerea*. Endangered Species Research 44: 421–437.

Greenwell, C. 2021. Life history, ecology, and population dynamics of the Australian Fairy Tern and implications for their conservation. Research thesis, Murdoch University, Perth, Western Australia.

Gosby, C., Erbe, C., Harvey, E.S., Figueroa Landero, M.M. and McCauley, R.D. 2022. Vocalizing humpback whales (*Megaptera novaeangliae*) migrating from Antarctic feeding grounds arrive earlier and earlier in the Perth Canyon, Western Australia. Frontiers in Marine Science, 9, p.1086763.

Guinea, M.L. 2006. Sea Turtles, Sea Snakes and Dugongs of Scott Reef, Seringapatam Reef and Browse Island with Notes on West Lacepede Island. Report to URS, Charles Darwin University.

Guinea, M.L. 2007a. Marine snakes: species profile for the north-western planning area, report for the Australian Government Department of the Environment, Water, Heritage and the Arts, Charles Darwin University, Northern Territory.

Guinea, M.L. 2007b. Final report survey March 16 – April 2 2007: sea snakes of Ashmore Reef, Hibernia Reef and Cartier Island with comments on Scott Reef, Charles Darwin University, Darwin.

Guinea, M.L. 2009. Long Term Marine Turtle Monitoring at Scott Reef. Report prepared for Woodside Pty Ltd.

Guinea, M.L. and Whiting, S.D. 2005. Insights into the distribution and abundance of sea snakes at Ashmore Reef. The Beagle (Supplement 1): 199–206.

Guinea, M. 2011. Long term monitoring of the marine turtles of Scott Reef satellite tracking of green turtles from Scott Reef #1 (p. 35). Appendix F27. Report prepared by Sinclair Knight Merz. Browse LNG Development.

Hallenburger, M., Reuning, L., Takayanagi, H., Iryu, Y., Keul, N., Ishiwa, T. and Yokoyama, Y. 2022. The pteropod species *Heliconoides inflatus* as an archive of late Pleistocene to Holocene environmental conditions on the Northwest Shelf Australia. Progress in Earth and Planetary Science 9:49. https://doi.org/10.1186/s40645-022-00507-1.

Hallegraeff, G.M. 1995. Marine phytoplankton communities in the Australian region: current status and the future threats. Our sea, our future: major findings of the State of the Marine Environment Report for Australia. Great Barrier Reef Marine Park Authority, Canberra, Australia.

Hanf, D., Hunt, T. and Parra, G.J. 2016. Humpback dolphins of Western Australia: a review of current knowledge and recommendations for future management. Advances in Marine Biology 73: 193–218. https://doi.org.10.1016/bs.amb.2015.07.004.

Hanf, D.M. 2015. Species Distribution Modelling of Western Pilbara Inshore Dolphins. Masters Research thesis. Murdoch University, Perth, Western Australia.

Hanson, C.E., Pattiaratchi, C.B. and Waite, A.M. 2005. Seasonal production regimes off south-western Australia: influence of the Capes and Leeuwin Currents on phytoplankton dynamics. Marine and Freshwater Research 56(7): 1011–1026.

Hanson, C.E., Waite, A.M., Thompson, P.A. and Pattiaratchi, C.B. 2007. Phytoplankton community structure and nitrogen nutrition in Leeuwin Current and coastal waters off the Gascoyne region of Western Australia. Deep Sea Research Part II: Topical Studies in Oceanography 54 (8–10): 902–924.

Harris, P., Heap, A., Passlow, V., Sbaffi, L. Fellows, M., Porter-Smith, R., Buchanan, C., and Daniell, J. 2005. Geomorphic Features of the Continental Margin of Australia. Geoscience Australia, Record 2003/30, 142 pp.

Harris, P.T., Heap, A., Marshall, J., Hemer, M., Daniell, J., Hancock, A., Buchanan, C., Brewer, D. and Heales, D. 2007. Submerged coral reefs and benthic habitats of the southern Gulf of Carpentaria: post survey report GA survey 276, RV Southern Surveyor, Record 2007/02, Geoscience Australia, Canberra.

Hart, A., Murphy, D. and Steele, A. 2023a. Sea Cucumber Resource Status Report. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2021/2022: The State of the Fisheries eds. Newman, S.J., Wise, B.S., Santoro, K.G. and Gaughan, D.J. Department of Primary Industries and Regional Development, Western Australia. pp. 180–191.

Hart, A., Murphey, D. and Brown, S. 2023b. Pearl Oyster Managed Fishery Resource Status Report. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2021/2022: The State of the Fisheries eds. Newman, S.J., Wise, B.S., Santoro, K.G. and Gaughan, D.J. Department of Primary Industries and Regional Development, Western Australia. pp. 176–182.

Hart, A., Bruce, C. and Steele, A. 2023c. Statewide Specimen Shell Resource Status Report. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2021/2022: The State of the Fisheries eds. Newman, S.J., Wise, B.S., Santoro, K.G. and Gaughan, D.J. Department of Primary Industries and Regional Development, Western Australia. pp. 269–271.

Hart, A., Murphy, D. and Blay, N. 2023d. West Coast Octopus Resource Status Report. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2021/2022: The State of the Fisheries eds. Newman, S.J., Wise, B.S., Santoro, K.G. and Gaughan, D.J. Department of Primary Industries and Regional Development, Western Australia. pp. 58–62.

Hart, A., Murphy, D. and Moore, N. 2023e. Pearl Oyster Managed Fishery Resource Status Report 2023 In: Newman, S.J., Santoro, K.G. and Gaughan, D.J. Status Reports of the Fisheries and Aquatic Resources of Western Australia 2022/23: The State of the Fisheries. Department of Primary Industries and Regional Development, Western Australia pp. 184–187

Hart, A., Bruce, C. and Steele, A. 2023f. Statewide Specimen Shell Resource Status Report. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2022/2023: The State of the Fisheries eds. Newman, S.J., Wise, B.S., Santoro, K.G. and Gaughan, D.J. Department of Primary Industries and Regional Development, Western Australia. pp. 286–289

Hart, A., Murphy, D. and Bouwer, K. 2023g. West Coast Octopus Resource Status Report 2023. In: Newman, S.J., Santoro, K.G. and Gaughan, D.J. Status Reports of the Fisheries and Aquatic Resources of Western Australia 2022/23: The State of the Fisheries. Department of Primary Industries and Regional Development, Western Australia pp 59–63.

Hart, A., Murphy, D., and Steele, A. 2023h. Sea Cucumber Resource Status Report 2023 In: Newman, S.J., Santoro, K.G. and Gaughan, D.J. (eds). Status Reports of the Fisheries and Aquatic Resources of Western Australia 2022/23: The State of the Fisheries. Department of Primary Industries and Regional Development, Western Australia pp. 187–190.

Hassell, C.J. 2003. A bird survey with the Australian Quarantine Inspection Service of some Kimberley islands and Ashmore Reef. Unpubl. report to Australian Quarantine Service.

Haughey, R., Hunt, T.N., Hanf, D., Passadore, C., Baring, R., Parra, G.J. 2021. Distribution and Habitat Preferences of Indo-Pacific Bottlenose Dolphins (*Tursiops aduncus*) Inhabiting Coastal Waters With Mixed Levels of Protection. Frontiers in Marine Science 8:617518.doi:

10.3389/fmars.2021.617518.

Heck Jr., K.L., Hays, G. and Orth, R.J. 2003. Critical evaluation of the nursery role hypothesis for seagrass meadows. Marine Ecology Progress Series 253: 123–136.

Hedley, S.L., Bannister, J.L. and Dunlop, R.A. 2011. Abundance estimates of Breeding Stock 'D' humpback whales from aerial and land-based surveys off Shark Bay, Western Australia, 2008. Journal of Cetacean Research Management (special issue 3): 209–21.

Heyward, A.J., Halford, A.R., Smith, L.D. and Williams, D.M. 1997. Coral reefs of north west Australia: baseline monitoring of an oceanic reef ecosystem. In: Proceedings on 8th International Coral Reef Symposium 1: 289–294.

Heyward, A.J., Revill, A.T. and Sherwood, C.R. 2000. Review of Research and Data Relevant to Marine Environmental Management of Australia's North West Shelf', Produced for the Western Australian Department of Environmental Protection. (Unpublished report).123 pp.

Heyward, A.J. and Radford, B. 2019. Northwest Australia. In: Loya, Y., Puglise, K. Bridge, T. (eds) Mesophotic Coral Ecosystems. Corals Reefs of the World, Volume 12, p 337-349. https://link.springer.com/book/10.1007/978-3-319-92735-0.

Higgins, P.J. and Davies, S.J.J.F. (eds) 1996. Handbook of Australian, New Zealand and Antarctic Birds. Volume 3: Snipe to Pigeons. Oxford University Press, Melbourne.

Holley, D.K., Lawler, I.R. and Gales, N.J. 2006. Summer survey of dugong distribution and abundance in Shark Bay reveals additional key habitat area. Wildlife Research 33: 243-250. https://doi.org/10.1071/WR05031.

Holloway, P. 2001. A regional model of the semidiurnal internal tide on the Australian North West Shelf. Journal of Geophysical Research 106: 19625–19638.

Holloway, P. and Nye, H.C. 1985. Leeuwin Current and wind distributions on the southern part of the Australian North West Shelf between January 1982 and July 1983. Australian Journal of Marine and Freshwater Research 36: 123–137.

Hoschke, A. M., Whisson, G. J., Haulsee, D. 2023. Population distribution, aggregation sites and seasonal occurrence of Australia's western population of the grey nurse shark *Carcharias taurus*. Endangered Species Research 50:107–123.

How, J., Coughran, D., Smith, J., Double, M., Harrison, J., McMath, J., Hebiton, B., Denham, A., 2015. Effectiveness of mitigation measures to reduce interactions between commercial fishing gear and whales. FRDC Final Report 2013/037. Department of Fisheries Western Australia, Perth. 120 pp. https://www.bycatch.org/sites/default/files/How_etal_2015.pdf.

How, J. and Baudains, G. West Coast Deep Sea Crustacean Resource Status Report 2021. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2020/21: The State of the Fisheries eds. B.S. Wise, D.J. Gaughan, K.G. Santoro and S.J. Newman. Department of Primary Industries and Regional Development, Western Australia. pp. 116–120.

How, J. and Wiberg, L. 2023a. West Coast Deep Sea Crustacean Resource Status Report. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2021/2022: The State of the Fisheries eds. Newman, S.J., Wise, B.S., Santoro, K.G. and Gaughan, D.J. Department of Primary Industries and Regional Development, Western Australia. pp. 125–129.

How, J. and Wiberg, L. 2023b. South Coast Crustacean Resource Status Report. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2021/2022: The State of the Fisheries eds. Newman, S.J., Wise, B.S., Santoro, K.G. and Gaughan, D.J. Department of Primary Industries and Regional Development, Western Australia. pp. 201–207.

How, J., Tuffley, E., and Wiberg, L. 2023c. West Coast Deep Sea Crustacean Resource Status Report 2023. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2022/2023: The State of the Fisheries eds. Newman, S.J., Wise, B.S., Santoro, K.G. and Gaughan,

D.J. Department of Primary Industries and Regional Development, Western Australia. pp. 127–133.

How, J., Tuffley, E., and Wiberg, L. 2023d. South Coast Crustacean Resource Status Report 2023. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2022/2023: The State of the Fisheries eds. Newman, S.J., Wise, B.S., Santoro, K.G. and Gaughan, D.J. Department of Primary Industries and Regional Development, Western Australia. pp. 211–217.

Howey-Jordan, L.A., Brooks, E.J., Abercrombie, D.L., Jordan, L.K., Brooks, A., Williams, S., Gospodarczyk, E. and Chapman, D.D. 2013. Complex movements, philopatry and expanded depth range of a severely threatened pelagic shark, the oceanic whitetip (*Carcharhinus longimanus*) in the western North Atlantic. PloS One 8:e56588. https://doi:10.1371/journal.pone.0056588.

Hunt, T.N., Bejder, L., Allen, S.J., Rankin, R.W., Hanf, D. and Parra, G.J. 2017. Demographic characteristics of Australian humpback dolphins reveal important habitat toward the southwestern limit of their range. Endangered Species Research 32: 71–88. https://doi.org/10.3354/esr00784.

Irvine, L.G., Thums, M., Hanson, C.E., McMahon, C.R. and Hindell, M.A. 2017. Evidence for a widely expanded humpback whale calving range along the Western Australian coast. Marine Mammal Science 34(2): 294-310. https://doi.org/10.1111/mms.12456.

Irvine, L.G. and Salgado Kent, C., 2019. The distribution and relative abundance of marine mega-fauna, with a focus on humpback whales. Exmouth Gulf, Western Australia. Attachment 2J Humpback Whale Aerial Survey Report, Subsea, 7.

Jackson, G., Walters, S. and Turner, S. 2021a. Gascoyne Demersal Scalefish Resource Status Report 2021. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2020/21: The State of the Fisheries eds. B.S. Wise, D.J. Gaughan, K.G. Santoro and S.J. Newman. Department of Primary Industries and Regional Development, Western Australia. pp. 120–126.

Jackson, G., and Nolan, D. 2023b. Gascoyne Inner Shark Bay Scalefish Resource Status Report 2023. In: Newman, S.J., Santoro, K.G. and Gaughan, D.J. (eds). Status Reports of the Fisheries and Aquatic Resources of Western Australia 2022/23: The State of the Fisheries. Department of Primary Industries and Regional Development, Western Australia pp 140–146.

Jackson, G., Walters, S., Fisher, E., and Rynvis, L. 2023c. Gascoyne Demersal Scalefish Resource Status Report 2023. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2021/2022: The State of the Fisheries eds. Newman, S.J., Wise, B.S., Santoro, K.G. and Gaughan, D.J. Department of Primary Industries and Regional Development, Western Australia. pp. 133–139.

James, N.P., Bone, Y., Kyser, T.K., Dix, G.R. and Collins, L.B. 2004. The importance of changing oceanography in controlling late Quaternary carbonate sedimentation on a high-energy, tropical, oceanic ramp: north-western Australia. Sedimentology 51: 1179–1205.

Jefferson, T.A. and Rosenbaum, H.C. 2014. Taxonomic revision of the humpback dolphins (*Sousa* spp.), and description of a new species from Australia. Marine Mammal Science 30(4): 1494-1541.

Jenner, K., Jenner, M. and McCabe, K. 2001. Geographical and temporal movements of humpback whales in Western Australian waters. APPEA Journal 41: 692–707.

Jenner, C., Jenner, M., Burton, C., Sturrock, V., Salgado Kent, C., Morrice, M., Attard, C., Möller, L. and Double, M. 2008. Mark recapture analysis of pygmy blue whales from the Perth Canyon, Western Australia 2000–2005. Paper SC/60/SH16 presented to the Scientific Committee of the International Whaling Commission.

Johnstone, R.E., Burbidge, A. and Darnell, J. 2013. Birds of the Pilbara region, including seas and offshore islands, Western Australia: distribution, status and historical changes. Records of the Western Australian Museum, Supplement. 78. 343. 10.18195/issn.0313- 122x.78(2).2013.343–441.

Johnstone, R.E. and Storr, G.M. 1998. Handbook of Western Australian Birds. Vol. 1 – Non-Passerines, Emu to Dollarbird.' (Western Australian Museum: Perth).

Johnston, D., Harris, D. and Blazeski, S. 2020a. North Coast Crab Resource Status Report 2020. In:

Status Reports of the Fisheries and Aquatic Resources of Western Australia 2019/20: The State of the Fisheries eds. D.J. Gaughan and K. Santoro. Department of Primary Industries and Regional Development, Western Australia. pp. 113–117.

Johnston, D., Yeoh, D., Harris, D. and Fisher, E. 2020b. Blue Swimmer Crab (*Portunus armatus*) and Mud Crab (Scylla serrata and Scylla olivacea) Resources in the North Coast and Gascoyne Coast Bioregions, Western Australia. Department of Primary Industries and Regional Development, Perth. Report 306.

Johnston, D., Yeoh, D. and Blazeski, S. 2021. North Coast Crab Resource Status Report 2021. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2020/21: The State of the Fisheries eds. B.S. Wise, D.J. Gaughan, K.G. Santoro and S.J. Newman. Department of Primary Industries and Regional Development, Western Australia. pp. 174–182.

Johnston, D., Myers, E., Maus, C. and Blazeski, S. 2023. North Coast Crab Resource Status Report. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2021/2022: The State of the Fisheries eds. Newman, S.J., Wise, B.S., Santoro, K.G. and Gaughan, D.J. Department of Primary Industries and Regional Development, Western Australia. pp. 181–191.

Johnston, D., Harris, D., Mckinley, S. and Blay, N. 2023a. North Coast Crab Resource Status Report 2023. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2022/23: The State of the Fisheries. Department of Primary Industries and Regional Development, Western Australia pp. 191–200.

Jolliffe, C, Russell, G., McPherson, C., and Eldson, B. 2024. Evidence of humpback whale calving in southwest Western Australia. Discover Animals 1:14. Brief Communication. Evidence of humpback whale calving in south-west Western Australia | Discover Animals (springer.com).

Jones, R., Wakeford, M., Currey-Randall, L., Miller, K. and Hemerson, T. 2021. Drill cuttings and drilling fluids (muds) transport, fate and effects near a coral reef mesophotic zone. Marine Pollution Bulletin 172:112717.

Joyce, W., Campana, S., Natanson, L., Kohler, N., Pratt Jr., H. and Jensen, C. 2002. Analysis of stomach contents of the porbeagle shark (*Lamna nasus* Bonnaterre) in the northwest Atlantic. ICES Journal of Marine Science 53: 1263–1269.

Kangas, M., Wilkin, S., Breheny, N., Cavalli, P., Grounds, G. and Brown S. 2020. Saucer Scallop Resource Status Report 2020. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2019/20: The State of the Fisheries eds. D.J. Gaughan and K. Santoro. Department of Primary Industries and Regional Development, Western Australia. pp. 95–101.

Kangas, M., Chandrapavan, A., Wilkin, S., Fisher, E., Evans, S. 2021a. Resource Assessment Report Abrolhos Islands and Mid-West Trawl Managed Fishery Resource March 2021. Western Australian Marine Stewardship Council Report Series No. 20. Department of Primary Industries and Regional Development, Perth.

Kangas, M., Wilkin, S., Breheny, N., Cavalli, P., Grounds, G. and Brown, S. 2021b. Saucer Scallop Resource Status Report 2021. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2020/21: The State of the Fisheries eds. B.S. Wise, D.J. Gaughan, K.G. Santoro and S.J. Newman. Department of Primary Industries and Regional Development, Western Australia. pp. 96–103.

Kangas, M., Wilkin, S., Koefoed, I. and Brown, S. 2021c. Exmouth Gulf Prawn Resource Status Report 2021. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2020/21: The State of the Fisheries eds. B.S. Wise, D.J. Gaughan, K.G. Santoro and S.J. Newman. Department of Primary Industries and Regional Development, Western Australia. pp. 108–115.

Kangas, M., Wilkin, S., Shanks, W. and Leaversuch, R. 2023a. North Coast Prawn Resource Status. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2021/2022: The State of the Fisheries eds. Newman, S.J., Wise, B.S., Santoro, K.G. and Gaughan, D.J. Department

of Primary Industries and Regional Development, Western Australia. pp. 155–616.

Kangas, M., Wilkin, S., Leaversuch, R. and Grounds, G. 2023b. Saucer Scallop Resource Status Report. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2021/2022: The State of the Fisheries eds. Newman, S.J., Wise, B.S., Santoro, K.G. and Gaughan, D.J. Department of Primary Industries and Regional Development, Western Australia. pp. 106–112.

Kangas, M., Wikin, S., Koefoed I. and Grounds, G. 2023c. Exmouth Gulf Prawn Resource Status Report. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2021/2022: The State of the Fisheries eds. Newman, S.J., Wise, B.S., Santoro, K.G. and Gaughan, D.J. Department of Primary Industries and Regional Development, Western Australia. pp. 117–124.

Kangas, M., Wilkin, S., Cavalli, P. and Grounds, G. 2023d. Shark Bay Prawn Resource Status Report. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2021/2022: The State of the Fisheries eds. Newman, S.J., Wise, B.S., Santoro, K.G. and Gaughan, D.J. Department of Primary Industries and Regional Development, Western Australia. pp. 117–124.

Keller, K., Blake, S., Cao, A. 2023. Western Deepwater Trawl Fishery. In: Fishery Status Reports 2023. Batler, I., Patterson, H., Bromhead, D., Galeano, D., Timmiss, T., Woodhams, J., Curtotti, R., 2023. Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra. pp. 249–256. https://doi.org/10.25814/vgp4-xr81.

Keller, K., Curtotti, R. 2023. North West Slope Trawl Fishery. In: Fishery Status Reports 2023.

Kim Oanh, N. T., Permadi, D. A., Hopke, P. K., Smith, K. R., Phan Dong, N., Nguyet Dang, A. 2018. Annual emissions of air toxics emitted from crop residue open burning in Southeast Asia over the period of 2010-2015. Atmospheric Environment 187: 163–173.

Kimberley Land Council. n.d. Ranger/IPA Map. https://www.klc.org.au/ranger-ipa-map. [Accessed 17 August 2023].

Kingsley, M. R., Lavers, J. L., Steeves, T. E., & Burridge, C. P. (2019). Genetic distinctiveness of Masked Booby (Sula dactylatra) on Bedout Island, Western Australia. Emu - Austral Ornithology, 120(2), 150–155. https://doi.org/10.1080/01584197.2019.1663125.

Kirkwood, R., Pemberton, D. and Copson, G. 1992. The conservation and management of seals in Tasmania. Hobart: Department of Parks, Wildlife and Heritage. 48 pp.

Kobryn, H.T., Beckley, L.E., Wouters, K. 2022. Bathymetry Derivatives and Habitat Data from Hyperspectral Imagery Establish a High-Resolution Baseline for Managing the Ningaloo Reef, Western Australia. Remote Sensing 14, 1827. https://doi.org/10.3390/rs14081827.

Kyne, P. M., Heupel, M. R., White, W. T. and Simpfendorfer, C. A. 2021. The Action Plan for Australian Sharks and Rays. National Environmental Science Program, Marine Biodiversity Hub, Hobart.

Last, P., Lyne, V., Yearsley, G., Gledhill, D., Gommon, M., Rees, T. and White, W. 2005. Validation of national demersal fish datasets for the regionalisation of the Australian continental slope and outer shelf (>40 m depth). Australian Government Department of the Environment and Heritage and CSIRO Marine Research, Australia.

Last, P.R., and Stevens, J.D. 2009. Sharks and rays of Australia, 2nd edition, CSIRO Publishing, Melbourne.

Le Corre M., Ollivier A., Ribes, S., and Jouventin, P. 2002. Light-induced mortality of petrels: a 4-year study from Réunion Island (Indian Ocean). Biological Conservation 105:93-102.

Lewis, P., Blay, N. and Watt, M. 2020. Statewide Large Pelagic Finfish Resource Status Report 2020. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2019/20: The State of the Fisheries eds. D.J. Gaughan and K. Santoro. Department of Primary Industries and Regional Development, Western Australia. pp. 241–247.

Lewis, O. and Watt, M. 2023. Statewide Large Pelagic Finfish Resource Status Report. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2021/2022: The State of the Fisheries eds. Newman, S.J., Wise, B.S., Santoro, K.G. and Gaughan, D.J. Department of Primary Industries and Regional Development, Western Australia. pp. 255–261.

Lewis, P., Rynvis, L. 2023. Statewide Large Pelagic Finfish Resource Status Report. In: Newman, S.J., Santoro, K.G. and Gaughan, D.J. (eds). 2023. Status Reports of the Fisheries and Aquatic Resources of Western Australia 2022/23: The State of the Fisheries. Department of Primary Industries and Regional Development, Western Australia pp.

Limpus, C.J. 1992. Estimation of tag loss in marine turtle research. Wildlife Research 19: 457–469. https://doi.org/10.1071/WR9920457.

Limpus, C.J. 2009. A biological review of Australian marine turtles. Environmental Protection Agency, Brisbane, QLD.

Limpus, C.J., Parmenter, C.J., Baker, V. and Fleay, A. 1983. The Flatback Turtle, *Chelonia depressa*, in Queensland: Post-Nesting Migration and Feeling Ground Distribution. Wildlife Research 10: 557–561. https://doi.org/10.1071/WR9830557.

Liu, Q.Y., Feng, M., Wang, D. and Wijffels, S. 2015. Interannual variability of the Indonesian Throughflow transport: a revisit based on 30 year expendable bathythermograph data. Journal of Geophysical Research: Oceans 120: 8270–8282.

Locarnini, R. A., Mishonov, A. V., Baranova, O. K., Boyer, T. P., Zweng, M. M., Garcia, H. E., Reagan, J. R., Seidov, D., Weathers, K. w., Paver, C. R. & Smolyar, I. V. 2018. Temperature. World Ocean Atlas 2018, Volume 1. A. Mishonov Technical Ed.; NOAA Atlas NESDIS 81.

López, N.A., McAuley, R.B. and Meeuwig, J.J. 2022. Identification of the southernmost aggregation of scalloped hammerhead sharks (*Sphyrna lewini*) in Australia. Austral Ecology, 47: 717–722. https://doi.org/10.1111/aec.13149.

Lourie, S.A., Foster, S.J., Cooper, E.W.T. and Vincent, A.C.J. 2004. A guide to the identification of seahorses. Project Seahorse and TRAFFIC North America, University of British Columbia and World Wildlife Fund. Available from: https://cites.unia.es/cites/file.php/1/files/guide- seahorses.pdf [Accessed 22 Sep 2020].

Lourie, S.A., Vincent, A.C.J. and Hall, H.J. 1999. Seahorses: an identification guide to the world's species and their conservation. Project Seahorse, London, UK.

Lukoschek, V., Beger, M., Ceccarelli, D., Richards, Z. and Pratchett, M. 2013. Enigmatic declines of Australia's sea snakes from a biodiversity hotspot. Biological Conservation 166: 191e202.

Lulofs, H.M.A. and Sumner, N.R. 2002. Historical diving profiles for pearl oyster divers in Western Australia. Fisheries Research Report, 138.

MAC – See Murujuga Aboriginal Corporation.

Mackie, M., Gaughan, D.J. and Buckworth, R.C. 2003. Stock assessment of narrow-barred Spanish mackerel (*Scomberomorus commerson*) in Western Australia. FRDC Project No. 1999/151.

Mackie, M., Nardi, A., Lewis, P. and Newman, S. 2007. Small pelagic fishes of the north-west marine region. Department of Fisheries, Perth.

Marchant & Higgins 1990. *Fregata andrewsi* Christmas Frigatebird. In: Handbook of Australian, New Zealand and Antarctic Birds, Volume 1, Ratites to Ducks. Oxford University Press, Melbourne.

Marsh, H., O'Shea, T.J. and Reynolds, J.R. 2011. The ecology and conservation of sirenia; dugongs and manatees. Cambridge University Press, London.

Marsh, H., Penrose, H., Eros C. and Hugues, J. 2002. Dugong Status Report and Action Plans for Countries and Territories. Early Warning Assessment Reports. United Nations Environment Programme, Nairobi.

Marsh, H., Prince, R.I.T., Saafeld, W.K. and Shepherd, R. 1994. The distribution and abundance of the dugong in Shark Bay, Western Australia. Wildlife Research 21: 149–161. https://doi.org/10.1071/WR9940149.

Marshall, A., Bennett, M., Kodja, G., Hinojosa-Alvarez, S., Galvan-Magana, F., Harding, M., Stevens, G. and Kashiwaga, T. 2011. *Manta birostris* (Chevron Manta Ray, Giant Manta Ray, Oceanic Manta Ray, Pacific Manta Ray, Pelagic Manta Ray) [WWW Document]. The IUCN Red List of Threatened Species. Accessed at http://www.iucnredlist.org/details/198921/0.

Marshall, A.D., Compagno, L.J. and Bennett, M.B. 2009. Redescription of the genus *Manta* with resurrection of *Manta alfredi* (Krefft, 1868) (Chondrichthyes; Myliobatoidei; Mobulidae). Zootaxa 2301: 1–28.

Martin, R.A. 2007. A review of behavioural ecology of whale sharks. Fisheries Research 84: 10–16.

McAuley, R. 2004. Western Australian Grey Nurse Shark Pop Up Archival Tag Project. Final Report to Department of Environment and Heritage. Department of Fisheries, Western Australia. 49 pp.

McCauley, R.D. 2011a. Fugro Scarborough Sea Noise Logger Program: January 2010 to January 2011. Report R2011-50. Fugro Survey on behalf of ExxonMobil. 68 pp.

McCauley, R. 2011b. Woodside Kimberley sea noise logger program, Sept-2006 to June-2009: Whales, Fish and Man-made Noise. Report produced for Woodside Energy Ltd.

McCauley, R. and Duncan, A. 2011. Sea noise logger deployment, Wheatstone and Onslow, April 2009 to November 2010 (Technical Report No. R2011-23). Centre for Marine Science and Technology, Curtin University of Technology, Perth.

McCauley, R. and Jenner, C. 2010. Migratory patterns and estimated population size of pygmy blue whales (*Balaenoptera musculus brevicauda*) traversing the Western Australian coast based on passive acoustics. Paper SC/62/SH26 presented to the IWC Scientific Committee, June 2010, Agadir, Morocco (unpublished). 9 pp.

McCauley, R., Jenner, C., Bannister, J., Cato, D. and Duncan, A. 2000. Blue whale calling in the Rottnest trench, Western Australia, and low frequency sea noise. Acoustics Australia / Australian Acoustical Society: 245–250.

McCauley, R., Salgado Kent, C., Gavrilov, A., Recalde-Salas, A., Burton, C. and Marley, S. 2004. Passive acoustic monitoring of baleen whales in Geographe Bay, Western Australia. Acoustics Australia Proceedings of Acoustics 2004 November Gold Coast.

McCauley, R.D., Gavrilov, A.N., Jolliffe, C.D., Ward, R. and Gill, P.C. 2018. Pygmy blue and Antarctic blue whale presence, distribution and population parameters in southern Australia based on passive acoustics. Deep-Sea Research Part II: Topical Studies in Oceanography 157–158: 154–168.

McClatchie, S., Middleton, J.F. and Ward, T.M. 2006. Water mass analysis and alongshore variation in upwelling intensity in the eastern Great Australian Bight. Journal of Geophysical Research, Oceans 111(C8). https://doi.org/10.1029/2004JC002699.

McCosker, J. 1975. Feeding behavior of Indo-Australian hydrophiidae. The biology of sea snakes 1: 217–232.

McDonald, E.M. and Phillips, T. 2021. Report of an Ethnographic Consultation Regarding Woodside's Scarborough Gas Project & Submerged Landscape, Pilbara, Western Australia – Phase I. Report by Ethnosciences to Murujuga Aboriginal Corporation.

McDuie, F. and Congdon, B.C. 2016. Trans-equatorial migration and non-breeding habitat of tropical shearwaters: implications for modelling pelagic Important Bird Areas. Marine Ecology Progress Series, 550, 219–234.

McLeay, L.J., Page, B., Goldsworthy, S.D., Ward, T.M., Paton, D.C., Waterman, M. and Murray, M.D., 2009. Demographic and morphological responses to prey depletion in a crested tern (*Sterna*

bergii) population: can fish mortality events highlight performance indicators for fisheries management?. ICES Journal of Marine science, 66(2), pp.237–247.

Mcleay, L., Page, B., Goldsworthy, S., Paton, D., Teixeira, C., Burch, P., Ward, T. 2010. Foraging behaviour and habitat use of a short-ranging seabird, the crested tern. Marine Ecology Progress Series. 411. 271–283. 10.3354/meps08606.

McNiven, I. 2004. Saltwater People: spiritscapes, maritime rituals and the archaeology of Australian indigenous seascapes. World Archaeology, 35(3): 329–349.

Meekan and Radford 2010. Migration Patterns of Whale Sharks; A summary of 15 satellite tag tracks from 2005 to 2008. Report for Woodside Energy Ltd to support Browse.

Menezes, V.V., Phillips, H.E., Schiller, A., Domingues, C.M. and Bindoff, N.L. 2013. Salinity dominance on the Indian Ocean Eastern Gyral current. Geophysical Research Letters 40: 5716–5721.

MetOcean Engineers, 2005, Preliminary metocean conditions for the Browse Development (Prospective Production Facilities/Areas, Pipeline Routes/Shore Crossings and Flow- Lines/Seabed Manifolds), Scott Reef Vicinity to Shore. Report produced for Woodside Energy Limited.

Miller, K, Depczynski, M., Cappo, M. Wakeford, M., Speed, C., Stowar, M., Colquhoun, J., Tinkler, P., Cheal, A., Fisher, R., Johansson, C., Noble, M. and Radford, B. (2015). Ningaloo and Outer Shark Bay Environmental Baseline Survey 2014. Report prepared for Woodside Energy Ltd by the Australian Institute of Marine Science, Townsville. 2015 (117 pp).

Milton, D.A. 2005. Birds of Ashmore Reef National Nature Reserve: an assessment of its importance for seabirds and waders. The Beagle, Records of the Museums and Art Galleries of the Northern Territory Supplement 1 133–141.

Minton, C. Wahl, J., Jessop, R., Hassell, C., Collins, P. Gibbs, H. 2006. Migration routes of waders which spend the non-breeding season in Australia. Stilt. 50. 135–157.

Minton, S., Heatwole, H. and Dunson, W. 1975. Sea snakes from reefs of the Sahul Shelf. University of Maryland Press, 1: 141–144.

Miyazaki, S. and Stagg, H. 2013. Exmouth Plateau [WWW Document]. Geoscience Australia: National Geological Provinces Online Database. Available at: http://www.ga.gov.au/provexplorer/provinceDetails.do?eno=30351.

Mott R., Herrod A., Clarke, R.H. 2017. Post-breeding dispersal of frigatebirds increases their exposure to mercury, Marine Pollution Bulletin, Volume 119, Issue 1, pp. 204–210.

Mollet, H., Cliff, G., Pratt Jr, H. and Stevens, J. 2000. Reproductive biology of the female shortfin mako, *Isurus oxyrinchus* Rafinesque, 1810, with comments on the embryonic development of lamnoids. Fishery Bulletin – National Oceanic and Atmospheric Administration 98(2): 299–318.

Molony, B., Lai, E., and Jones, R. 2015. Mackerel Managed Fishery Report: Statistics Only. In: *Status* Reports of the Fisheries and Aquatic Resources of Western Australia 2014/15: The State of the Fisheries eds. W.J. Fletcher and K. Santoro, Department of Fisheries, Western Australia, pp. 207–210.

Möller, L.M., Attard, C.R.M., Bilgmann, K., Andrews-Goff, V., Jonsen, I, Paton, D. and Double, M.C. 2020. Movements and behaviour of blue whales satellite tagged in an Australian upwelling system. Nature Scientific Reports 10:21165. https://www.nature.com/articles/s41598-020-78143-2.

Morrice, M.G., Gill, P.C., Hughes, J. and Levings, A.H. 2004. Summary of aerial surveys for the Santos Ltd EPP32 seismic survey, 2–13 December 2003. Report WEG-SO 02/2004 to Santos Ltd. Whale Ecology Group, Deakin University, Warrnambool.

Mott R., Herrod A., Clarke, R.H. 2017. Post-breeding dispersal of frigatebirds increases their exposure to mercury, Marine Pollution Bulletin, Volume 119, Issue 1, pp. 204–210.

Mott R., Herrod A., Clarke, R.H. 2021. Transboundary priorities for protection of frigatebird non-breeding habitat in a heavily impacted region, Global Ecology and Conservation, Volume 27.

Moustaka, M., Evans, R.D., Kendrick, G.A., Hyndes, G.A., Cuttler, M.V.W., Bassett, T.J., O'Leary, MJ., Wilson, S.K. 2024. Local habitat composition and complexity outweigh seascape effects on fish distributions across a tropical seascape. Landscape Ecology, 39(28).

Murujuga Aboriginal Corporation 2021. Cultural Values of the Environment for Scarborough DSDMP: Consultation Report on Mermaid Sound. Unpublished Report to Woodside Energy Limited by Murujuga Aboriginal Corporation, Dampier, WA.

Mustika, P.L. K., Ratha, I.M.J., Setyawan, E., Prinanda, M.O., Rusydi, R., Purnomo, F.S. and Fuazi, I. 2024. The first record of the southbound movement of satellite-tagged pygmy blue whales (*B. m. brevicauda*) from Savu Sea (Indonesia) to the subantarctic waters. Marine Mammal Science 2024:e13167. https://onlinelibrary.wiley.com/doi/epdf/10.1111/mms.13167.

Mustoe, S., and Edmunds, M. (2008). Coastal and Marine natural values of the Kimberley. Produced for WWF-Australia by: AES Applied Ecology Solutions Pty Ltd.

Newman, S.J., Wakefield, C., Skepper, C., Boddington, D., Blay, N., Jones, R. and Dobson, P. 2015. North Coast Demersal Fisheries Status Report 2015. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2014/15: The State of the Fisheries eds. W.J. Fletcher and K. Santoro, Department of Fisheries, Western Australia, pp. 189–206.

Newman, S.J., Wakefield, C., Skepper, C., Boddington, D. and Smith, E. 2018. North Coast Demersal Resource Status Report 2017. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2016/17: The State of the Fisheries eds. D.J. Gaughan and K. Santoro. Department of Primary Industries and Regional Development, Western Australia. pp. 125–133.

Newman, S.J., Wakefield, C., Skepper, C., Boddington, D. and Steele, A. 2021a. North Coast Demersal Resource Status Report 2021. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2020/21: The State of the Fisheries eds. B.S. Wise, D.J. Gaughan, K.G. Santoro and S.J. Newman. Department of Primary Industries and Regional Development, Western Australia. pp. 158–166.

Newman, S.J., Wakefield, C., Skepper, C., Boddington, D. and Steele, A. 2021b. Statewide Marine Aquarium Fish and Hermit Crab Resources Status Report 2021. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2020/21: The State of the Fisheries eds.

B.S. Wise, D.J. Gaughan, K.G. Santoro and S.J. Newman. Department of Primary Industries and Regional Development, Western Australia. pp. 252–258.

Newman, S., Bruce, C. and Steele A. 2022. Statewide Marine Aquarium Fish and Hermit Crab Resources Status. In: In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2021/2022: The State of the Fisheries eds. Newman, S.J., Wise, B.S., Santoro, K.G. and Gaughan, D.J. Department of Primary Industries and Regional Development, Western Australia. pp. 261–268.

Newman, S., Bruce, C. and Steele A. 2023a. Statewide Marine Aquarium Fish and Hermit Crab Resources Status Report 2023 In: Newman, S.J., Santoro, K.G. and Gaughan, D.J. (eds). Status Reports of the Fisheries and Aquatic Resources of Western Australia 2022/23: The State of the Fisheries. Department of Primary Industries and Regional Development, Western Australia pp. 279–285.

Newman, S.J., Santoro, K.G. and Gaughan, D.J. (eds) 2023b. Status Reports of the Fisheries and Aquatic Resources of Western Australia 2022/23: The State of the Fisheries. Department of Primary Industries and Regional Development, Western Australia.

Nicholson, L.W. 2002. Breeding strategies and community structure in an assemblage of tropical seabirds on the Lowendal Islands, Western Australia [PhD thesis]. Perth, Australia: Murdoch University. 327 pp.

Norman, B.M., Whitty, J.M., Beatty, S.J., Reynolds, S.D. and Morgan, D.L. 2017. Do they stay or do they go? Acoustic monitoring of whale sharks at Ningaloo Marine Park, Western Australia. J Fish Biol. 91(6): 1713–1720.

Northern Territory Government 2011. Cobourg Marine Park Plan of Management. Prepared by the Cobourg Peninsula Sanctuary and Marine Park Board and Parks and Wildlife Service of the Northern Territory, Department of Natural Resources, Environment, The Arts and Sport. https://depws.nt.gov.au/_data/assets/pdf_file/0006/249045/Cobourg-Marine-Park.pdf.

Norriss, J. and Blazeski, S. 2020. South Coast Small Pelagic Scalefish Resource Status Report 2020. In: *Status Reports of the Fisheries and Aquatic Resources of Western Australia 2019/20*: The State of the Fisheries eds. D.J. Gaughan and K. Santoro. Department of Primary Industries and Regional Development, Western Australia. pp. 209–213.

Norriss, J. and Blaceski, S. 2023a. South Coast Small Pelagic Scalefish Resource Status Report. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2021/2022: The State of the Fisheries eds. Newman, S.J., Wise, B.S., Santoro, K.G. and Gaughan, D.J. Department of Primary Industries and Regional Development, Western Australia. pp. 221–226.

Norriss, J. and Blaceski, S. 2023b. West Coast Small Pelagic Scalefish Resource Status Report. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2021/2022: The State of the Fisheries eds. Newman, S.J., Wise, B.S., Santoro, K.G. and Gaughan, D.J. Department of Primary Industries and Regional Development, Western Australia. pp. 70–75.

Norriss, J. and Blaceski, S. 2023c. South Coast Small Pelagic Scalefish Resource Status Report. In: Newman, S.J., Santoro, K.G. and Gaughan, D.J. (eds) 2023. Status Reports of the Fisheries and Aquatic Resources of Western Australia 2022/23: The State of the Fisheries. Department of Primary Industries and Regional Development, Western Australia pp. 234–238.

Norriss, J. and Blaceski, S. 2023d. West Coast Small Pelagic Scalefish Resource Status Report. In: Newman, S.J., Santoro, K.G. and Gaughan, D.J. (eds). 2023. Status Reports of the Fisheries and Aquatic Resources of Western Australia 2022/23: The State of the Fisheries. Department of Primary Industries and Regional Development, Western Australia pp.71–76.

O'Leary, M.J., Paumard, V., and Ward I. 2020. Exploring Sea Country through High-Resolution 3D Seismic Imaging of Australia's NW Shelf: Resolving Early Coastal Landscapes and Preservation of Underwater Cultural Heritage. Quaternary Science Reviews (239), 106353.

Ottewell, K., Coughran, D., Gall, M., Irvine, L. and Bryne, M. 2016. A Recent Stranding of Omura's Whale (*Balaenoptera omurai*) in Western Australia. *Aquatic Mammals*, 42(2): 193–197. DOI 10.1578/AM.42.2.2016.193.

Parra, G.J. 2006. Resource partitioning in sympatric delphinids: Space use and habitat preferences of Australian snubfin and Indo-Pacific humpback dolphins. Journal of Animal Ecology 75: 862–874.

Parra, G.J., Corkeron, P.J. and Marsh, H. 2006. Population sizes, site fidelity and residence patterns of Australian snubfin and Indo-Pacific humpback dolphins: implications for conservation. Biological Conservation 129: 167–180.

Parra, G.J., Corkeron, P.J. and Marsh, H. 2002. The Indo-Pacific humpback dolphin, *Sousa chinensis* (Osbeck, 1765) in Australian waters: a summary of current knowledge and recommendations for their conservation. Unpublished Report to the Scientific Committee of the International Whaling Commission, SC/54/SM27.

Parra, G.J. and D. Cagnazzi. 2016. Conservation Status of the Australian Humpback Dolphin (*Sousa sahulensis*) Using the IUCN Red List Criteria. Advances in Marine Biology. 73:157–192.

Paterson, A., Shellam, T., Veth, P., Mulvaney, K., Anderson, R., Dortch, J. and McDonald, J. 2019. The Mermaid? Re-envisaging the 1818 exploration of Enderby Island, Murujuga, Western Australia. The Journal of Island and Coastal Archaeology, 1–21. Paton, D. C. and Rogers, D. J. 200. Ecology of breeding fairy terns Sterna nereis in the Coorong. Final report for the Wildlife Conservation Fund.

Paton, D.C. and Rogers, D.J. 2009. Ecology of breeding Fairy Terns *Sternula nereis* in the Coorong. Final report for the Wildlife Conservation Fund. Adelaide University, Adelaide.

Patterson, H., Noriega, R., Georgeson, L., Larcombe, J. and Curtotti, R. 2017. Fishery status reports 2017, Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra. CC BY 4.0.

Patterson, S.H., Larcombe, J., Woodhams, J. and Curtotti, R. 2020. Fishery status reports 2020, Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra. CC BY 4.0. https://doi.org/10.25814/5f447487e6749.

Patterson, H. and Dylewski, M. 2021a. Chapter 23: Southern Bluefin Tuna Fishery. In: *Fishery status reports 2021*, Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra. CC BY 4.0.

Patterson, H. and Dylewski, M., 2023a. Southern Bluefin Tuna Fishery. In: Fishery Status Reports 2023. Batler, I., Patterson, H., Bromhead, D., Galeano, D., Timmiss, T., Woodhams, J., Curtotti, R., 2023. Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra. pp. 344–351. https://doi.org/10.25814/vgp4-xr81.

Patterson, H. and Dylewski, M. 2023b. Skipjack Tuna Fishery. In Fishery Status Reports 2023. Batler, I., Patterson, H., Bromhead, D., Galeano, D., Timmiss, T., Woodhams, J., Curtotti, R., 2023. Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra. pp. 336–343. https://doi.org/10.25814/vgp4-xr81.

Patterson, H., Bromhead, D. and Dylewski, M. 2023. Western Tuna and Billfish Fishery. In: Fishery Status Reports 2023. Batler, I., Patterson, H., Bromhead, D., Galeano, D., Timmiss, T., Woodhams, J., Curtotti, R., 2023. Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra. pp.352-365. https://doi.org/10.25814/vgp4-xr81.

Pearce, A., Buchan, S., Chiffings, T., D'Adamo, N., Fandry, C., Fearns, P., Mills, D., Phillips, R. and Simpson, C. 2003. A review of the oceanography of the Dampier Archipelago, Western Australia, in: Wells, F., Walker, D., Jones, D. (Eds.), The Marine Flora and Fauna of Dampier, Western Australia. Western Australian Museum, Perth, pp. 13–50.

Peck, D. and Congdon, B. 2005. Colony-specific foraging behaviour and co-ordinated divergence of chick development in the wedge-tailed shearwater *Puffinus pacificus.* Mar Ecol Prog Ser Vol. 299: 289–296.

Peel, L.R., Whiting, S.D., Pendoley, K., Whittock, P.A., Ferreira, L.C., Thums, M., Whiting, A.U., Tucker, A.D., Rossendell, J., McFarlane, G. and Fossette, S., 2024. I still call Australia home: Satellite telemetry informs the protection of flatback turtles in Western Australian waters. Ecosphere, 15(5), p.e4847.

Pendoley, K.L. 2005. Sea turtles and the environmental management of industrial activities in North West Western Australia. PhD thesis, Murdoch University.

Pendoley, K., Vitenbergs, A., Whittock, P. and Bell, C. 2016. Twenty years of turtle tracks: marine turtle nesting activity at remote locations in the Pilbara region, Western Australia. Australian Journal of Zoology 64. https://doi.org.10.1071/ZO16021.

Pennycuick, C.J., Schaffner, F.C., Fuller, M.R., Obrecht III, H.H. and Sternberg, L., 1990. Foraging flights of the white-tailed tropicbird (*Phaethon lepturus*): radiotracking and doubly-labelled water. Colonial Waterbirds, pp.96–102.

Physick, W.L. 2001. Meteorology and Air Quality of the Pilbara Region. CSIRO Atmospheric Research, Victoria. Available from: https://www.wa.gov.au/system/files/2023-03/Meteorology-and-air-quality-of-the-Pilbara-region.pdf.

Pillans, R.D., Stevens, J.D., Peverell, S. and Edgar. S. 2008. Spatial distribution and habitat utilisation of the speartooth shark *Glyphis glyphis* in relation to fishing in Northern Australia.

Department of the Environment, Water, Heritage and the Arts, Canberra. 47 pp.

Pillans, R.D., Stevens, J.D., Kyne, P.M. and Salini, J. 2009. Observations on the distribution, biology, short-term movements and habitat requirements of river sharks *Glyphis* spp. in northern Australia. Endangered Species Research 10: 321–332.

Pitman, R.L., Totterdell, J.A., Fearnbach, H., Ballance, L.T., Durban, J.W. and Kemps, H. 2015. Whale killers: Prevalence and ecological implications of killer whale predation on humpback whale calves off Western Australia. Marine Mammal Science 31(2): 629-657. https://doi.org/10.1111/mms.12182.

Pogonoski, J.J., Pollard, D.A. and Paxton, J.R. 2002. Conservation Overview and Action Plan for Australian Threatened and Potentially Threatened Marine and Estuarine Fishes. Canberra, ACT: Environment Australia. Available from: http://www.environment.gov.au/coasts/publications/marine-fish-action/pubs/marine-fish.pdf.

Preen, A. 2004. Distribution, abundance and conservation status of dugongs and dolphins in the southern and western Arabian Gulf. Biological Conservation 118(2): 205–218.

Preen, A., Marsh, H., Lawler, I., Prince, R. and Shepherd, R. 1997. Distribution and abundance of dugongs, turtles, dolphins and other megafauna in Shark Bay, Ningaloo Reef and Exmouth Gulf, Western Australia. Wildlife Research 24: 185–208.

Prieto, R., Janiger, D., Silva, M.A., Waring, G.T. and Gonçalves, J.M. 2012. The forgotten whale: a bibliometric analysis and literature review of the North Atlantic sei whale *Balaenoptera borealis.* Mammal Review 42: 235–272. https://doi.org.10.1111/j.1365-2907.2011.00195.x.

Przeslawski, R., Daniell, J., Nichol, S., Anderson, T. and Barrie, J.V. 2011. Seabed Habitats and Hazards of the Joseph Bonaparte Gulf and Timor Sea, Northern Australia. Record 2011/040. Geoscience Australia, Canberra.

Przeslawski, R., Alvarez, B., Battershill, C. and Smith, T. 2014. Sponge biodiversity and ecology of the Van Diemen Rise and eastern Joseph Bonaparte Gulf, northern Australia. Hydrobiologia 730: 1–16.

Ramsar Convention Bureau 2000. Strategic Framework and Guidelines for the Future Development of the List of Wetlands of International Importance. Ramsar Convention Bureau, Gland, Switzerland.

Raudino, H., Hunt, T.N. and Waples, K.A. 2018. Records of Australian humpback dolphins (*Sousa sahulensis*) from an offshore island groups in Western Australia. Marine Biodiversity Records 11:14–20.

Raudino, H.C., Bouchet, P.J., Douglas, C., Douglas, R. and Waples, K., 2023. Aerial abundance estimates for two sympatric dolphin species at a regional scale using distance sampling and density surface modeling. Frontiers in Ecology and Evolution, 10, p.1086686.

Reardon, M.B., Gerber, L. and Cavanagh, R.D. 2006. *Isurus paucus*. The IUCN Red List of Threatened Species 2006.

Reinhold, L. and Whiting, A. 2014. High-density Loggerhead Sea Turtle Nesting on Dirk Hartog Island, Western Australia. Marine Turtle Newsletter 141: 7–10.

Richards, Z.T., Haines, L., Ross, C., Preston, S., Matthews, T., Terriaca, A., Black, E., Lewis, Y., Mannolini, J., Dean, P., Middelton, V. and Saunders, B. 2024. Deoxygenation following coral spawning and low-level thermal stress trigger mass coral mortality at Coral Bay, Ningaloo Reef. Coral Reefs 43:443-453. https://doi.org/10.1007/s00338-024-02476-x.

Risch, D., T. Norris, M. Curnock and Friedlaender, A. 2019. Common and Antarctic Minke Whales: Conservation status and future research directions. Frontiers in Marine Science vol. 6 https://doi.org/10.3389/fmars.2019.00247.

RPS 2010. Humpback whale monitoring survey, North West Cape. Report prepared for Woodside

Energy Ltd.

RPS 2012. Sediment quality surveys March-April 2011. Greater Western Flank Marine Environmental Baseline Studies. RPS Environment and Planning Pty Ltd, Perth.

Rob, D., Barnes, P., Whiting, S., Fossette, S., Tucker, T. and Mongan, T. 2019. Turtle activity and nesting on the Muiron Islands and Ningaloo Coast: Final Report 2018, Ningaloo Turtle Program. Report prepared for Woodside Energy Limited. Department of Biodiversity, Conservation and Attractions, Exmouth. 51 pp.

Rochester, W.A., Moeseneder, C.H., Miller, M.J., Milton, D.A., Fry, G.C., Griffiths, S.P, Pillans, R.D., Rothlisberg, P.C., Bustamante, R.H. and Butler, A.J. 2007. The North Marine Region marine bioregional plan: Information and analysis for the regional profile. Final report to the Department of the Environment and Water Resources. CSIRO Marine and Atmospheric Research.

Rock JC, Leonard ML, Boyne AW. 2007. Foraging habitat and chick diets of roseate tern, *Sterna dougallii*, breeding on Country Island, Nova Scotia. Avian Conserv Ecol 2:1–10.

Rosser, N.L. and Gilmour, J.P. 2008. New insights into patterns of coral spawning on Western Australian reefs. Coral Reefs 27: 345-349.

RPS 2016. Metocean Criteria Guidelines for MODU Mooring on Australia's North West Shelf.

Russell, G., Cagnazzi, D., Colefax, A., Sprogis, K.R. and Christiansen, F., 2024. Cost of migration and migratory timing in Western Australian humpback whales. Marine Mammal Science, 40(2), p.e13074.

Salgado Kent, C., Jenner, C., Jenner, M., Bouchet, P. and Rexstad, E. 2012. Southern Hemisphere breeding stock D humpback whale population estimates from North West Cape, Western Australia. Journal of Cetacean Research and Management 12(1): 29–38.

Santos, C. D., Campos, L. F. A .S., and Efe, M. A. 2018. Foraging habitat choice of white-tailed tropicbirds revealed by fine-scale GPS tracking and remote sensing. PeerJ 7. DOI 10.5441/001/1.649s6f21.

Saunders, D.A. and De Rebeira, P. 1985. The Birdlife of Rottnest Island. The Authors. Perth. A.H. & A.W. Reed Ltd, Sydney.

Saunders, R., Royer, F. and Clarke, M. 2011. Winter migration and diving behaviour of Porbeagle shark, *Lamna nasus*, in the Northeast Atlantic. ICES Journal of Marine Science 68(1): 166–174.

Schroeder, T., Lyne, V., Dekker, A.G. and Rathbone, C. 2009. Regional MODIS Satellite Data Study: Scott Reef. CSIRO report produced for Woodside Energy Ltd. CSIRO.

Serventy, D. L., Serventy, V. Warham, J. 1971. The Handbook of Australian Seabirds. (A.H. and A. W. Reed: Sydney.)

Shephard, J.M., Dunlop, J.N. and Bouten, W. 2018. Foraging movements of common noddies in the East Indian Ocean are dependent on breeding stage: implications for marine reserve design. Pacific Conservation Biology 25, 164–173.

Sheppard, J., Preen, A.R., Marsh, H., Lawler, I.R., Whiting S. and Jones, R.E. 2006. Movement heterogeneity of dugongs, *Dugong dugon* (Muller) over large spatial scales. Journal of Experimental Marine Biology and Ecology 334: 64–83.

Simpson, C.J., Cary, J.L. and Masini, R.J. 1993. Destruction of corals and other reef animals by coral spawn slicks on Ningaloo Reef, Western Australia. Coral Reefs 12: 185–191. https://doi.org/10.1007/BF00334478.

Sleeman, J.C., Meekan, M.G., Wilson, S.G., Jenner, K.C.S., Jenner, M.N., Boggs, G. and Bradshaw, C.J.A. 2007. Biophysical correlates of relative abundances of marine megafauna at Ningaloo Reef, Western Australia. Marine and Freshwater Research 58: 608–623.

Smale, M.J. 2005. The diet of the ragged-tooth shark *Carcharias Taurus* Rafinesque 1810 in the Eastern Cape, South Africa. African Journal of Marine Science 27: 331–335. https://doi:10.2989/18142320509504091.

Smith, K., Brown, J., Howard, A., Walshe, K. and Fissioli, J. 2011. Status Reports of the Fisheries and aquatic resources of Western Australia. Department of Climate Change, Energy, the Environment and Water, Western Australia, pp. 80–97.

Smith, J.N., Double, M., Kelly, N., Charlton, C. and Bannister, J. 2022. Relative Abundance of the 'Western' Population of Southern Right Whales from an Aerial Survey Off Southern Australia: Final Report on 2021 Survey. Report to the National Environmental Science Program. Murdoch University (Lead organisation).

Smyth, D. 2007. Sea Countries of the North-West: Literature review on Indigenous connection to and uses of the North West Marine Region. Sea countries of the North-west: Literature review on Indigenous connection to and uses of the North-west Marine Region (dcceew.gov.au).

Somaweera, R. and Sanders, K. 2015. Guide to the Sea Snakes of the Kimberley Coast of Western Australia. Department of Parks and Wildlife, Western Australia. 10.13140/RG.2.1.2701.2960.

Sommerfeld, J., Stokes, T., and Baker, G.B. 2015. Breeding success, mate-fidelity and nest-site fidelity in Red-tailed Tropicbirds (*Phaethon rubricauda*) on Christmas Island, Indian Ocean. Emu - Austral Ornithology, 115(3), 214–222. https://doi.org/10.1071/MU14016.

Sporer, E., Kangas, M., Shanks, M. and Blay, N. 2015. North Coast Prawn Managed Fisheries Status Report. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2014/15:The State of the Fisheries eds. Fletcher, W.J. and Santoro, K., Department of Fisheries, Western Australia, pp. 173–188.

Stevens, J.D., Pillans, R.D. and Salini, J.P. 2005. Conservation assessment of *Glyphis glyphis* (speartooth shark), *Glyphis garicki* (northern river shark), *Pristis microdon* (freshwater sawfish) and *Pristis zijsron* (green sawfish). Report to Department of Environment and Heritage. Canberra. Australia. 84 pp.

Stevens, J., McAuley, R., Simpfendorfer, C. and Pillans, R. 2008. Spatial distribution and habitat utilisation of sawfish (*Pristis* spp.) in relation to fishing in northern Australia. CSIRO Marine and Atmospheric Research, Hobart.

Stevens, J.D., Bradford, R.W. and West, G.J. 2010. Satellite tagging of blue sharks (*Prionace glauca*) and other pelagic sharks off eastern Australia: depth behaviour, temperature experience and movements. Marine Biology 157: 575–591.

Stokes, T. and Hinchey, M. 1990. Which small noddies breed at Ashmore Reef in the Indian Ocean? Emu 90: 269–271.

Strahan, R. 1983. The Australian Museum Complete Book of Australian Mammals. London, United Kingdom: Angus and Robertson.

Strain, L., Fabris, F. and Blay N. 2023a. South Coast Greenlip/Brownlip Abalone Resource Status Report. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2021/2022: The State of the Fisheries eds. Newman, S.J., Wise, B.S., Santoro, K.G. and Gaughan, D.J. Department of Primary Industries and Regional Development, Western Australia. pp. 207–212.

Strain, L., Brown, J. and Jones, R. 2023b. West Coast Roe's Abalone Resource Status Report. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2021/2022: The State of the Fisheries eds. Newman, S.J., Wise, B.S., Santoro, K.G. and Gaughan, D.J. Department of Primary Industries and Regional Development, Western Australia. pp. 43-49.

Strain, L., Brown, J., Blay, N. 2023c. West Coast Roe's Abalone Resource Status Report 2023. In: Newman, S.J., Santoro, K.G. and Gaughan, D.J. (eds). Status Reports of the Fisheries and Aquatic Resources of Western Australia 2022/23: The State of the Fisheries. Department of Primary

Industries and Regional Development, Western Australia pp 46–52.

Strain, L., Brown, J., Blay, N. 2023d. South Coast Greenlip/Brownlip Abalone Resource Status Report 2023. In: Newman, S.J., Santoro, K.G. and Gaughan, D.J. (eds). Status Reports of the Fisheries and Aquatic Resources of Western Australia 2022/23: The State of the Fisheries. Department of Primary Industries and Regional Development, Western Australia pp 218–224.

Stokes, T. and Hinchey, M. 1990. Which small noddies breed at Ashmore Reef in the Indian Ocean? Emu 90: 269–271.

Surman, C. A., and Wooller, R. D. 1995. The Breeding Biology of the Lesser Noddy on Pelsaert Island, Western Australia, Emu - Austral Ornithology, 95:1, 47–53, DOI: 10.1071/MU9950047.

Surman C.A. and Wooller RD. 2003. Comparative feeding ecology of five sympatric terns at a sub-tropical island in the eastern Indian Ocean. J Zool 259:219–230.

Surman, C. A., and Nicholson, L. W. 2009. A survey of the breeding seabirds and migratory shorebirds of the Houtman Abrolhos, Western Australia. Corella, 33(4):89–98.

Surman, C.A. and Nicholson, L.W. 2011. Ichthys Gas Field Development Project: literature review of seabirds in the vicinity of Ichthys Field infrastructure in the Browse Basin, Western Australia. Report prepared by Halfmoon Biosciences, Perth, for INPEX Browse, Ltd., Perth, Western Australia.

Surman, C. A. and Nicholson, L. W. 2015. Exmouth Sub-basin Marine Avifauna Monitoring Program: Final Report. Unpublished report prepared for Apache Energy Ltd. by Halfmoon Biosciences. 188 pp.

Surman, C.A., Burbidge, A.A. and Fitzhardinge, J. 2016. Long term population trends in the vulnerable Lesser Noddy at the Houtman Abrolhos, Western Australia. Corella 40: 69–75.

Surman, C., Nicholson, L., & Ayling, S. 2017. Foraging behaviour of the Lesser Noddy *Anous tenuirostris* from the eastern Indian Ocean: Insights from micro-geologging. Marine Ornithology. 45. 123–128.

Surman, C.A., Nicholson, L.W. and Philipps, R.A. 2018. Distribution and patterns of migration of a tropical seabird community in the Eastern Indian Ocean. Journal of Ornithology 158: 867–877.

Surman, C.A. 2019. Houtman Abrolhos – A Natural History. Halfmoon Biosciences. 192 pp.

Sutton, A.L., Jenner, K.C.S. and Jenner, M-N.M. 2019. Habitat associations of cetaceans and seabirds in the tropical eastern Indian Ocean. Deep Sea Research Part II: Topical Studies in Oceanography 166: 171–186.

Swann, G. 2002. Ornithological report for Lacepede Islands and Adele Island – October 2002 Kimberley Birdwatching, Broome (Unpublished, 15 pages).

Swann, G. 2005a. Occasional count no. 7, Ashmore Reef, 21 to 30 January 2002. Stilt 47: 26–33.

Swann, G. 2005b. Occasional count no. 8, Ashmore Reef, 23 January to 4 February 2003. Stilt 47: 34–39.

Swann, G. 2005c. Ornithological Report, Ashmore Reef 23 January to 5 February 2005. Kimberley Birdwatching, Broome. Swann G & T Willing 1997 Annotated list of the birds of the Lacepede Islands 15–19 December 1997. Unpublished report.

Thiele, D. and Gill P.C. 1999. Cetacean observations during a winter voyage into Antarctic sea ice south of Australia. Antarctic Science 11(1): 48–53.

Thomson, P.G., Pillans, R., Jaine, F.R., Harcourt, R.G., Taylor, M.D., Pattiaratchi, C.B. and McLean, D.L., 2021. Acoustic telemetry around western Australia's oil and gas infrastructure helps detect the presence of an elusive and endangered migratory giant. Frontiers in Marine Science, 8, p.631449.

Thorburn, D.C. 2006. Biology, ecology and trophic interactions of elasmobranchs and other fishes in riverine waters of northern Australia. PhD Thesis, Murdoch University, Perth, Western Australia.

Thorburn, D.C., Peverell, S.C., Stevens, J.D., Last, P.R. and Rowland, A.J. 2003. Status of freshwater and estuarine elasmobranchs in Northern Australia. Final Report to the Natural Heritage Trust, pp. 1–75.

Thorburn, D.C. and Morgan, D.L. 2004. The northern river shark *Glyphis sp. C.* (Carcharhinidae) discovered in Western Australia. Zootaxa 685: 1–8.

Thorburn, D.C., Morgan, D.L., Rowland, A.J., Gill, H.S. and Paling, E. 2008. Life history notes of the critically endangered dwarf sawfish, *Pristis clavata*, Garman 1906 from the Kimberley region of Western Australia. Environmental Biology of Fishes 83: 139–145.

Threatened Species Scientific Committee 2009. Commonwealth Listing Advice on *Galeorhinus galeus*. Department of the Environment, Water, Heritage and the Arts. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/68453-listing-advice.pdf.

Threatened Species Scientific Committee 2013. Commonwealth Listing Advice on *Centrophorus zeehaani* (southern dogfish). Department of Sustainability, Environment, Water, Population and Communities. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/82679-listing-advice.pdf.

Threatened Species Scientific Committee 2013a. Conservation Advice *Rostratula australis* Australian painted snipe. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/77037-conservation-advice.pdf.

Threatened Species Scientific Committee 2015a. Conservation Advice *Balaenoptera borealis* sei whale. Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/34-conservation-advice-01102015.pdf.

Threatened Species Scientific Committee 2015b. Conservation Advice *Megaptera novaeangliae* humpback whale. Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/38-conservation-advice-10102015.pdf.

Threatened Species Scientific Committee 2015c. Conservation Advice *Balaenoptera physalus* fin whale. Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/37-conservation-advice-01102015.pdf.

Threatened Species Scientific Committee 2015d. Conservation Advice *Rhincodon typus* whale shark. Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/66680-conservation-advice-01102015.pdf.

Threatened Species Scientific Committee 2015e. Conservation Advice *Anous tenuirostris melanops* Australian lesser noddy. Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/26000-conservation-advice-01102015.pdf.

Threatened Species Scientific Committee 2015f. Conservation Advice *Pterodroma mollis* soft-plumaged petrel. Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/1036-conservation-advice-01102015.pdf.

Threatened Species Scientific Committee 2016. Conservation Advice *Charadrius mongolus* Lesser sand plover. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/879-conservation-advice-05052016.pdf.

Threatened Species Scientific Committee 2018. Listing Advice *Sphyrna lewini* scalloped hammerhead. Canberra: Department of the Environment and Energy. Available from:

http://www.environment.gov.au/biodiversity/threatened/species/pubs/85267-listing-advice-15032018.pdf.

Threatened Species Scientific Committee 2020a. Conservation Advice *Neophoca cinerea* Australian Sea Lion. Canberra: Department of Agriculture, Water and the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/22-conservation-advice-23122020.pdf.

Tourism Western Australia. 2024a. State Tourism Satellite Account 2022-23: Topline Results for WA. Prepared by Tourism WA. https://www.tourism.wa.gov.au/Publications%20Library/Markets%20and%20research/2023/State%20Tourism%20State%20Satellite%20Account%202022-23.PDF.

Tourism Western Australia. 2024b. Overview of Visitation to WA - YE Mar 24. Tourism Research Australia, International and National Visitor Surveys. https://www.tourism.wa.gov.au/Publications%20Library/Markets%20and%20research/2024/IVS%20NVS/Overview%20of%20Visitation%20to%20WA%20-%20YE%20Mar%2024.PDF.

Townsend, C.H. 1935. The distribution of certain whales as shown by logbook records of American whaleships. Zoologica 19: 3–50.

Thums M, Jenner C, Waples K, Salgado Kent C, Meekan M. 2018. Humpback whale use of the Kimberley; understanding and monitoring spatial distribution. Report of Project 1.2.1 prepared for the Kimberley Marine Research Program, Western Australian Marine Science Institution, Perth, Western Australia, 78pp.

Thums, M., Ferreira, L.C., Jenner, C., Jenner, M., Harris, D., Davenport, A., Andrews-Goff, V., Double, M., Möller, L., Attard, C.R. and Bilgmann, K. 2022. Pygmy blue whale movement, distribution and important areas in the Eastern Indian Ocean. Global Ecology and Conservation, 35, p.e02054.

Tucker, A. D., Pendoley, K. L., Murray, K., Loewenthal, G., Barber, C., Denda, J., Lincoln, G., Mathews, D., Oades, D., Whiting, S. D., Rangers, Miriuwung Gajerrong; Rangers, Balanggarra; Rangers, Wunambal Gaambera; Rangers, Dambimangari; Rangers, Mayala; Rangers, Bardi Jawi; Rangers, Nyul Nyul; Rangers, Yawuru; Rangers, Karajarri; Rangers, Nyangumart. 2021. Regional Ranking of Marine Turtle Nesting in Remote Western Australia by Integrating Traditional Ecological Knowledge and Remote Sensing. Remote Sens.13, 4696. https://doi.org/10.3390/rs13224696.

Udyawer, V., Read, M., Hamann, M., Heupel, M.R., and Simpfendorfer, C.A. 2016. Importance of shallow tidal habitats as refugia from trawl fishing for sea snakes. Journal of Herpetology 50: 527–533. https://doi.org.10.1670/15-026.

Udyawer, V., Somaweera, R., Nitschke, C., d'Anastasi, B., Sanders, K., Webber, B.L., Hourston, M. and Heupel, M.R. 2020. Prioritising search effort to locate previously unknown populations of endangered marine reptiles. Global Ecology and Conservation 22. https://doi.org/10.1016/j.gecco.2020.e01013.

UNESCO 1991. Shark Bay, Western Australia Description. UNESCO, World heritage Convention. https://whc.unesco.org/en/list/578/. [Accessed 27 Sep 2023].

UNESCO 2011. Ningaloo Coast Description. UNESCO, World heritage Convention. https://whc.unesco.org/en/list/1369/. [Accessed 27 Sep 2023].

UWA 2021. Scarborough Pipeline Cultural Heritage Assessment: Establishing Archaeological Potential and Significance. Technical report by UWA for Woodside Energy Limited.

Vadrevu, K. P, Lasko, K., Giglio, L. and Justice, C. 2014. Analysis of Southeast Asia pollution episode during June 2013 using satellite remote sensing datasets. Environmental Pollution 195: 245–256.

Veth, P., McDonald, J., Ward, I., O'Leary, M., Beckett, E., Benjamin, J., Ulm, S., Hacker, J., Ross, P. and Bailey, G., 2019. A Strategy for Assessing Continuity in Terrestrial and Maritime Landscapes

from Murujuga (Dampier Archipelago), North West Shelf, Australia. The Journal of Island and Coastal Archaeology 15(4): 477-503. Doi: 10.1080/15564894.2019.1572677.

Vincent, A.C.J. 1996. The international trade in seahorses. TRAFFIC International, Cambridge, UK. Available from: http://www.trafficj.org/publication/96_International_Trade_Seahorse.pdf [Accessed 22 Sep 2020].

Voris, H.K. 1972. The role of sea snakes (Hydrophiidae) in the trophic structure of coastal ocean communities. Journal of the Marine Biological Association of India 14(2): 429–442.

Voris, H.K. and Voris, H.H. 1983. Feeding strategies in marine snakes: an analysis of evolutionary, morphological, behavioral and ecological relationships. American Zoology 23: 411–425. https://doi.org.10.1093/icb/23.2.411.

Wakefield, C., Trinnie, F., Skepper, C., Boddington, D., Newman, S. and Steele, A. 2023. North Coast Demersal Resource Status Report. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2021/2022: The State of the Fisheries eds. Newman, S.J., Wise, B.S., Santoro, K.G. and Gaughan, D.J. Department of Primary Industries and Regional Development, Western Australia. pp. 167–176.

Wakefield, C., Trinnie, F., Skepper, C., Boddington, D., and Grosse, T. 2023a. North Coast Demersal Resource Status Report 2023. In: Newman, S.J., Santoro, K.G. and Gaughan, D.J. (eds). Status Reports of the Fisheries and Aquatic Resources of Western Australia 2022/23: The State of the Fisheries. Department of Primary Industries and Regional Development, Western Australia pp. 173–183.

Ward, I., Larcombe, P., Ross, P. and Fandry, C. 2022. Applying geoarchaeological principles to marine archaeology: A reappraisal of the ‘first marine’ and ‘in situ’ lithic scatters in the Dampier Archipelago, NW Australia. Geoarchaeology (37), 783–810. https://doi.org/10.1002/gea.21917.

Warren, V.E., J.J.-Y. Delarue, C. Robinson, K.A. Kowarski, C.R. McPherson, C.C. Wilson, E.E. Maxner,C.B. Lawrence, B.J. Gaudet, and A. Muellenmeister. 2023. Marine Mammal Acoustic Monitoring Report: Characterisation of Pygmy Blue Whales and Other Acoustic Contributors. Document 02826, Version 2.0 FINAL, 81+pp. Technical report by JASCO Applied Sciences for Woodside Energy Limited.

Watson, M., Stamation, K. and Charlton C. 2021. Calving Rates, Long-Range Movements and Site Fidelity of Southern Right Whales (*Eubalaena australis*) in South-Eastern Australia. Journal of Cetacean Research Management 22(1) pp. 17–28.

WBM Oceanics and Claridge, G. 1997. Guidelines for managing visitation to seabird breeding islands, Great Barrier Reef Marine Park Authority, Townsville.

Weimerskirch, H., Le Corre, M., Jaquemet, S. and Marsac, F. 2005. Foraging strategy of a tropical seabird, the red-footed booby, in a dynamic marine environment. Mar Ecol Prog Ser Vol. 288: 251–261.

Weimerskirch, H., Le Corre, M. and Bost, C.A. 2008. Foraging strategy of masked boobies from the largest colony in the world: relationship to environmental conditions and fisheries. Mar Ecol Prog Ser 362:291–302. https://doi.org/10.3354/meps07424.

Weimerskirch, H., de Grissac, S., Ravache, A., Prudor, A., Corbeau, A., Congdon, B., McDuie, F.,Bourgeois, K., Dromzée, S., Butscher, J., Menkes, C., Allain, V., Vidal, E., Jaeger, A. and Borsa, P. 2020. At-sea movements of wedge-tailed shearwaters during and outside the breeding season from four colonies in New Caledonia. Marine Ecology Progress Series. 633. 225–238. 10.3354/meps13171.

Weller, D.R and Lee, C.V. 2017. Migratory shorebird conservation action plan. BirdLife Australia, unpublished report, September 2017.

Whiting, A.U., Thomson, A., Chaloupka, M. and Limpus, C.J. 2008. Seasonality, abundance and

breeding biology of one of the largest populations of nesting flatback turtles: Cape Domett. Western Australia. Australian Journal of Zoology 56: 297–303.

Whiting, S.D. 2000. The foraging ecology of juvenile green and hawksbill sea turtles in north- western Australia. PhD thesis, Northern Territory University, Darwin, NT.

Whitty, J.M., Phillips, N.M., Morgan, D.L., Chaplin, J.A., Thorburn, D.C. and Peverell, S.C. 2008. Habitat associations of Freshwater Sawfish (*Pristis microdon*) and Northern River Sharks (*Glyphis garricki*): including genetic analysis of freshwater sawfish across northern Australia. Report to Australian Government, Department of the Environment, Water, Heritage and the Arts. Murdoch University Centre for Fish and Fisheries Research. Perth, Western Australia. 75 pp.

Wilinggin Aboriginal Corporation. 2022. Keeping Ngarinyin People and Willinggin Country Healthy 2023–2032. https://www.wilinggin.com.au/hcp.

Wijeratne, S. Pattiaratchi, C. and Proctor, R. 2018. Estimates of surface and subsurface boundary current transport around Australia. Journal of Geophysical Research: Oceans 123: 3444–3466.

Williams, A., Ulm, S., Sapienza, T. Lewis, S. and Turney, C. 2018. Sea-level change and demography during the last glacial termination and early Holocene across the Australian continent. Quaternary Science Reviews (182), 144–154. Doi: https://doi.org/10.1016/j.quascirev.2017.11.030.

Williams, A., Althaus, F., Dunstan, P.K., Poore, G.C.B., Bax, N.J., Kloser, R.J. and McEnnulty, F.R. 2010. Scales of habitat heterogeneity and megabenthos biodiversity on an extensive Australian continental margin (100–1100 m depths). Marine Ecology 31: 222–236.

Williamson, P.C., Sumner, N.R. and Malseed, B.E. 2006. A 12-month survey of recreational fishing in the Pilbara region of Western Australia during 1999–2000, Fisheries Research Report No. 153, Department of Fisheries, Western Australia. 61 pp.

Wilkin, S., How, J., Oliver, R. and Brown, S. 2023a. Saucer Scallop Resource Status Report 2023. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2022/2023: The State of the Fisheries eds. Newman, S.J., Wise, B.S., Santoro, K.G. and Gaughan, D.J. Department of Primary Industries and Regional Development, Western Australia. pp.107–114.

Wilkin, S., How, J., Shanks, M. and Leaversuch, R. 2023b. North Coast Prawn Resource Status 2023. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2022/2023: The State of the Fisheries eds. Newman, S.J., Wise, B.S., Santoro, K.G. and Gaughan, D.J. Department of Primary Industries and Regional Development, Western Australia. P 161–167.

Wilkin, S., How, J., Shanks, M. and Leaversuch, R. 2023c. Exmouth Gulf Prawn Resource Status 2023. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2022/2023: The State of the Fisheries eds. Newman, S.J., Wise, B.S., Santoro, K.G. and Gaughan, D.J. Department of Primary Industries and Regional Development, Western Australia. P 119–127.

Wilkin, S., How, J., Koefoed, I. and Brown, S. 2023d. Shark Bay Prawn Resource Status Report 2023. In: Newman, S.J., Santoro, K.G. and Gaughan, D.J. (eds). Status Reports of the Fisheries and Aquatic Resources of Western Australia 2022/23: The State of the Fisheries. Department of Primary Industries and Regional Development, Western Australia pp.100–107.

Wilson, B.R. 2013. The biogeography of the Australian North West Shelf: Environmental Change and Life's Response. Western Australian Museum, Perth, Australia. 415 pp.

Wilson, S., Carleton, J. and Meekan, M. 2003. Spatial and temporal patterns in the distribution and abundance of macrozooplankton on the southern North West Shelf, Western Australia. Estuarine, Coastal and Shelf Science 56: 897–908.

Wilson, S.G., Polovina, J.J., Stewart, B.S. and Meekan, M.G. 2006. Movement of whale sharks (*Rhincodon typus*) tagged at Ningaloo Reef, Western Australia. Mar Biol 148: 1157–1166.

Wilson, S.G., Stewart, B.S., Polovina, J.J., Meekan, M.G., Stevens, J.D. and Galuardi, B, 2007. Accuracy and precision of archival tag data: a multiple-tagging study conducted on a whale shark

(Rhincodon typus) in the Indian Ocean. Fisheries Oceanography, 16(6), pp.547–554.

Wilson, S.K., Depczynski, M. and Fisher, R. 2010. Habitat associations of juvenile fish at Ningaloo Reef, Western Australia: the importance of coral and algae. PLoS ONE 5(12): e15185. https://doi.org/10.1371/journal.pone.0015185.

Wilson, P., Pattiaratchi, C., Whiting, S., Ferreira, L.C., Fossette, S., Pendoley, K. and Thums, M., 2023. Predicting core areas of flatback turtle hatchlings and potential exposure to threats. Endangered Species Research, 52,129–147. https://doi.org/10.3354/esr01269.

Worley 2024. Seabird and Shorebird Existing Knowledge Review 2024. North West Marine Region. Unpublished report prepared for Woodside Energy Ltd. by Worley with Subject Matter Expert input from Dr Annie Knipe and Dr Lisa Nicholson.

Woodhams, J., Patterson, H., Larcombe, J., Bromhead, D., Curtotti, R. and Dylewski, M. 2021. Fishery status reports 2021, Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra. CC BY 4.0.

Woodside 2015. North Rankin Complex – Basic Design Data Specification Sheet – Metocean. Controlled reference number A1100ST9393191. Woodside Energy Limited, Perth, Western Australia.

Woodside 2019. Proposed Browse to NWS Project Draft EIS/ERD. EPA Assessment No. 2191, EPBC 2018/8319. December 2019. 1986 pp.

Woodside 2020. Scarborough Offshore Project Proposal, Revision 5 Submission, February 2020. Woodside Energy Ltd. 806 pp.

Woodside 2022. Vincent – basic design data specification sheet – metocean (No. V0000ST9650826). Woodside Energy Limited, Perth, Western Australia.

Woodside Energy Ltd. 2023. Scarborough, Dredging and Spoil Disposal Management Plan. SA0006AH0000002.

Wynen. L., Larson, H., Thorburn, D., Peverell, S., Morgan, D., Field, I. and Gibb, K. 2009. Mitochondrial DNA supports the identification of two endangered river sharks (*Glyphis glyphis* and *Glyphis garricki*) across northern Australia. Marine and Freshwater Research 60: 554–562.

APPENDIX A. PROTECTED MATTER SEARCH REPORTS FOR NWMR, SWMR AND NMR

The PMST tool conducts searches on a grid-based function. Accordingly, the PMST results can indicate features or species that do not actually intersect or have a presence in the area. To validate search results, comprehensive literature and scientific expertise is used. As such, only species considered relevant to the scope of this document have been described.

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 06-Jun-2024 Summary

Details

Matters of NES

Other Matters Protected by the EPBC Act Extra Information

Caveat Acknowledgements

Figure 1: NWMR PMST subarea 1

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	2
National Heritage Places:	5
Wetlands of International Importance (Ramsar	2
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	9
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	105
Listed Migratory Species:	97

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	65
Commonwealth Heritage Places:	5
Listed Marine Species:	174
Whales and Other Cetaceans:	34
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	29
Habitat Critical to the Survival of Marine Turtles:	5

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	78
Regional Forest Agreements:	None
Nationally Important Wetlands:	8
EPBC Act Referrals:	317
Key Ecological Features (Marine):	13
Biologically Important Areas:	92
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

World Heritage Properties [Resource Information]

Name	State	Legal Status
Shark Bay, Western Australia	WA	Declared property
The Ningaloo Coast	WA	Declared property

National Heritage Places [Resource Information]

Name	State	Legal Status
Historic		
Dirk Hartog Landing Site 1616 - Cape Inscription Area	WA	Listed place
Indigenous		
Dampier Archipelago (including Burrup Peninsula)	WA	Listed place
Natural		
Shark Bay, Western Australia	WA	Listed place
The Ningaloo Coast	WA	Listed place
The West Kimberley	WA	Listed place

Wetlands of International Importance (Ramsar Wetlands) [Resource Information]

Ramsar Site Name	Proximity
Eighty-mile beach	Within Ramsar site
Roebuck bay	Within 10km of Ramsar site

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside a Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area.

Feature Name
Commonwealth Marine Areas (EPBC Act) Commonwealth Marine Areas (EPBC Act) Commonwealth Marine Areas (EPBC Act) Commonwealth Marine Areas (EPBC Act) Commonwealth Marine Areas (EPBC Act)

Feature Name
Commonwealth Marine Areas (EPBC Act) Commonwealth Marine Areas (EPBC Act) Commonwealth Marine Areas (EPBC Act) Commonwealth Marine Areas (EPBC Act)

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text
Monsoon vine thickets on the coastal sand dunes of Dampier Peninsula	Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act. Number is the current name ID.

Scientific Name	Threatened Category	Presence Text
BIRD		
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Breeding known to occur within area
Aphelocephala leucopsis Southern Whiteface [529]	Vulnerable	Species or species habitat known to occur within area
Arenaria interpres Ruddy Turnstone [872]	Vulnerable	Roosting known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Vulnerable	Roosting known to occur within area

Scientific Name	Threatened Category	Presence Text
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat may occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Endangered	Species or species habitat may occur within area
Erythrura gouldiae Gouldian Finch [413]	Endangered	Species or species habitat known to occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat known to occur within area
Falcunculus frontatus whitei Crested Shrike-tit (northern), Northern Shrike-tit [26013]	Vulnerable	Species or species habitat likely to occur within area
Geophaps smithii blaauwi Partridge Pigeon (western) [66501]	Vulnerable	Species or species habitat likely to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Limnodromus semipalmatus Asian Dowitcher [843]	Vulnerable	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit [86432]	Endangered	Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]	Endangered	Roosting known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Malurus leucopterus edouardi White-winged Fairy-wren (Barrow Island), Barrow Island Black-and-white Fairy-wren [26194]	Vulnerable	Species or species habitat likely to occur within area
Malurus leucopterus leucopterus White-winged Fairy-wren (Dirk Hartog Island), Dirk Hartog Black-and-White Fairy-wren [26004]	Vulnerable	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Papasula abbotti Abbott's Booby [59297]	Endangered	Species or species habitat may occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area
Phaethon lepturus fulvus Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Species or species habitat may occur within area
Phaethon rubricauda westralis Red-tailed Tropicbird (Indian Ocean), Indian Ocean Red-tailed Tropicbird [91824]	Endangered	Breeding known to occur within area
Pluvialis squatarola Grey Plover [865]	Vulnerable	Roosting known to occur within area

Scientific Name	Threatened Category	Presence Text
Polytelis alexandrae Princess Parrot, Alexandra's Parrot [758]	Vulnerable	Species or species habitat may occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Breeding known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area
Tyto novaehollandiae kimberli Masked Owl (northern) [26048]	Vulnerable	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Xenus cinereus Terek Sandpiper [59300]	Vulnerable	Roosting known to occur within area

Zanda latirostris listed as Calyptorhynchus latirostris
Carnaby's Black Cockatoo, Short-billed Black-cockatoo [87737] Endangered Species or species habitat likely to occur within area

FISH

Milyeringa veritas
Cape Range Cave Gudgeon, Blind Gudgeon [66676] Vulnerable Species or species habitat known to occur within area

Ophisternon candidum
Blind Cave Eel [66678] Vulnerable Species or species habitat known to occur within area

Thunnus maccoyii
Southern Bluefin Tuna [69402] Conservation Dependent Breeding known to occur within area

MAMMAL

Balaenoptera borealis
Sei Whale [34] Vulnerable Foraging, feeding or related behaviour likely to occur within area

Balaenoptera musculus
Blue Whale [36] Endangered Migration route known to occur within area

Balaenoptera physalus
Fin Whale [37] Vulnerable Foraging, feeding or related behaviour likely to occur within area

Bettongia lesueur Barrow and Boodie Islands subspecies
Boodie, Burrowing Bettong (Barrow and Boodie Islands) [88021] Vulnerable Species or species habitat known to occur within area

Bettongia lesueur lesueur
Burrowing Bettong (Shark Bay), Boodie [66659] Vulnerable Species or species habitat known to occur within area

Bettongia penicillata ogilbyi
Woylie [66844] Endangered Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat may occur within area
Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat known to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Isoodon auratus auratus Golden Bandicoot (mainland) [66665]	Vulnerable	Species or species habitat likely to occur within area
Isoodon auratus barrowensis Golden Bandicoot (Barrow Island) [66666]	Vulnerable	Species or species habitat known to occur within area
Lagorchestes conspicillatus conspicillatus Spectacled Hare-wallaby (Barrow Island) [66661]	Vulnerable	Species or species habitat known to occur within area
Lagorchestes hirsutus bernieri Rufous Hare-wallaby (Bernier Island) [66662]	Vulnerable	Species or species habitat known to occur within area
Lagorchestes hirsutus Central Australian subspecies Mala, Rufous Hare-Wallaby (Central Australia) [88019]	Endangered	Translocated population known to occur within area
Lagorchestes hirsutus dorreae Rufous Hare-wallaby (Dorre Island) [66663]	Vulnerable	Species or species habitat known to occur within area
Lagostrophus fasciatus fasciatus Banded Hare-wallaby, Merrnine, Marnine, Munning [66664]	Vulnerable	Species or species habitat known to occur within area
Leporillus conditor Wopilkara, Greater Stick-nest Rat [137]	Vulnerable	Translocated population known to occur within area

Scientific Name	Threatened Category	Presence Text
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat known to occur within area
Macrotis lagotis Greater Bilby [282]	Vulnerable	Species or species habitat known to occur within area
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Endangered	Species or species habitat may occur within area
Osphranter robustus isabellinus Barrow Island Wallaroo, Barrow Island Euro [89262]	Vulnerable	Species or species habitat likely to occur within area
Perameles bougainville Shark Bay Bandicoot [278]	Endangered	Species or species habitat known to occur within area
Petrogale concinna monastria Nabarlek (Kimberley) [87607]	Endangered	Species or species habitat known to occur within area
Petrogale lateralis lateralis Black-flanked Rock-wallaby, Mororong, Black-footed Rock Wallaby [66647]	Endangered	Species or species habitat known to occur within area
Phascogale tapoatafa kimberleyensis Kimberley brush-tailed phascogale, Brush-tailed Phascogale (Kimberley) [88453]	Vulnerable	Species or species habitat likely to occur within area
Pseudomys fieldi Shark Bay Mouse, Djoongari, Alice Springs Mouse [113]	Vulnerable	Species or species habitat likely to occur within area
Rhinonicteris aurantia (Pilbara form) Pilbara Leaf-nosed Bat [82790]	Vulnerable	Species or species habitat known to occur within area
Saccolaimus saccolaimus nudicluniatus Bare-rumped Sheath-tailed Bat, Bare-rumped Sheathtail Bat [66889]	Vulnerable	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Trichosurus vulpecula arnhemensis Northern Brushtail Possum [83091]	Vulnerable	Species or species habitat likely to occur within area
Xeromys myoides Water Mouse, False Water Rat, Yirrkoo [66]	Vulnerable	Species or species habitat may occur within area
PLANT		
Caladenia barbarella Small Dragon Orchid, Common Dragon Orchid [68686]	Endangered	Species or species habitat may occur within area
Caladenia hoffmanii Hoffman's Spider-orchid [56719]	Endangered	Species or species habitat likely to occur within area
Eucalyptus beardiana Beard's Mallee [18933]	Vulnerable	Species or species habitat likely to occur within area
Minuria tridens Minnie Daisy [13753]	Vulnerable	Species or species habitat known to occur within area
REPTILE		
Aipysurus apraefrontalis Short-nosed Sea Snake, Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat known to occur within area
Aipysurus foliosquama Leaf-scaled Sea Snake, Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Ctenotus zastictus Hamelin Ctenotus [25570]	Vulnerable	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered within area	Foraging, feeding or related behaviour known to occur
Egernia stokesii badia Western Spiny-tailed Skink, Baudin Island Spiny-tailed Skink [64483]	Endangered	Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Congregation or aggregation known to occur within area
Lerista nevinae Nevin's Slider [85296]	Endangered	Species or species habitat known to occur within area
Liasis olivaceus barroni Pilbara Olive Python [66699]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Tiliqua scincoides intermedia Northern Blue-tongued Skink [89838]	Critically Endangered	Species or species habitat known to occur within area
Varanus mertensi Mertens' Water Monitor, Mertens's Water Monitor [1568]	Endangered	Species or species habitat known to occur within area
Varanus mitchelli Mitchell's Water Monitor [1569]	Critically Endangered	Species or species habitat likely to occur within area
SHARK		
Carcharias taurus (west coast population) Grey Nurse Shark (west coast population) [68752]	Vulnerable	Congregation or aggregation known to occur within area

Scientific Name	Threatened Category	Presence Text
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Centrophorus uyato Little Gulper Shark [68446]	Conservation Dependent	Species or species habitat likely to occur within area
Glyphis garricki Northern River Shark, New Guinea River Shark [82454]	Endangered	Breeding likely to occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Breeding known to occur within area
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Breeding known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sphyrna lewini Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat known to occur within area
SPIDER		
Idiosoma nigrum Shield-backed Trapdoor Spider, Black Rugose Trapdoor Spider [66798]	Vulnerable	Species or species habitat known to occur within area

Listed Migratory Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text
Migratory Marine Birds	Anous stolidus Common Noddy [825]	Species or species habitat likely to occur within area
	Apus pacificus Fork-tailed Swift [678]	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area
Ardenna pacifica Wedge-tailed Shearwater [84292]		Breeding known to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat may occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Breeding known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Breeding known to occur within area
Hydroprogne caspia Caspian Tern [808]		Breeding known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Onychoprion anaethetus Bridled Tern [82845]		Breeding known to occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Phaethon rubricauda Red-tailed Tropicbird [994]		Breeding known to occur within area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area
Sternula albifrons Little Tern [82849]		Breeding known to occur within area
Sula dactylatra Masked Booby [1021]		Breeding known to occur within area
Sula leucogaster Brown Booby [1022]		Breeding known to occur within area
Sula sula Red-footed Booby [1023]		Breeding known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area
Migratory Marine Species		
Anoxypristis cuspidata Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Balaenoptera bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat likely to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area

Scientific Name	Threatened Category	Presence Text
Dugong dugon Dugong [28]		Breeding known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Eubalaena australis as Balaena glacialis australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
Isurus paucus Longfin Mako [82947]		Species or species habitat likely to occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Congregation or aggregation known to occur within area
Megaptera novaeangliae Humpback Whale [38]		Breeding known to occur within area
Mobula alfredi as Manta alfredi Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat known to occur within area
Mobula birostris as Manta birostris Giant Manta Ray [90034]		Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Orcaella heinsohni Australian Snubfin Dolphin [81322]		Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Breeding known to occur within area
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Breeding known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sousa sahulensis as Sousa chinensis Australian Humpback Dolphin [87942]		Breeding known to occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
Migratory Terrestrial Species		
Cecropis daurica Red-rumped Swallow [80610]		Species or species habitat may occur within area
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Motacilla cinerea		
Grey Wagtail [642]		Species or species habitat known to occur within area
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Acrocephalus orientalis		
Oriental Reed-Warbler [59570]		Species or species habitat may occur within area
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat known to occur within area
Arenaria interpres		
Ruddy Turnstone [872]	Vulnerable	Roosting known to occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]	Vulnerable	Roosting known to occur within area
Calidris alba		
Sanderling [875]		Roosting known to occur within area
Calidris canutus		
Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris pugnax as Philomachus pugnax		
Ruff [91256]		Roosting known to occur within area
Calidris ruficollis		
Red-necked Stint [860]		Roosting known to occur within area

Scientific Name	Threatened Category	Presence Text
Calidris subminuta Long-toed Stint [861]		Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Vulnerable	Roosting known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Roosting known to occur within area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area
Glareola maldivarum Oriental Pratincole [840]		Roosting known to occur within area
Limicola falcinellus Broad-billed Sandpiper [842]		Roosting known to occur within area
Limnodromus semipalmatus Asian Dowitcher [843]	Vulnerable	Species or species habitat known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]	Endangered	Roosting known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting known to occur within area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola Grey Plover [865]	Vulnerable	Roosting known to occur within area
Thalasseus bergii Greater Crested Tern [83000]		Breeding known to occur within area
Tringa brevipes Grey-tailed Tattler [851]		Roosting known to occur within area
Tringa glareola Wood Sandpiper [829]		Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area
Tringa totanus Common Redshank, Redshank [835]		Roosting known to occur within area
Xenus cinereus Terek Sandpiper [59300]	Vulnerable	Roosting known to occur within area

Commonwealth Lands [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State
Defence	
Defence - EXMOUTH VLF TRANSMITTER STATION [50122]	WA
Defence - EXMOUTH VLF TRANSMITTER STATION [50123]	WA
Defence - LEARMONTH - RAAF BASE [50106]	WA
Defence - LEARMONTH - RAAF BASE [50109]	WA
Defence - LEARMONTH - RAAF BASE [50108]	WA
Defence - LEARMONTH - RAAF BASE [50101]	WA
Defence - LEARMONTH - RAAF BASE [50107]	WA
Defence - LEARMONTH - RAAF BASE [50097]	WA
Defence - LEARMONTH - RAAF BASE [50103]	WA
Defence - LEARMONTH - RAAF BASE [50100]	WA
Defence - LEARMONTH RADAR SITE - VLAMING HEAD EXMOUTH [50001]	WA
Defence - YAMPI SOUND TRAINING AREA [50145]	WA
Unknown	
Commonwealth Land - [51698]	WA
Commonwealth Land - [51699]	WA
Commonwealth Land - [51707]	WA
Commonwealth Land - [51704]	WA
Commonwealth Land - [51696]	WA
Commonwealth Land - [51705]	WA
Commonwealth Land - [51709]	WA
Commonwealth Land - [51700]	WA
Commonwealth Land - [51706]	WA

Commonwealth Land Name	State
Commonwealth Land - [52116]	WA
Commonwealth Land - [51695]	WA
Commonwealth Land - [51671]	WA
Commonwealth Land - [52104]	WA
Commonwealth Land - [51672]	WA
Commonwealth Land - [51670]	WA
Commonwealth Land - [51055]	WA
Commonwealth Land - [51054]	WA
Commonwealth Land - [51702]	WA
Commonwealth Land - [51053]	WA
Commonwealth Land - [51708]	WA
Commonwealth Land - [51703]	WA
Commonwealth Land - [52198]	WA
Commonwealth Land - [51716]	WA
Commonwealth Land - [52236]	WA
Commonwealth Land - [52099]	WA
Commonwealth Land - [52097]	WA
Commonwealth Land - [51719]	WA
Commonwealth Land - [52100]	WA
Commonwealth Land - [52195]	WA
Commonwealth Land - [52109]	WA
Commonwealth Land - [52098]	WA
Commonwealth Land - [51710]	WA
Commonwealth Land - [51714]	WA
Commonwealth Land - [51715]	WA
Commonwealth Land - [52106]	WA
Commonwealth Land - [52107]	WA

Commonwealth Land Name	State
Commonwealth Land - [51947]	WA
Commonwealth Land - [52108]	WA
Commonwealth Land - [52105]	WA
Commonwealth Land - [52103]	WA
Commonwealth Land - [52102]	WA
Commonwealth Land - [52101]	WA
Commonwealth Land - [51404]	WA
Commonwealth Land - [51403]	WA
Commonwealth Land - [51668]	WA
Commonwealth Land - [51666]	WA
Commonwealth Land - [51667]	WA
Commonwealth Land - [51718]	WA
Commonwealth Land - [51720]	WA
Commonwealth Land - [51717]	WA
Commonwealth Land - [51712]	WA
Commonwealth Land - [51713]	WA
Commonwealth Land - [51711]	WA

Commonwealth Heritage Places		[Resource Information]
Name	State	Status
Natural		
Learmonth Air Weapons Range Facility	WA	Listed place
Mermaid Reef - Rowley Shoals	WA	Listed place
Ningaloo Marine Area - Commonwealth Waters	WA	Listed place
Scott Reef and Surrounds - Commonwealth Area	EXT	Listed place
Yampi Defence Area	WA	Listed place

Listed Marine Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text
Bird		

Scientific Name	Threatened Category	Presence Text
Acrocephalus orientalis Oriental Reed-Warbler [59570]		Species or species habitat may occur within area overfly marine area
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Breeding known to occur within area
Anseranas semipalmata Magpie Goose [978]		Species or species habitat may occur within area overfly marine area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area
Ardenna carneipes as Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area
Ardenna pacifica as Puffinus pacificus Wedge-tailed Shearwater [84292]		Breeding known to occur within area
Arenaria interpres Ruddy Turnstone [872]	Vulnerable	Roosting known to occur within area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Roosting known to occur within area

Scientific Name	Threatened Category	Presence Text
Calidris alba Sanderling [875]		Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area overfly marine area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area overfly marine area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area overfly marine area
Calidris pugnax as Philomachus pugnax Ruff [91256]		Roosting known to occur within area overfly marine area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area overfly marine area
Calidris subminuta Long-toed Stint [861]		Species or species habitat known to occur within area overfly marine area
Calidris tenuirostris Great Knot [862]	Vulnerable	Roosting known to occur within area overfly marine area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Cecropis daurica as Hirundo daurica Red-rumped Swallow [80610]		Species or species habitat may occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat known to occur within area overfly marine area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Roosting known to occur within area overfly marine area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Roosting known to occur within area overfly marine area
Chroicocephalus novaehollandiae as Larus novaehollandiae Silver Gull [82326]		Breeding known to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat may occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Breeding known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Breeding known to occur within area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area overfly marine area
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Glareola maldivarum Oriental Pratincole [840]		Roosting known to occur within area overfly marine area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Roosting known to occur within area overfly marine area
Hirundo rustica Barn Swallow [662]		Species or species habitat known to occur within area overfly marine area
Hydroprogne caspia as Sterna caspia Caspian Tern [808]		Breeding known to occur within area
Larus pacificus Pacific Gull [811]		Breeding known to occur within area
Limicola falcinellus Broad-billed Sandpiper [842]		Roosting known to occur within area overfly marine area
Limnodromus semipalmatus Asian Dowitcher [843]	Vulnerable	Species or species habitat known to occur within area overfly marine area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]	Endangered	Roosting known to occur within area overfly marine area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat known to occur within area overfly marine area
Motacilla flava Yellow Wagtail [644]		Species or species habitat known to occur within area overfly marine area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting known to occur within area overfly marine area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area
Onychoprion anaethetus as Sterna anaethetus Bridled Tern [82845]		Breeding known to occur within area
Onychoprion fuscatus as Sterna fuscata Sooty Tern [90682]		Breeding known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Papasula abbotti Abbott's Booby [59297]	Endangered	Species or species habitat may occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Phaethon lepturus fulvus Christmas Island White-tailed Tropicbird, Endangered		Species or species habitat may occur within area
Golden Bosunbird [26021]		
Phaethon rubricauda Red-tailed Tropicbird [994]		Breeding known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola Grey Plover [865]	Vulnerable	Roosting known to occur within area overfly marine area
Pterodroma macroptera Great-winged Petrel [1035]		Foraging, feeding or related behaviour known to occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Puffinus assimilis Little Shearwater [59363]		Foraging, feeding or related behaviour known to occur within area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Roosting known to occur within area overfly marine area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area
Stercorarius antarcticus as Catharacta skua Brown Skua [85039]		Species or species habitat may occur within area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Sternula albifrons as Sterna albifrons		
Little Tern [82849]		Breeding known to occur within area

Sternula nereis as Sterna nereis
Fairy Tern [82949] Breeding known to occur within area

Stiltia isabella
Australian Pratincole [818] Roosting known to occur within area overfly marine area

Sula dactylatra
Masked Booby [1021] Breeding known to occur within area

Sula leucogaster
Brown Booby [1022] Breeding known to occur within area

Sula sula
Red-footed Booby [1023] Breeding known to occur within area

Thalassarche carteri
Indian Yellow-nosed Albatross [64464] Vulnerable Species or species habitat may occur within area

Thalassarche cauta
Shy Albatross [89224] Endangered Species or species habitat may occur within area

Thalassarche impavida
Campbell Albatross, Campbell Black-browed Albatross [64459] Vulnerable Species or species habitat may occur within area

Thalassarche melanophris
Black-browed Albatross [66472] Vulnerable Species or species habitat may occur within area

Thalassarche steadi
White-capped Albatross [64462] Vulnerable Species or species habitat may occur within area

Thalasseus bengalensis as Sterna bengalensis
Lesser Crested Tern [66546] Breeding known to occur within area

Thalasseus bergii as Sterna bergii
Greater Crested Tern [83000] Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Tringa brevipes as Heteroscelus brevipes		
Grey-tailed Tattler [851]		Roosting known to occur within area
Tringa glareola		
Wood Sandpiper [829]		Species or species habitat known to occur within area overfly marine area
Tringa nebularia		
Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area overfly marine area
Tringa stagnatilis		
Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area overfly marine area
Tringa totanus		
Common Redshank, Redshank [835]		Roosting known to occur within area overfly marine area
Xenus cinereus		
Terek Sandpiper [59300]	Vulnerable	Roosting known to occur within area overfly marine area
Fish Acentronura australe		
Southern Pygmy Pipehorse [66185]		Species or species habitat may occur within area
Acentronura larsonae		
Helen's Pygmy Pipehorse [66186]		Species or species habitat may occur within area
Bhanotia fasciolata		
Corrugated Pipefish, Barbed Pipefish [66188]		Species or species habitat may occur within area
Bulbonaricus brauni		
Braun's Pughead Pipefish, Pug-headed Pipefish [66189]		Species or species habitat may occur within area
Campichthys galei		
Gale's Pipefish [66191]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Campichthys tricarinatus Three-keel Pipefish [66192]		Species or species habitat may occur within area
Choeroichthys brachysoma Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area
Choeroichthys latispinosus Muiron Island Pipefish [66196]		Species or species habitat may occur within area
Choeroichthys suillus Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
Corythoichthys amplexus Fijian Banded Pipefish, Brown-banded Pipefish [66199]		Species or species habitat may occur within area
Corythoichthys flavofasciatus Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area
Corythoichthys intestinalis Australian Messmate Pipefish, Banded Pipefish [66202]		Species or species habitat may occur within area
Corythoichthys schultzi Schultz's Pipefish [66205]		Species or species habitat may occur within area
Cosmocampus banneri Roughridge Pipefish [66206]		Species or species habitat may occur within area
Doryrhamphus dactyliophorus Banded Pipefish, Ringed Pipefish [66210]		Species or species habitat may occur within area
Doryrhamphus excisus Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Doryrhamphus janssi Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area
Doryrhamphus multiannulatus Many-banded Pipefish [66717]		Species or species habitat may occur within area
Doryrhamphus negrosensis Flagtail Pipefish, Masthead Island Pipefish [66213]		Species or species habitat may occur within area
Festucalex scalaris Ladder Pipefish [66216]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within area
Halicampus dunckeri Red-hair Pipefish, Duncker's Pipefish [66220]		Species or species habitat may occur within area
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
Halicampus nitidus Glittering Pipefish [66224]		Species or species habitat may occur within area
Halicampus spinirostris Spiny-snout Pipefish [66225]		Species or species habitat may occur within area
Haliichthys taeniophorus Ribboned Pipehorse, Ribboned Seadragon [66226]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippocampus angustus Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area
Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area
Hippocampus histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area
Hippocampus spinosissimus Hedgehog Seahorse [66239]		Species or species habitat may occur within area
Hippocampus subelongatus West Australian Seahorse [66722]		Species or species habitat may occur within area
Hippocampus trimaculatus Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720]		Species or species habitat may occur within area
Lissocampus fatiloquus Prophet's Pipefish [66250]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Micrognathus micronotopterus Tidepool Pipefish [66255]		Species or species habitat may occur within area
Mitotichthys meraculus Western Crested Pipefish [66259]		Species or species habitat may occur within area
Nannocampus subosseus Bonyhead Pipefish, Bony-headed Pipefish [66264]		Species or species habitat may occur within area
Phoxocampus belcheri Black Rock Pipefish [66719]		Species or species habitat may occur within area
Phycodurus eques Leafy Seadragon [66267]		Species or species habitat may occur within area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
Pugnaso curtirostris Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Trachyrhamphus longirostris Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Mammal Dugong dugon Dugong [28]		Breeding known to occur within area
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Endangered	Species or species habitat may occur within area
Reptile Aipysurus apraefrontalis Short-nosed Sea Snake, Short-nosed Seasnake [1115]	Critically Endangered within area	Species or species habitat known to occur
Aipysurus duboisii Dubois' Sea Snake, Dubois' Seasnake, Reef Shallows Sea Snake [1116]		Species or species habitat may occur within area
Aipysurus foliosquama Leaf-scaled Sea Snake, Leaf-scaled Seasnake [1118]	Critically Endangered within area	Species or species habitat known to occur

Scientific Name	Threatened Category	Presence Text
Aipysurus fuscus Dusky Sea Snake [1119]		Species or species habitat known to occur within area
Aipysurus laevis Olive Sea Snake, Olive-brown Sea Snake [1120]		Species or species habitat may occur within area
Aipysurus mosaicus as Aipysurus eydouxii Mosaic Sea Snake [87261]	Species or species habitat may occur within area	
Aipysurus pooleorum Shark Bay Sea Snake [66061]	Species or species habitat may occur within area	
Aipysurus tenuis Brown-lined Sea Snake, Mjoberg's Sea Snake [1121]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Crocodylus johnstoni Freshwater Crocodile, Johnston's Crocodile, Johnstone's Crocodile [1773]		Species or species habitat may occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered within area	Foraging, feeding or related behaviour known to occur
Emydocephalus annulatus Eastern Turtle-headed Sea Snake [1125]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Ephalophis greyae as Ephalophis greyi Mangrove Sea Snake [93738]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Hydrelaps darwiniensis Port Darwin Sea Snake, Black-ringed Mangrove Sea Snake [1100]		Species or species habitat may occur within area
Hydrophis coggeri Cogger's Sea Snake [25925]		Species or species habitat may occur within area
Hydrophis czeblukovi Fine-spined Sea Snake [59233]		Species or species habitat may occur within area
Hydrophis elegans Elegant Sea Snake, Bar-bellied Sea Snake [1104]		Species or species habitat may occur within area
Hydrophis hardwickii as Lapemis hardwickii Spine-bellied Sea Snake [93516]		Species or species habitat may occur within area
Hydrophis kingii as Disteira kingii Spectacled Sea Snake [93511]		Species or species habitat may occur within area
Hydrophis macdowelli as Hydrophis mcdowelli MacDowell's Sea Snake, Small-headed Sea Snake, [75601]		Species or species habitat may occur within area
Hydrophis major as Disteira major Olive-headed Sea Snake [93512]		Species or species habitat may occur within area
Hydrophis ornatus Spotted Sea Snake, Ornate Reef Sea Snake [1111]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Hydrophis peronii as Acalyptophis peronii		
Horned Sea Snake [93509]		Species or species habitat may occur within area
Hydrophis platura as Pelamis platurus		
Yellow-bellied Sea Snake [93746]		Species or species habitat may occur within area
Hydrophis stokesii as Astrotia stokesii		
Stokes' Sea Snake [93510]		Species or species habitat may occur within area
Hydrophis zweiffei as Enhydrina schistosa		
Australian Beaked Sea Snake [93514]		Species or species habitat may occur within area
Lepidochelys olivacea		
Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Congregation or aggregation known to occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area

Whales and Other Cetaceans		[Resource Information]
Current Scientific Name	Status	Type of Presence
Mammal		
Balaenoptera acutorostrata		
Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera bonaerensis		
Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis		
Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni		
Bryde's Whale [35]		Species or species habitat likely to occur within area

Current Scientific Name	Status	Type of Presence
Balaenoptera musculus Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Feresa attenuata Pygmy Killer Whale [61]		Species or species habitat may occur within area
Globicephala macrorhynchus Short-finned Pilot Whale [62]		Species or species habitat may occur within area
Globicephala melas Long-finned Pilot Whale [59282]		Species or species habitat may occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Indopacetus pacificus Longman's Beaked Whale [72]		Species or species habitat may occur within area
Kogia breviceps Pygmy Sperm Whale [57]		Species or species habitat may occur within area
Kogia sima Dwarf Sperm Whale [85043]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
Lagenodelphis hosei Fraser's Dolphin, Sarawak Dolphin [41]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Breeding known to occur within area	
Mesoplodon densirostris Blainville's Beaked Whale, Dense- beaked Whale [74]		Species or species habitat may occur within area
Mesoplodon ginkgodens Gingko-toothed Beaked Whale, Gingko-toothed Whale, Gingko Beaked Whale [59564]		Species or species habitat may occur within area
Mesoplodon grayi Gray's Beaked Whale, Scamperdown Whale [75]		Species or species habitat may occur within area
Orcaella heinsohni Australian Snubfin Dolphin [81322]	Breeding known to occur within area	
Orcinus orca Killer Whale, Orca [46]	Species or species habitat may occur within area	
Peponocephala electra Melon-headed Whale [47]	Species or species habitat may occur within area	
Physeter macrocephalus Sperm Whale [59]	Species or species habitat may occur within area	
Pseudorca crassidens False Killer Whale [48]	Species or species habitat likely to occur within area	
Sousa sahulensis Australian Humpback Dolphin [87942]	Breeding known to occur within area	
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area
Stenella longirostris Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area
Steno bredanensis Rough-toothed Dolphin [30]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Australian Marine Parks [Resource Information]

Park Name	Zone & IUCN Categories
Abrolhos	Habitat Protection Zone (IUCN IV)
Carnarvon Canyon	Habitat Protection Zone (IUCN IV)
Dampier	Habitat Protection Zone (IUCN IV)
Gascoyne	Habitat Protection Zone (IUCN IV)
Gascoyne	Habitat Protection Zone (IUCN IV)
Kimberley	Habitat Protection Zone (IUCN IV)

Park Name	Zone & IUCN Categories
Kimberley	Habitat Protection Zone (IUCN IV)
Abrolhos	Multiple Use Zone (IUCN VI)
Abrolhos	Multiple Use Zone (IUCN VI)
Argo-Rowley Terrace	Multiple Use Zone (IUCN VI)
Argo-Rowley Terrace	Multiple Use Zone (IUCN VI)
Dampier	Multiple Use Zone (IUCN VI)
Eighty Mile Beach	Multiple Use Zone (IUCN VI)
Gascoyne	Multiple Use Zone (IUCN VI)
Kimberley	Multiple Use Zone (IUCN VI)
Montebello	Multiple Use Zone (IUCN VI)
Roebuck	Multiple Use Zone (IUCN VI)
Shark Bay	Multiple Use Zone (IUCN VI)
Abrolhos	National Park Zone (IUCN II)
Argo-Rowley Terrace	National Park Zone (IUCN II)
Dampier	National Park Zone (IUCN II)
Gascoyne	National Park Zone (IUCN II)
Kimberley	National Park Zone (IUCN II)
Mermaid Reef	National Park Zone (IUCN II)
Ningaloo	National Park Zone (IUCN II)
Ningaloo	Recreational Use Zone (IUCN IV)
Ningaloo	Recreational Use Zone (IUCN IV)
Abrolhos	Special Purpose Zone (IUCN VI)
Argo-Rowley Terrace	Special Purpose Zone (Trawl) (IUCN VI)

Habitat Critical to the Survival of Marine Turtles		[Resource Information]
Scientific Name	Behaviour	Presence
Aug - Sep		

Scientific Name	Behaviour	Presence
Natator depressus		
Flatback Turtle [59257]	Nesting	Known to occur
Dec - Jan		
Chelonia mydas		
Green Turtle [1765]	Nesting	Known to occur
May - Jul		
Lepidochelys olivacea		
Olive Ridley Turtle [1767]	Nesting	Known to occur
Nov-Feb		
Caretta caretta		
Loggerhead Turtle [1763]	Nesting	Known to occur
Nov - May		
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Nesting	Known to occur

Extra Information

State and Territory Reserves		[Resource Information]
Protected Area Name	Reserve Type	State
Adele Island	Nature Reserve	WA
Airlie Island	Nature Reserve	WA
Bardi Jawi	Indigenous Protected Area	WA
Barrow Island	Nature Reserve	WA
Barrow Island	Marine Management Area	WA
Barrow Island	Marine Park	WA
Bedout Island	Nature Reserve	WA
Bernier And Dorre Islands	Nature Reserve	WA
Bessieres Island	Nature Reserve	WA
Boodie, Double Middle Islands	Nature Reserve	WA
Bundegi Coastal Park	5(1)(h) Reserve	WA
Cape Range (South)	National Park	WA

Protected Area Name	Reserve Type	State
Coulomb Point	Nature Reserve	WA
Dambimangari	Indigenous Protected Area	WA
Dirk Hartog Island	National Park	WA
Eighty Mile Beach	Marine Park	WA
Faure Island	Private Nature Reserve	WA
Francois Peron	National Park	WA
Freycinet, Double Islands etc	Nature Reserve	WA
Gnandaroo Island	Nature Reserve	WA
Great Sandy Island	Nature Reserve	WA
Hamelin Pool	Marine Nature Reserve	WA
Jarrkunpungu	Nature Reserve	WA
Jurabi Coastal Park	5(1)(h) Reserve	WA
Karajarri	Indigenous Protected Area	WA
Koks Island	Nature Reserve	WA
Lacepede Islands	Nature Reserve	WA
Lalang-garram / Camden Sound	Marine Park	WA
Lalang-garram / Horizontal Falls	Marine Park	WA
Little Rocky Island	Nature Reserve	WA
Locker Island	Nature Reserve	WA
Lowendal Islands	Nature Reserve	WA
Miaboolya Beach	Fish Habitat Protection Area	WA
Montebello Islands	Conservation Park	WA
Montebello Islands	Marine Park	WA
Montebello Islands	Conservation Park	WA
Muiron Islands	Nature Reserve	WA

Protected Area Name	Reserve Type	State
Muiron Islands	Marine Management Area	WA
Nanga Station	NRS Addition - Gazettal in Progress	WA
Ningaloo	Marine Park	WA
North Kimberley	Marine Park	WA
North Lalang-garram	Marine Park	WA
North Sandy Island	Nature Reserve	WA
North Turtle Island	Nature Reserve	WA
Nyangumarta Warrarn	Indigenous Protected Area	WA
Nyingguulu (Ningaloo) Coastal Reserve	5(1)(h) Reserve	WA
Rocky Island	Nature Reserve	WA
Round Island	Nature Reserve	WA
Rowley Shoals	Marine Park	WA
Scott Reef	Nature Reserve	WA
Sedimentary Deposits Reserve	5(1)(g) Reserve	WA
Serrurier Island	Nature Reserve	WA
Shark Bay	Marine Park	WA
Swan Island	Nature Reserve	WA
Tanner Island	Nature Reserve	WA
Tent Island	Nature Reserve	WA
Thevenard Island	Nature Reserve	WA
Unnamed WA28968	5(1)(h) Reserve	WA
Unnamed WA36909	5(1)(h) Reserve	WA
Unnamed WA36913	Nature Reserve	WA
Unnamed WA36915	Nature Reserve	WA
Unnamed WA37168	5(1)(h) Reserve	WA

Protected Area Name	Reserve Type	State
Unnamed WA373385(1)(h)	Reserve	WA
Unnamed WA373835(1)(h)	Reserve	WA
Unnamed WA403225(1)(h)	Reserve	WA
Unnamed WA408285(1)(h)	Reserve	WA
Unnamed WA408775(1)(h)	Reserve	WA
Unnamed WA410805(1)(h)	Reserve	WA
Unnamed WA446655(1)(h)	Reserve	WA
Unnamed WA446675(1)(h)	Reserve	WA
Unnamed WA446695(1)(h)	Reserve	WA
Unnamed WA446725(1)(h)	Reserve	WA
Unnamed WA446735(1)(h)	Reserve	WA
Victor Island	Nature Reserve	WA
Whalebone Island	Nature Reserve	WA
Yawuru	Indigenous Protected Area	WA
Yawuru Nagulagun / Roebuck Bay	Marine Park	WA
Y Island	Nature Reserve	WA

Nationally Important Wetlands

[Resource Information]

Wetland Name	State
Cape Range Subterranean Waterways	WA
Eighty Mile Beach System	WA
Exmouth Gulf East	WA
Hamelin Pool	WA
Leslie (Port Hedland) Saltfields System	WA
Mermaid Reef	EXT
Shark Bay East	WA
Yampi Sound Training Area	WA

EPBC Act Referrals			[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status
Browse to North West Shelf Development, Indian Ocean, WA	2018/8319		Approval
Cockatoo Island Multi-User Supply Base, WA	2017/7986		Assessment
Gorgon Gas Development	2003/1294		Post-Approval
Koolan Island Operations	2022/09392		Assessment
Marine Route Survey for Subsea Fibre Optic Data Cable System - Australia West	2024/09826		Referral Decision
Midwest Offshore Wind Farm	2022/09264		Assessment
Ningaloo Lighthouse Development, 17km north west Exmouth, Western Australia	2020/8693		Post-Approval
North West Shelf Project Extension, Carnarvon Basin, WA	2018/8335		Approval
Ocean Barramundi Expansion Project	2022/09272		Assessment
Optimised Mardie Solar Salt Project	2022/9169		Approval
Project Highclere Cable Lay and Operation	2022/09203		Completed
Ridley Magnetite Project	2023/09477		Referral Decision
Action clearly unacceptable			
Asian Renewable Energy Hub Revised Proposal, WA	2021/8891	Action ClearlyUnacceptable	Completed
Highlands 3D Marine Seismic Survey	2012/6680	Action ClearlyUnacceptable	Completed
Controlled action			
'Van Gogh' Petroleum Field Development	2007/3213	Controlled Action	Post-Approval
2-D seismic survey Scott Reef	2000/125	Controlled Action	Post-Approval
Anketell Point Iron Ore Processing & Export Port	2009/5120	Controlled Action	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Controlled action			
Balmoral South Iron Ore Mine	2008/4236	Controlled Action	Post-Approval
Binowee Iron Ore Project	2001/366	Controlled Action	Proposed Decision
Browse FLNG Development, Commonwealth Waters	2013/7079	Controlled Action	Post-Approval
Cape Lambert Port B Development	2008/4032	Controlled Action	Post-Approval
Conduct an exploration drilling campaign	2010/5718	Controlled Action	Completed
Construct and operate LNG & domestic gas plant including onshore and offshore facilities - Wheatston	2008/4469	Controlled Action	Post-Approval
Construction and operation of a Solar Salt Project, SW Onslow, WA	2016/7793 Approach	Controlled Action	Assessment
Develop Ichthys gas-condensate field permit area W	2006/2767	Controlled Action	Completed
Develop Jansz-Io deepwater gas field in Permit Areas WA-18-R, WA-25-R and WA-26-	2005/2184	Controlled Action	Post-Approval
Development of Angel gas and condensate field, North West Shelf	2004/1805	Controlled Action	Post-Approval
Development of an iron ore mine and associated infrastructure	2010/5630 Approach	Controlled Action	Assessment
Development of Browse Basin Gas Fields (Upstream)	2008/4111	Controlled Action	Completed
Development of Coniston/Novara fields within the Exmouth Sub-basin	2011/5995	Controlled Action	Post-Approval
Development of Stybarrow petroleum field incl drilling and facility installation	2004/1469	Controlled Action	Post-Approval
Echo-Yodel Production Wells	2000/11	Controlled Action	Post-Approval
Enfield full field development	2001/257	Controlled Action	Post-Approval
Equus Gas Fields Development Project, Carnarvon Basin	2012/6301	Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Controlled action			
Eramurra Industrial Salt Project Approach	2021/9027	Controlled Action	Assessment
Eramurra Industrial Salt Project, near Karratha, WA	2019/8448	Controlled Action	Completed
Gorgon Gas Development 4th Train Proposal	2011/5942	Controlled Action	Post-Approval
Gorgon Gas Revised Development	2008/4178	Controlled Action	Post-Approval
Greater Enfield (Vincent) Development	2005/2110	Controlled Action	Post-Approval
Greater Gorgon Development - Optical Fibre Cable, Mainland to Barrow Island	2005/2141	Controlled Action	Completed
Ichthys Gas Field, Offshore and onshore processing facilities and subsea pipeline	2008/4208	Controlled Action	Post-Approval
Iron ore mine	2006/2522	Controlled Action	Post-Approval
Light Crude Oil Production	2001/365	Controlled Action	Post-Approval
Mardie Project, 80 km south west of Karratha, WA	2018/8236	Controlled Action	Post-Approval
Mauds Landing Marina	2000/98	Controlled Action	Completed
Nava-1 Cable System	2001/510	Controlled Action	Completed
Pluto Gas Project	2005/2258	Controlled Action	Completed
Pluto Gas Project Including Site B	2006/2968	Controlled Action	Post-Approval
Pluton Irvine Island Iron Ore Project	2011/6064	Controlled Action	Proposed Decision
Port Hedland Outer Harbour Development and associated marine and terrestrial in	2008/4159	Controlled Action	Post-Approval
Port Hedland Spoilbank Marina, WA	2019/8520	Controlled Action	Post-Approval
Proposed West Pilbara Iron Ore Project	2009/4706	Controlled Action	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Controlled action			
Pyrenees Oil Fields Development	2005/2034	Controlled Action	Post-Approval
Shark Bay Resources Dredging	2020/8717	Controlled Action	Post-Approval
Shark Bay Salt Facilities upgrade for direct ocean disposal of bitterns discharge	2011/5984	Controlled Action	Completed
Simpson Development	2000/59	Controlled Action	Completed
Simpson Oil Field Development	2001/227	Controlled Action	Post-Approval
The Scarborough Project - FLNG & assoc subsea infrastructure, Carnarvon Basin	2013/6811	Controlled Action	Post-Approval
Torosa South Initial Appraisal Drilling	2007/3500	Controlled Action	Completed
Vincent Appraisal Well	2000/22	Controlled Action	Post-Approval
Yannarie Solar Salt Project	2004/1679	Controlled Action	Completed
Yardie Creek Road Realignment Project	2021/8967	Controlled Action	Assessment Approach
Not controlled action			
'Goodwyn A' Low Pressure Train Project	2003/914	Not Controlled Action	Completed
'Van Gogh' Oil Appraisal Drilling Program, Exploration Permit Area WA-155-P(1)	2006/3148	Not Controlled Action	Completed
3D marine seismic survey in WA 314P and WA 315P	2004/1927	Not Controlled Action	Completed
Adele Trend TQ3D Seismic Survey	2001/252	Not Controlled Action	Completed
Airlie Island soil and groundwater investigations, Exmouth Gulf, offshore Pilbara coast	2014/7250	Not Controlled Action	Completed
APX-West Fibre-optic telecommunications cable system, WA to Singapore	2013/7102	Not Controlled Action	Completed
Aquaculture - Barramundi grow out, Yampi Sound	2005/2476	Not Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
archaeological surveys & excavation at historic sites, Cape Inscription	2006/3027 Action	Not Controlled	Completed
Baniyas-1 Exploration Well, EP-424, near Onslow	2007/3282 Action	Not Controlled	Completed
Barrow Island 2D Seismic survey	2006/2667 Action	Not Controlled	Completed
Bollinger 2D Seismic Survey 200km North of North West Cape WA	2004/1868 Action	Not Controlled	Completed
Bultaco-2, Laverda-2, Laverda-3 and Montesa-2 Appraisal Wells	2000/103 Action	Not Controlled	Completed
Cape Lambert Port A Marine Structures Refurbishment Project	2018/8370 Action	Not Controlled	Completed
Carnarvon 3D Marine Seismic Survey	2004/1890 Action	Not Controlled	Completed
Cazadores 2D seismic survey	2004/1720 Action	Not Controlled	Completed
Construction and operation of an unmanned sea platform and connecting pipeline to Varanus Island for	2004/1703 Action	Not Controlled	Completed
Construction of a Commodities Berth, Wharf and Associated Infrastructure	2008/4129 Action	Not Controlled	Completed
Controlled Source Electromagnetic Survey	2007/3262 Action	Not Controlled	Completed
Development of Halyard Field off the west coast of WA	2010/5611 Action	Not Controlled	Completed
Development of iron ore facilities	2013/7013 Action	Not Controlled	Completed
Development of Mutineer and Exeter petroleum fields for oil production, Permit	2003/1033 Action	Not Controlled	Completed
Drilling between Kalbarri and Cliff Head	2005/2185 Action	Not Controlled	Completed
Drilling of an exploration well Gats-1 in Permit Area WA-261-P	2004/1701 Action	Not Controlled	Completed
Drilling of exploration wells, Permit areas WA-301-P to WA-305-P	2002/769 Action	Not Controlled	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
Eagle-1 Exploration Drilling, North West Shelf, WA	2019/8578 Action	Not Controlled	Completed
Echo A Development WA-23-L, WA-24-L	2005/2042 Action	Not Controlled	Completed
Expansion of Monkey Mia Resort	2003/1146 Action	Not Controlled	Completed
Expansion of the Sino Iron Ore Mine and export facilities, Cape Preston, WA	2017/7862 Action	Not Controlled	Completed
Expansion Proposal, Mineralogy Cape Preston Iron Ore Project, Cape Preston, WA	2009/5010 Action	Not Controlled	Completed
Exploration drilling well WA-155-P(1)	2003/971 Action	Not Controlled	Completed
Exploration of appraisal wells	2006/3065 Action	Not Controlled	Completed
Exploration Well (Taunton-2)	2002/731 Action	Not Controlled	Completed
Exploration Well in Permit Area WA-155-P(1)	2002/759 Action	Not Controlled	Completed
Exploratory drilling in permit area WA-225-P	2001/490 Action	Not Controlled	Completed
Extension of Simpson Oil Platforms & Wells	2002/685 Action	Not Controlled	Completed
Extention to the existing Blind Strait Black Lip Pearl Oyster Farm	2004/1342 Action	Not Controlled	Completed
Gulf Fishing Lodge	2010/5499	Not Controlled Action	Completed
Hadda 1,Flying Foam 1,Magnat 1 exploration drill	2004/1697 Action	Not Controlled	Completed
HCA05X Macedon Experimental Survey	2004/1926 Action	Not Controlled	Completed
Hess Exploration Drilling Programme	2007/3566	Not Controlled Action	Completed
Huascaran-1 exploration well (WA-292-P)	2001/539 Action	Not Controlled	Completed

Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522 Action	Not Controlled	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
INDIGO West Submarine Telecommunications Cable, WA	2017/8126 Action	Not Controlled	Completed
Infill Production Well (Griffin-9) Action	2001/417	Not Controlled	Completed
Jansz-2 and 3 Appraisal Wells Action	2002/754	Not Controlled	Completed
Klammer 2D Seismic Survey Action	2002/868	Not Controlled	Completed
Koolan Island Mine - Reconstruction of seawall and capital dewatering of mine pit,130km northwest of	2016/7848 Action	Not Controlled	Completed
Maia-Gaea Exploration wells Action	2000/17	Not Controlled	Completed
Manaslu - 1 and Huascaran - 1 Offshore Exploration Wells	2001/235 Action	Not Controlled	Completed
Marine Seismic Survey in WA-239-P Action	2000/24	Not Controlled	Completed
Mermaid Marine Australia Desalination Project	2011/5916 Action	Not Controlled	Completed
Montesa-1 and Bultaco-1 Exploration Wells	2000/102 Action	Not Controlled	Completed
Murujuga archaeological excavation, collection and sampling, Dampier Archipelago, WA	2014/7160 Action	Not Controlled	Completed
North Rankin B gas compression facility	2005/2500 Action	Not Controlled	Completed
Pipeline System Modifications Project Action	2000/3	Not Controlled	Completed
Port Hedland Channel Risk and Optimisation Project, WA	2017/7915 Action	Not Controlled	Completed
Project Highclere Geophysical Survey Controlled Action	2021/9023	Not	Completed
Rail and Port Facilities	2001/474	Not Controlled Action	Completed
Searipple gas and condensate field development	2000/89 Action	Not Controlled	Completed
Spool Base Facility	2001/263	Not Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
Subsea Gas Pipeline From Stybarrow Field to Griffin Venture Gas Export Pipeline	2005/2033 Action	Not Controlled	Completed
sub-sea tieback of Perseus field wells	2004/1326	Not Controlled Action	Completed
Telfer Gold Mine Project - Mine and Borefield Extensions and Upgrade of Storage	2002/787 Action	Not Controlled	Completed
Telstra North Rankin Spur Fibre Optic Cable	2016/7836 Action	Not Controlled	Completed
Thevenard Island Retirement Project	2015/7423	Not Controlled Action	Completed
To construct and operate an offshore submarine fibre optic cable, WA	2014/7373 Action	Not Controlled	Completed
WA-295-P Kerr-McGee Exploration Wells	2001/152 Action	Not Controlled	Completed
Walkway Lighting Upgrade	2009/4965	Not Controlled Action	Completed
Wanda Offshore Research Project, 80 km north-east of Exmouth, WA	2018/8293 Action	Not Controlled	Completed
Western Flank Gas Development	2005/2464	Not Controlled Action	Completed
Wheatstone 3D seismic survey, 70km north of Barrow Island	2004/1761 Action	Not Controlled	Completed
Not controlled action (particular manner)			
'Kate' 3D marine seismic survey, exploration permits WA-320-P and WA-345-P, 60km	2005/2037 Action (Particular Manner)	Not Controlled	Post-Approval
'Tourmaline' 2D marine seismic survey, permit areas WA-323-P, WA-330-P and WA-32	2005/2282 Action (Particular Manner)	Not Controlled	Post-Approval
"Leanne" offshore 3D seismic exploration, WA-356-P	2005/1938 Action (Particular Manner)	Not Controlled	Post-Approval
2D and 3D seismic surveys	2005/2151	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
2D marine seismic survey	2012/6296	Not Controlled Action (Particular Manner)	Post-Approval
2D seismic survey	2008/4493	Not Controlled Action (Particular Manner)	Post-Approval
2D Seismic Survey	2005/2146	Not Controlled Action (Particular Manner)	Post-Approval
2D seismic survey in permit areas WA-274P and WA-281P	2004/1521	Not Controlled Action (Particular Manner)	Post-Approval
2D Seismic Survey Permit Area WA-352-P	2008/4628	Not Controlled Action (Particular Manner)	Post-Approval
2D seismic survey within permit WA-291	2007/3265	Not Controlled Action (Particular Manner)	Post-Approval
2 geotechnical surveys - preliminary and final	2006/2886	Not Controlled Action (Particular Manner)	Post-Approval
3D marine seismic survey	2008/4281	Not Controlled Action (Particular Manner)	Post-Approval
3D Marine Seismic Survey (WA-482-P, WA-363-P), WA	2013/6761	Not Controlled Action (Particular Manner)	Post-Approval
3D Marine Seismic Survey in Permit Areas WA-15-R, WA-18-R, WA-205-P, WA-253-P, WA-267-P and WA-268-P	2003/1271	Not Controlled Action (Particular Manner)	Post-Approval
3D Marine Seismic Survey in WA 457-P & WA 458-P, North West Shelf, offshore WA	2013/6862	Not Controlled Action (Particular Manner)	Post-Approval
3D marine seismic Survey - Maxima 3D MSS	2006/2945	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
3D marine seismic survey over petroleum title WA-268-P	2007/3458	Not Controlled Action (Particular Manner)	Post-Approval
3D Marine Seismic Surveys - Contos CT-13 & Supertubes CT-13, offshore WA	2013/6901	Not Controlled Action (Particular Manner)	Post-Approval
3D seismic survey	2006/2715	Not Controlled Action (Particular Manner)	Post-Approval
3D Seismic Survey, Browse Basin, WA	2009/5048	Not Controlled Action (Particular Manner)	Post-Approval
3D Seismic Survey, near Scott Reef, Browse Basin	2005/2126	Not Controlled Action (Particular Manner)	Post-Approval
3D Seismic Survey, WA	2008/4428	Not Controlled Action (Particular Manner)	Post-Approval
3D Seismic Survey in the Carnarvon Bsin on the North West Shelf	2002/778	Not Controlled Action (Particular Manner)	Post-Approval
3D sesmic survey	2006/2781	Not Controlled Action (Particular Manner)	Post-Approval
Acacia East Pit Cutback Mining Project,northern Kimberley, WA	2013/6752	Not Controlled Action (Particular Manner)	Post-Approval
Acheron Non-Exclusive 2D Seismic Survey	2009/4968	Not Controlled Action (Particular Manner)	Post-Approval
Acheron Non-Exclusive 2D Seismic Survey	2008/4565	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Agrippina 3D Seismic Marine Survey	2009/5212	Not Controlled Action (Particular Manner)	Post-Approval
Apache Northwest Shelf Van Gogh Field Appraisal Drilling Program	2007/3495	Not Controlled Action (Particular Manner)	Post-Approval
Aperio 3D Marine Seismic Survey, WA	2012/6648	Not Controlled Action (Particular Manner)	Post-Approval
Artemis-1 Drilling Program (WA-360-P)	2010/5432	Not Controlled Action (Particular Manner)	Post-Approval
Aurora MC3D Marine Seismic Survey	2010/5510	Not Controlled Action (Particular Manner)	Post-Approval
Australia to Singapore Fibre Optic Submarine Cable System	2011/6127	Not Controlled Action (Particular Manner)	Post-Approval
Babylon 3D Marine Seismic Survey, Commonwealth Waters, nr Exmouth WA	2013/7081	Not Controlled Action (Particular Manner)	Post-Approval
Balnaves Condensate Field Development	2011/6188	Not Controlled Action (Particular Manner)	Post-Approval
Bonaventure 3D seismic survey	2006/2514	Not Controlled Action (Particular Manner)	Post-Approval
Braveheart 2D Infill Marine Seismic Survey 100km offshore	2008/4442	Not Controlled Action (Particular Manner)	Post-Approval
Braveheart 2D Marine Seismic Survey	2005/2322	Not Controlled Action (Particular Manner)	Post-Approval
Cable Seismic Exploration Permit areas WA-323-P and WA-330-P	2008/4227	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Manner)			
Cape Preston East - Iron Ore Export Facilities, Pilbara, WA	2013/6844	Not Controlled Action (Particular Manner)	Post-Approval
Caswell MC3D Marine Seismic Survey	2012/6594	Not Controlled Action (Particular Manner)	Post-Approval
Cerberus exploration drilling campaign, Carnarvon Basin, WA	2016/7645	Not Controlled Action (Particular Manner)	Post-Approval
CGGVERITAS 2010 2D Seismic Survey	2010/5714	Not Controlled Action (Particular Manner)	Post-Approval
Charon 3D Marine Seismic Survey	2007/3477	Not Controlled	Post-Approval
Action (Particular Manner)			
Conduct an exploration drilling campaign	2011/5964	Not Controlled Action (Particular Manner)	Post-Approval
Consturction & operation of the Varanus Island kitchen & mess cyclone refuge building, compression p	2013/6952	Not Controlled Action (Particular Manner)	Post-Approval
Coverack Marine Seismic Survey	2001/399	Not Controlled	Post-Approval
Action (Particular Manner)			
Cue Seismic Survey within WA-359-P, WA-361-P and WA-360-P	2007/3647	Not Controlled Action (Particular Manner)	Post-Approval
CVG 3D Marine Seismic Survey	2012/6654	Not Controlled	Post-Approval
Action (Particular Manner)			
DAVROS MC 3D marine seismic survey northwaet of Dampier, WA	2013/7092	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Decommissioning of the Legendre facilities	2010/5681	Not Controlled Action (Particular Manner)	Post-Approval
Deep Water Drilling Program	2010/5532	Not Controlled Action (Particular Manner)	Post-Approval
Deep Water Northwest Shelf 2D Seismic Survey	2007/3260	Not Controlled Action (Particular Manner)	Post-Approval
Demeter 3D Seismic Survey, off Dampier, WA	2002/900	Not Controlled Action (Particular Manner)	Post-Approval
Draeck 3D Marine Seismic Survey, WA-205-P	2006/3067	Not Controlled Action (Particular Manner)	Post-Approval
Dredging of marine sediment to enable construction of eight berths and a turnin	2010/5678	Not Controlled Action (Particular Manner)	Post-Approval
Drilling 35-40 offshore exploration wells in deep water	2008/4461	Not Controlled Action (Particular Manner)	Post-Approval
Earthworks for kitchen/mess, cyclone refuge building & Compression Plant, Varanus Island	2013/6900	Not Controlled Action (Particular Manner)	Post-Approval
Eendracht Multi-Client 3D Marine Seismic Survey	2009/4749	Not Controlled Action (Particular Manner)	Post-Approval
Effect of marine seismic sounds to demersal fish and pearl oysters, north-west WA	2018/8169	Not Controlled Action (Particular Manner)	Post-Approval
Endurance 3D Marine Seismic Data Acquisition Survey	2007/3667	Not Controlled Action (Particular Manner)	Post-Approval
Enfield M3 & Vincent 4D Marine Seismic Surveys	2008/3981	Not Controlled Action (Particular	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Manner)			
Enfield M3 4D, Vincent 4D & 4D Line Test Marine Seismic Surveys	2008/4122	Not Controlled Action (Particular Manner)	Post-Approval
Enfield M4 4D Marine Seismic Survey Action (Particular Manner)	2008/4558	Not Controlled	Post-Approval
Enfield oilfield 3D Seismic Survey Action (Particular Manner)	2006/3132	Not Controlled	Post-Approval
Exmouth West 2D Marine Seismic Survey	2008/4132	Not Controlled Action (Particular Manner)	Post-Approval
Exploration drilling of Zeus-1 well Action (Particular Manner)	2008/4351	Not Controlled	Post-Approval
Exploration Drilling Program - Permit areas - WA-314-P, WA-315-P, WA-398-P.	2008/4064	Not Controlled Action (Particular Manner)	Post-Approval
Fletcher-Finucane Development, WA26-L and WA191-P	2011/6123	Not Controlled Action (Particular Manner)	Post-Approval
Foxhound 3D Non-Exclusive Marine Seismic Survey	2009/4703	Not Controlled Action (Particular Manner)	Post-Approval
Gazelle 3D Marine Seismic Survey in WA-399-P and WA-42-L	2010/5570	Not Controlled Action (Particular Manner)	Post-Approval
Geco Eagle 3D Marine Seismic Survey	2008/3958	Not Controlled Action (Particular Manner)	Post-Approval
Geoscience Australia - Marine survey in Browse Basin to acquire data to assist assessment of CO2 sto	2013/6747	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Gigas 2D Pilot Ocean Bottom Cable Marine Seismic Survey	2007/3839	Not Controlled Action (Particular Manner)	Post-Approval
Glencoe 3D Marine Seismic Survey WA-390-P	2007/3684	Not Controlled Action (Particular Manner)	Post-Approval
Greater Western Flank Phase 1 gas Development	2011/5980	Not Controlled Action (Particular Manner)	Post-Approval
Grimalkin 3D Seismic Survey	2008/4523	Not Controlled Action (Particular Manner)	Post-Approval
Guacamole 2D Marine Seismic Survey	2008/4381	Not Controlled Action (Particular Manner)	Post-Approval
Harmony 3D Marine Seismic Survey	2012/6699	Not Controlled Action (Particular Manner)	Post-Approval
Harpy 1 exploration well	2001/183	Not Controlled Action (Particular Manner)	Post-Approval
Honeycombs MC3D Marine Seismic Survey	2012/6368	Not Controlled Action (Particular Manner)	Post-Approval
Huzzas MC3D Marine Seismic Survey (HZ-13) Carnarvon Basin, offshore WA	2013/7003	Not Controlled Action (Particular Manner)	Post-Approval
Huzzas phase 2 marine seismic survey, Exmouth Plateau, Northern Carnarvon Basin, WA	2013/7093	Not Controlled Action (Particular Manner)	Post-Approval
Ichthys 3D Marine Seismic Survey	2010/5550	Not Controlled Action (Particular Manner)	Post-Approval
INDIGO Marine Cable Route Survey (INDIGO)	2017/7996	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Manner)			
John Ross & Rosella Off Bottom Cable Seismic Exploration Program	2008/3966	Not Controlled Action (Particular Manner)	Post-Approval
Judo Marine 3D Seismic Survey within and adjacent to WA-412-P	2008/4630	Not Controlled Action (Particular Manner)	Post-Approval
Judo Marine 3D Seismic Survey within and adjacent to WA-412-P	2009/4801	Not Controlled Action (Particular Manner)	Post-Approval
Julimar Brunello Gas Development Project	2011/5936	Not Controlled Action (Particular Manner)	Post-Approval
Kingtree & Ironstone-1 Exploration Wells	2011/5935	Not Controlled Action (Particular Manner)	Post-Approval
Klimt 2D Marine Seismic Survey	2007/3856	Not Controlled	Post-Approval
Action (Particular Manner)			
Koolama 2D Seismic Survey Dampier Basin	2010/5420	Not Controlled Action (Particular Manner)	Post-Approval
Kraken, Lusca & Asperus 3D Marine Seismic Survey	2013/6730	Not Controlled Action (Particular Manner)	Post-Approval
Laverda 3D Marine Seismic Survey and Vincent M1 4D Marine Seismic Survey	2010/5415	Not Controlled Action (Particular Manner)	Post-Approval
Laying a submarine optical fibre telecommunications cable, Perth to Singapore and Jakarta	2014/7332	Not Controlled Action (Particular Manner)	Post-Approval
Leopard 2D marine seismic survey	2005/2290	Not Controlled	Post-Approval
Action (Particular Manner)			

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Lion 2D Marine Seismic Survey	2007/3777	Not Controlled Action (Particular Manner)	Post-Approval
Macedon Gas Field Development	2008/4605	Not Controlled Action (Particular Manner)	Post-Approval
Marine Geotechnical Drilling Program	2008/4012	Not Controlled Action (Particular Manner)	Post-Approval
Marine reconnaissance survey	2008/4466	Not Controlled Action (Particular Manner)	Post-Approval
Mariner Non-Exclusive 2D Seismic Survey	2011/6172	Not Controlled Action (Particular Manner)	Post-Approval
Millstream 20GL Pipeline, Bungaroo, Borefield Integration	2012/6379	Not Controlled Action (Particular Manner)	Post-Approval
Moosehead 2D seismic survey within permit WA-192-P	2005/2167	Not Controlled Action (Particular Manner)	Post-Approval
Munmorah 2D seismic survey within permits WA-308/9-P	2003/970	Not Controlled Action (Particular Manner)	Post-Approval
Nelson Point Dredging	2009/4920	Not Controlled Action (Particular Manner)	Post-Approval
Ocean Bottom Cable Seismic Program, WA-264-P	2007/3844	Not Controlled Action (Particular Manner)	Post-Approval
Ocean Bottom Cable Seismic Survey	2005/2017	Not Controlled Action (Particular Manner)	Post-Approval
Offshore Canning Multi Client 2D Marine Seismic Survey	2010/5393	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Manner)			
Offshore Drilling Campaign	2011/5830	Not Controlled	Post-Approval
Action (Particular Manner)			
Offshore Exploration Drilling Campaign	2011/6222	Not Controlled	Post-Approval
	Action (Particular Manner)		
Offshore Fibre Optic Cable Network Construction & Operation, Port Hedland WA to Darwin NT	2014/7223	Not Controlled	Post-Approval
	Action (Particular Manner)		
Offshore Gas Exploration Drilling Campaign	2012/6384	Not Controlled	Post-Approval
	Action (Particular Manner)		
Orcus 3D Marine Seismic Survey in WA-450-P	2010/5723	Not Controlled	Post-Approval
	Action (Particular Manner)		
Osprey and Dionysus Marine Seismic Survey	2011/6215	Not Controlled	Post-Approval
	Action (Particular Manner)		
Outer Canning exploration drilling program off NW coast of WA	2012/6618	Not Controlled	Post-Approval
	Action (Particular Manner)		
Palta-1 exploration well in Petroleum Permit Area WA-384-P	2011/5871	Not Controlled	Post-Approval
	Action (Particular Manner)		
Phoenix 3D Seismic Survey, Bedout Sub-Basin	2010/5360	Not Controlled	Post-Approval
	Action (Particular Manner)		
Pilot Appraisal Well - Torosa South 1	2008/3991	Not Controlled	Post-Approval
Action (Particular Manner)			
Pomodoro 3D Marine Seismic Survey in WA-426-P and WA-427-P	2010/5472	Not Controlled	Post-Approval
	Action (Particular Manner)		

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Port Headland Outer Harbour Pre-construction Pilling program	2012/6341	Not Controlled Action (Particular Manner)	Post-Approval
Port of Port Hedland channel marker replacement project, WA	2017/8010	Not Controlled Action (Particular Manner)	Post-Approval
Port Walcott upgrade, dredging & spoil disposal, & channel realignment	2006/2806	Not Controlled Action (Particular Manner)	Post-Approval
Pyrenees 4D Marine Seismic Monitor Survey, HCA12A	2012/6579	Not Controlled Action (Particular Manner)	Post-Approval
Pyrenees-Macedon 3D marine seismic survey	2005/2325	Not Controlled Action (Particular Manner)	Post-Approval
Quiberon 2D Seismic Survey, permit area WA-385P, offshore of Carnarvon	2009/5077	Not Controlled Action (Particular Manner)	Post-Approval
Reindeer gas reservior development, Devil Creek, Carnarvon Basin - WA	2007/3917	Not Controlled Action (Particular Manner)	Post-Approval
Repsol 3d & 2D Marine Seismic Survey	2012/6658	Not Controlled Action (Particular Manner)	Post-Approval
Rose 3D Seismic Program	2008/4239	Not Controlled	Post-Approval
Action (Particular Manner)			
Rosebud 3D Marine Seismic Survey in WA-30-R and TR/5	2012/6493	Not Controlled Action (Particular Manner)	Post-Approval
Rydal-1 Petroleum Exploration Well, WA	2012/6522	Not Controlled Action (Particular Manner)	Post-Approval
Salsa 3D Marine Seismic Survey	2010/5629	Not Controlled	Post-Approval
Action (Particular			

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Manner)			
Sampling of Stromatolites, additional sites, Mamelin Pool,WA	2013/7071	Not Controlled Action (Particular Manner)	Post-Approval
Sampling of Stromatolites and Sediments	2012/6307	Not Controlled Action (Particular Manner)	Post-Approval
Santos Winchester three dimensional seismic survey - WA-323-P & WA-330-P	2011/6107	Not Controlled Action (Particular Manner)	Post-Approval
Scarborough Development nearshore component, NWS, WA	2018/8362	Not Controlled Action (Particular Manner)	Post-Approval
Schild MC3D Marine Seismic Survey	2012/6373	Not Controlled	Post-Approval
Action (Particular Manner)			
Schild Phase 11 MC3D Marine Seismic Survey, Browse Basin	2013/6894	Not Controlled Action (Particular Manner)	Post-Approval
Scott Reef Seismic Research	2006/2647	Not Controlled	Post-Approval
Action (Particular Manner)			
Skorpion Marine Seismic Survey WA	2001/416	Not Controlled	Post-Approval
Action (Particular Manner)			
Sovereign 3D Marine Seismic Survey	2011/5861	Not Controlled	Post-Approval
Action (Particular Manner)			
Stag 4D & Reindeer MAZ Marine Seismic Surveys, WA	2013/7080	Not Controlled Action (Particular Manner)	Post-Approval
Stag Off-bottom Cable Seismic Survey	2007/3696	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Stybarrow 4D Marine Seismic Survey Action (Particular Manner)	2011/5810	Not Controlled	Post-Approval
Stybarrow Baseline 4D marine seismic survey	2008/4530 Action (Particular Manner)	Not Controlled	Post-Approval
Tantabiddi Boat Ramp Sand Bypassing	2015/7411 Action (Particular Manner)	Not Controlled	Post-Approval
Tidepole Maz 3D Seismic Survey Campaign	2007/3706 Action (Particular Manner)	Not Controlled	Post-Approval
Torosa-5 Apraisal Well, WA-30-R Action (Particular Manner)	2008/4430	Not Controlled	Post-Approval
Tortilla 2D Seismic Survey, WA Action (Particular Manner)	2011/6110	Not Controlled	Post-Approval
Tridacna 3D Ocean Bottom Cable Marine Seismic Survey	2011/5959 Action (Particular Manner)	Not Controlled	Post-Approval
Triton 3D Marine Seismic Survey, WA-2-R and WA-3-R	2006/2609 Action (Particular Manner)	Not Controlled	Post-Approval
Undertake a 3D marine seismic survey	2010/5695 Action (Particular Manner)	Not Controlled	Post-Approval
Undertake a three dimensional marine seismic survey	2010/5679 Action (Particular Manner)	Not Controlled	Post-Approval
Undertake a three dimensional marine seismic survey	2010/5715 Action (Particular Manner)	Not Controlled	Post-Approval
upgrade of 3 community recreation sites	2005/2349 Action (Particular	Not Controlled	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status	Not controlled action (particular manner)
Useless Loop Port Maintenance Works and Infrastructure Upgrade	2009/4791	Not Controlled Action (Particular Manner)	Post-Approval	
Vampire 2D Non Exclusive Seismic Survey, WA	2010/5543	Not Controlled Action (Particular Manner)	Post-Approval	
Veritas Voyager 2D Marine Seismic Survey	2009/5151	Not Controlled Action (Particular Manner)	Post-Approval	
Vincent M1 and Enfield M5 4D Marine Seismic Survey	2010/5720	Not Controlled Action (Particular Manner)	Post-Approval	
Warramunga Non-Inclusive 3D Seismic Survey	2008/4553	Not Controlled Action (Particular Manner)	Post-Approval	
West Anchor 3D Marine Seismic Survey	2008/4507	Not Controlled Action (Particular Manner)	Post-Approval	
West Panaeus 3D seismic survey	2006/3141	Not Controlled	Post-Approval	Action (Particular Manner)
Westralia SPAN Marine Seismic Survey, WA & NT	2012/6463	Not Controlled Action (Particular Manner)	Post-Approval	
Wheatstone 3D MAZ Marine Seismic Survey	2011/6058	Not Controlled Action (Particular Manner)	Post-Approval	
Wheatstone Iago Appraisal Well Drilling	2007/3941	Not Controlled Action (Particular Manner)	Post-Approval	
Wheatstone Iago Appraisal Well Drilling	2008/4134	Not Controlled Action (Particular Manner)	Post-Approval	

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Woodside Southern Browse 3D Seismic Survey, WA	2007/3534	Not Controlled Action (Particular Manner)	Post-Approval
Zeemeermin MC3D seismic survey, Browse Basin, Offshore WA	2009/5023	Not Controlled Action (Particular Manner)	Post-Approval
Referral decision			
3D Marine Seismic Survey in the offshore northwest Carnarvon Basin	2011/6175	Referral Decision	Completed
3D Seismic Survey	2008/4219	Referral Decision	Completed
Aurora extension MC3D Marine Seismic Survey	2011/5887	Referral Decision	Completed
Bianchi 3D Marine Seismic Survey, Carnavon Basin, WA	2013/7078	Referral Decision	Completed
BRSN08 3D Marine Seismic Survey	2008/4582	Referral Decision	Completed
CVG 3D Marine Seismic Survey	2012/6270	Referral Decision	Completed
Enfield 4D Marine Seismic Surveys, Production Permit WA-28-L	2005/2370	Referral Decision	Completed
Experimental Study of Behavioural and Physiological Impact on Fish of Seismic Ex	2006/2625	Referral Decision	Completed
Mardie Salt Project, Pilbara region, WA	2018/8183	Referral Decision	Completed
Outer Harbour Development and associated marine and terrestial infrastructure	2008/4148	Referral Decision	Completed
Pilot Appraisal Well - Torosa South-1	2008/3985	Referral Decision	Completed
Rose 3D Seismic acquisition survey	2008/4220	Referral Decision	Completed
Seismic Data Acquisition, Browse Basin	2010/5475	Referral Decision	Completed
Stybarrow Baseline 4D Marine Seismic Survey (Permit Areas WA-255-P, WA-32-L, WA-	2008/4165	Referral Decision	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Referral decision			
Tidal Power Generation Turbine	2009/5235	Referral Decision	Completed
Two Dimensional Transition Zone Seismic Survey - TP/7 (R1)	2010/5507	Referral Decision	Completed
Varanus Island Compression Project	2012/6698	Referral Decision	Completed

Key Ecological Features [Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
Ancient coastline at 125 m depth contour	North-west
Ancient coastline at 90-120m depth	South-west
Canyons linking the Argo Abyssal Plain with the Scott Plateau	North-west
Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula	North-west
Commonwealth waters adjacent to Ningaloo Reef	North-west
Continental Slope Demersal Fish Communities	North-west
Exmouth Plateau	North-west
Glomar Shoals	North-west
Mermaid Reef and Commonwealth waters surrounding Rowley Shoals	North-west
Seringapatam Reef and Commonwealth waters in the Scott Reef Complex	North-west
Wallaby Saddle	North-west
Western demersal slope and associated fish communities	South-west
Western rock lobster	South-west

Biologically Important Areas [Resource Information]

Scientific Name	Behaviour	Presence
Dolphins		
Orcaella heinsohni Australian Snubfin Dolphin [81322]	Breeding	Known to occur

Scientific Name	Behaviour	Presence
Orcaella heinsohni Australian Snubfin Dolphin [81322]	Calving	Known to occur
Orcaella heinsohni Australian Snubfin Dolphin [81322]	Foraging (high density prey)	Known to occur
Orcaella heinsohni Australian Snubfin Dolphin [81322]	Foraging likely	Known to occur
Orcaella heinsohni Australian Snubfin Dolphin [81322]	Resting	Known to occur
Sousa chinensis Indo-Pacific Humpback Dolphin [50]	Breeding	Likely to occur
Sousa chinensis Indo-Pacific Humpback Dolphin [50]	Breeding	Known to occur
Sousa chinensis Indo-Pacific Humpback Dolphin [50]	Calving	Known to occur
Sousa chinensis Indo-Pacific Humpback Dolphin [50]	Calving	Likely to occur
Sousa chinensis Indo-Pacific Humpback Dolphin [50]	Foraging	Likely to occur
Sousa chinensis Indo-Pacific Humpback Dolphin [50]	Foraging (high density prey)	Known to occur
Tursiops aduncus Indo-Pacific/Spotted Bottlenose Dolphin [68418]	Breeding	Known to occur
Tursiops aduncus Indo-Pacific/Spotted Bottlenose Dolphin [68418]	Calving	Known to occur
Tursiops aduncus Indo-Pacific/Spotted Bottlenose Dolphin [68418]	Foraging	Known to occur
Tursiops aduncus Indo-Pacific/Spotted Bottlenose Dolphin [68418]	Foraging likely	Known to occur

Scientific Name	Behaviour	Presence
Tursiops aduncus Indo-Pacific/Spotted Bottlenose Dolphin [68418]	Migration likely	Known to occur
Dugong Dugong dugon Dugong [28]	Breeding	Known to occur
Dugong dugon Dugong [28]	Calving	Known to occur
Dugong dugon Dugong [28]	Foraging	Known to occur
Dugong dugon Dugong [28]	Foraging	Likely to occur
Dugong dugon Dugong [28]	Foraging (high density seagrass beds)	Known to occur
Dugong dugon Dugong [28]	Migration	Known to occur
Dugong dugon Dugong [28]	Migration likely	Known to occur
Dugong dugon Dugong [28]	Nursing	Known to occur
Marine Turtles Caretta caretta Loggerhead Turtle [1763]	Foraging	Known to occur
Caretta caretta Loggerhead Turtle [1763]	Internesting	Known to occur
Caretta caretta Loggerhead Turtle [1763]	Internesting buffer	Known to occur
Caretta caretta Loggerhead Turtle [1763]	Nesting	Known to occur

Scientific Name	Behaviour	Presence
Chelonia mydas Green Turtle [1765]	Aggregation	Known to occur
Chelonia mydas Green Turtle [1765]	Basking	Known to occur
Chelonia mydas Green Turtle [1765]	Foraging	Known to occur
Chelonia mydas Green Turtle [1765]	Foraging	Likely to occur
Chelonia mydas Green Turtle [1765]	Internesting	Likely to occur
Chelonia mydas Green Turtle [1765]	Internesting	Known to occur
Chelonia mydas Green Turtle [1765]	Internesting buffer	Known to occur
Chelonia mydas Green Turtle [1765]	Mating	Known to occur
Chelonia mydas Green Turtle [1765]	Migration corridor	Known to occur
Chelonia mydas Green Turtle [1765]	Nesting	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Foraging	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Foraging	Likely to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Internesting	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Internesting buffer	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Mating	Known to occur

Scientific Name	Behaviour	Presence
Eretmochelys imbricata Hawksbill Turtle [1766]	Migration corridor	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Nesting	Known to occur
Natator depressus Flatback Turtle [59257]	Aggregation	Known to occur
Natator depressus Flatback Turtle [59257]	Foraging	Known to occur
Natator depressus Flatback Turtle [59257]	Internesting	Known to occur
Natator depressus Flatback Turtle [59257]	Internesting buffer	Known to occur
Natator depressus Flatback Turtle [59257]	Mating	Known to occur
Natator depressus Flatback Turtle [59257]	Migration corridor	Known to occur
Natator depressus Flatback Turtle [59257]	Nesting	Known to occur
River shark Pristis clavata Dwarf Sawfish [68447]	Foraging	Known to occur
Pristis clavata Dwarf Sawfish [68447]	Juvenile	Known to occur
Pristis clavata Dwarf Sawfish [68447]	Nursing	Known to occur
Pristis clavata Dwarf Sawfish [68447]	Pupping	Known to occur
Pristis pristis Freshwater Sawfish [60756]	Foraging	Known to occur

Scientific Name		Behaviour	Presence
Pristis pristis Freshwater Sawfish [60756]		Nursing	Likely to occur
Pristis pristis Freshwater Sawfish [60756]		Nursing	Known to occur
Pristis pristis Freshwater Sawfish [60756]		Pupping	Likely to occur
Pristis zijsron Green Sawfish [68442]		Foraging	Known to occur
Pristis zijsron Green Sawfish [68442]		Nursing	Known to occur
Pristis zijsron Green Sawfish [68442]		Pupping	Known to occur
Seabirds	Ardenna pacifica Wedge-tailed Shearwater [84292]	Breeding	Known to occur
Ardenna pacifica Wedge-tailed Shearwater [84292]		Foraging (in high numbers)	Known to occur
Fregata ariel Lesser Frigatebird [1012]		Breeding	Known to occur
Fregata minor Greater Frigatebird [1013]		Breeding	Known to occur
Hydroprogne caspia Caspian Tern [808]		Foraging (provisioning young)	Known to occur
Onychoprion anaethetus Bridled Tern [82845]		Foraging (in high numbers)	Known to occur
Onychoprion fuscata Sooty Tern [82847]		Foraging	Known to occur
Pelagodroma marina White-faced Storm petrel [1016]		Foraging (in high	Known to occur

Scientific Name		Behaviour	Presence
numbers)			
[Phaethon lepturus](#)			
White-tailed Tropicbird [1014]		Breeding	Known to occur
[Puffinus assimilis tunneyi](#)			
Little Shearwater [59363]		Foraging (in high numbers)	Known to occur
[Sterna dougallii](#)			
Roseate Tern [817]		Breeding	Known to occur
[Sterna dougallii](#)			
Roseate Tern [817]		Resting	Known to occur
[Sternula albifrons sinensis](#)			
Little Tern [82850]		Breeding	Known to occur
[Sternula albifrons sinensis](#)			
Little Tern [82850]		Resting	Known to occur
[Sternula nereis](#)			
Fairy Tern [82949]		Breeding	Known to occur
[Sula leucogaster](#)			
Brown Booby [1022]		Breeding	Known to occur
[Sula sula](#)			
Red-footed Booby [1023]		Breeding	Known to occur
[Thalasseus bengalensis](#)			
Lesser Crested Tern [66546]		Breeding	Known to occur
Sharks	[Rhincodon typus](#)		
Whale Shark [66680]		Foraging	Known to occur
[Rhincodon typus](#)			
Whale Shark [66680]		Foraging (high density prey)	Known to occur
Whales	[Balaenoptera musculus brevicauda](#)		
Pygmy Blue Whale [81317]		Distribution	Known to occur

Scientific Name	Behaviour	Presence
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Foraging	Known to occur
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Migration	Known to occur
Megaptera novaeangliae Humpback Whale [38]	Calving	Known to occur
Megaptera novaeangliae Humpback Whale [38]	Migration	Known to occur
Megaptera novaeangliae Humpback Whale [38] (north)	Migration	Known to occur
Megaptera novaeangliae Humpback Whale [38] (north and south)	Migration	Known to occur
Megaptera novaeangliae Humpback Whale [38]	Nursing	Known to occur
Megaptera novaeangliae Humpback Whale [38]	Resting	Known to occur

Caveat

PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

World and National Heritage properties;

Wetlands of International and National Importance;

Commonwealth and State/Territory reserves;

distribution of listed threatened, migratory and marine species;

listed threatened ecological communities; and

other information that may be useful as an indicator of potential habitat value.

DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

threatened species listed as extinct or considered vagrants;

some recently listed species and ecological communities;

some listed migratory and listed marine species, which are not listed as threatened species; and

migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded

seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements
This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:
-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact us page.

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EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 06-Jun-2024 Summary

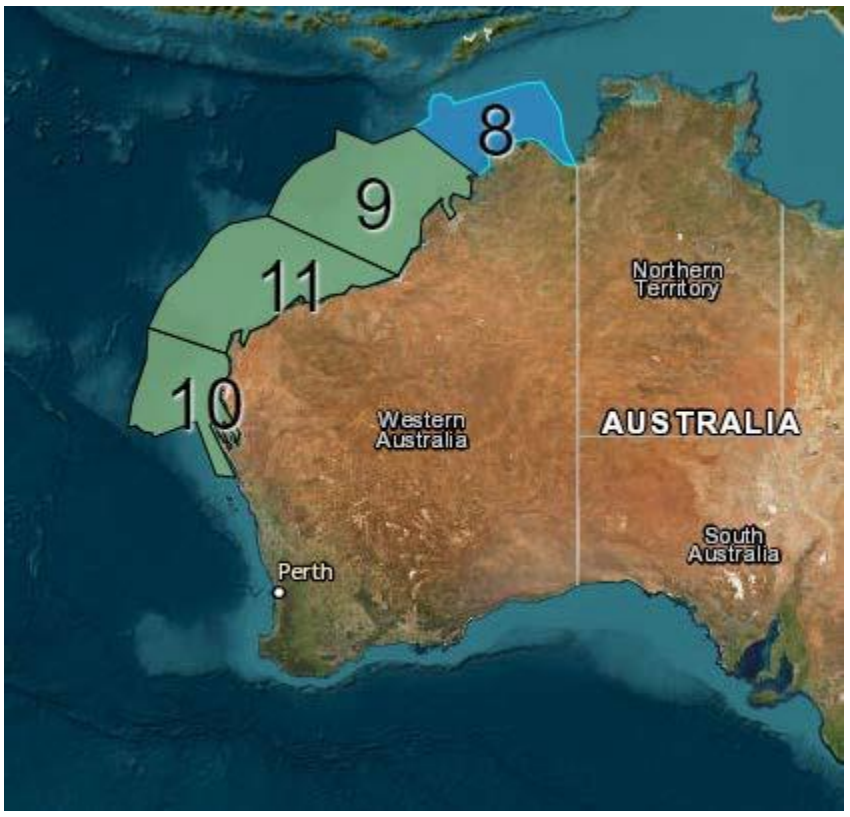
Details

Matters of NES

Other Matters Protected by the EPBC Act Extra Information

Caveat Acknowledgements

NWMR PMST sub area 2 (North area)



Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	1
Wetlands of International Importance (Ramsar	2
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	8
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	53
Listed Migratory Species:	64

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	3
Commonwealth Heritage Places:	1
Listed Marine Species:	107
Whales and Other Cetaceans:	27
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	7
Habitat Critical to the Survival of Marine Turtles:	3

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	14
Regional Forest Agreements:	None
Nationally Important Wetlands:	1
EPBC Act Referrals:	118
Key Ecological Features (Marine):	7
Biologically Important Areas:	57
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

National Heritage Places [Resource Information]

Name	State	Legal Status
Natural		
The West Kimberley	WA	Listed place

Wetlands of International Importance (Ramsar Wetlands) [Resource Information]

Ramsar Site Name	Proximity
Ashmore reef national nature reserve	Within Ramsar site
Ord river floodplain	Within 10km of Ramsar site

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside a Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area.

Feature Name Commonwealth Marine Areas (EPBC Act)

Commonwealth Marine Areas (EPBC Act) Commonwealth Marine Areas (EPBC Act) Commonwealth Marine Areas (EPBC Act) Commonwealth Marine Areas (EPBC Act) Commonwealth Marine Areas (EPBC Act) Commonwealth Marine Areas (EPBC Act) Commonwealth Marine Areas (EPBC Act) Commonwealth Marine Areas (EPBC Act)

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act. Number is the current name ID.

Scientific Name	Threatened Category	Presence Text
BIRD		
Anous tenuirostris melanops		
Australian Lesser Noddy [26000]	Vulnerable	Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Endangered	Species or species habitat likely to occur within area
Erythrura gouldiae Gouldian Finch [413]	Endangered	Species or species habitat likely to occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Falcunculus frontatus whitei Crested Shrike-tit (northern), Northern Shrike-tit [26013]	Vulnerable	Species or species habitat likely to occur within area
Geophaps smithii blaauwi Partridge Pigeon (western) [66501]	Vulnerable	Species or species habitat likely to occur within area
Limnodromus semipalmatus Asian Dowitcher [843]	Vulnerable	Species or species habitat known to occur within area
Limosa lapponica baueri Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit [86380]	Endangered	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit [86432]	Endangered	Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Papasula abbotti Abbott's Booby [59297]	Endangered	Species or species habitat may occur within area
Phaethon lepturus fulvus Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Phaethon rubricauda westralis Red-tailed Tropicbird (Indian Ocean), Indian Ocean Red-tailed Tropicbird [91824]	Endangered	Breeding known to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area
Tyto novaehollandiae kimberli Masked Owl (northern) [26048]	Vulnerable	Species or species habitat likely to occur within area
FISH		
Thunnus maccoyii Southern Bluefin Tuna [69402]	Conservation Dependent	Breeding known to occur within area
MAMMAL		
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Migration route known to occur within area

Scientific Name	Threatened Category	Presence Text
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Conilurus penicillatus Brush-tailed Rabbit-rat, Brush-tailed Tree-rat, Pakooma [132]	Vulnerable	Species or species habitat likely to occur within area
Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat known to occur within area
Isoodon auratus auratus Golden Bandicoot (mainland) [66665]	Vulnerable	Species or species habitat likely to occur within area
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat known to occur within area
Mesembriomys gouldii gouldii Black-footed Tree-rat (Kimberley and mainland Northern Territory), Djintamoonga, Manbul [87618]	Endangered	Species or species habitat may occur within area
Petrogale concinna monastria Nabarlek (Kimberley) [87607]	Endangered	Species or species habitat known to occur within area
Phascogale tapoatafa kimberleyensis Kimberley brush-tailed phascogale, Brush-tailed Phascogale (Kimberley) [88453]	Vulnerable	Species or species habitat likely to occur within area
Saccolaimus saccolaimus nudicluniatus Bare-rumped Sheath-tailed Bat, Bare-rumped Sheathtail Bat [66889]	Vulnerable	Species or species habitat likely to occur within area
Trichosurus vulpecula arnhemensis Northern Brushtail Possum [83091]	Vulnerable	Species or species habitat likely to occur within area
Xeromys myoides Water Mouse, False Water Rat, Yirrkoo [66]	Vulnerable	Species or species habitat likely to occur within area

REPTILE

Scientific Name	Threatened Category	Presence Text
Acanthophis hawkei Plains Death Adder [83821]	Vulnerable	Species or species habitat may occur within area
Aipysurus apraefrontalis Short-nosed Sea Snake, Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat known to occur within area
Aipysurus foliosquama Leaf-scaled Sea Snake, Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Tiliqua scincoides intermedia Northern Blue-tongued Skink [89838]	Critically Endangered	Species or species habitat known to occur within area
Varanus mertensi Mertens' Water Monitor, Mertens's Water Monitor [1568]	Endangered	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Varanus mitchelli Mitchell's Water Monitor [1569]	Critically Endangered	Species or species habitat likely to occur within area
SHARK		
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Glyphis garricki Northern River Shark, New Guinea River Shark [82454]	Endangered	Species or species habitat known to occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat likely to occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sphyrna lewini Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat known to occur within area

Listed Migratory Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text
Migratory Marine Birds	Anous stolidus Common Noddy [825]	Breeding known to occur within area
	Apus pacificus Fork-tailed Swift [678]	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Ardenna pacifica Wedge-tailed Shearwater [84292]		Breeding known to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Breeding known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Breeding known to occur within area
Hydroprogne caspia Caspian Tern [808]		Breeding known to occur within area
Onychoprion anaethetus Bridled Tern [82845]		Breeding known to occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Breeding known to occur within area
Phaethon rubricauda Red-tailed Tropicbird [994]		Breeding known to occur within area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area
Sternula albifrons Little Tern [82849]		Breeding known to occur within area
Sula dactylatra Masked Booby [1021]		Breeding known to occur within area
Sula leucogaster Brown Booby [1022]		Breeding known to occur within area
Sula sula Red-footed Booby [1023]		Breeding known to occur within area

Migratory Marine Species

Scientific Name	Threatened Category	Presence Text
Anoxypristis cuspidata Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat may occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area

Scientific Name	Threatened Category	Presence Text
[Dugong dugon](#) Dugong [28]		Breeding known to occur within area
[Eretmochelys imbricata](#) Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
[Isurus oxyrinchus](#) Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
[Isurus paucus](#) Longfin Mako [82947]		Species or species habitat likely to occur within area
[Lepidochelys olivacea](#) Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour known to occur within area
[Megaptera novaeangliae](#) Humpback Whale [38]		Breeding known to occur within area
[Mobula alfredi as Manta alfredi](#) Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat known to occur within area
[Mobula birostris as Manta birostris](#) Giant Manta Ray [90034]		Species or species habitat likely to occur within area
[Natator depressus](#) Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
[Orcaella heinsohni](#) Australian Snubfin Dolphin [81322]		Breeding known to occur within area
[Orcinus orca](#) Killer Whale, Orca [46]		Species or species habitat may occur within area
[Physeter macrocephalus](#) Sperm Whale [59]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat likely to occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sousa sahulensis as Sousa chinensis Australian Humpback Dolphin [87942]		Breeding known to occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat likely to occur within area

Migratory Terrestrial Species	Cecropis daurica Red-rumped Swallow [80610]	Species or species habitat may occur within area
	Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]	Species or species habitat known to occur within area
	Hirundo rustica Barn Swallow [662]	Species or species habitat known to occur within area
	Motacilla cinerea Grey Wagtail [642]	Species or species habitat known to occur within area
	Motacilla flava Yellow Wagtail [644]	Species or species habitat known to occur within area

Migratory Wetlands Species

Scientific Name	Threatened Category	Presence Text
Acrocephalus orientalis Oriental Reed-Warbler [59570]		Species or species habitat known to occur within area
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area
Limnodromus semipalmatus Asian Dowitcher [843]	Vulnerable	Species or species habitat known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
[Numenius madagascariensis](#)		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
[Pandion haliaetus](#)		
Osprey [952]		Breeding known to occur within area
[Thalasseus bergii](#)		
Greater Crested Tern [83000]		Breeding known to occur within area
[Tringa nebularia](#)		
Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State
Unknown	
Commonwealth Land - [52278]	ACI
Commonwealth Land - [52276]	ACI
Commonwealth Land - [52277]	ACI

Commonwealth Heritage Places [Resource Information]

Name	State	Status
Natural		
[Ashmore Reef National Nature Reserve](#)	EXT	Listed place

Listed Marine Species [Resource Information]

Scientific Name	Threatened Category	Presence Text
Bird		
[Acrocephalus orientalis](#)		
Oriental Reed-Warbler [59570]		Species or species habitat known to occur within area overfly marine area
[Actitis hypoleucos](#)		
Common Sandpiper [59309]		Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Anous minutus		
Black Noddy [824]		Breeding known to occur within area
Anous stolidus		
Common Noddy [825]		Breeding known to occur within area
Anous tenuirostris melanops		
Australian Lesser Noddy [26000]	Vulnerable	Breeding known to occur within area
Anseranas semipalmata		
Magpie Goose [978]		Species or species habitat may occur within area overfly marine area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area
Ardenna pacifica as Puffinus pacificus		
Wedge-tailed Shearwater [84292]		Breeding known to occur within area
Bubulcus ibis as Ardea ibis		
Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area
Calidris acuminata		
Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area
Calidris canutus		
Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area overfly marine area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area overfly marine area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Cecropis daurica as Hirundo daurica Red-rumped Swallow [80610]		Species or species habitat may occur within area overfly marine area
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat known to occur within area overfly marine area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area overfly marine area
Chroicocephalus novaehollandiae as Larus novaehollandiae Silver Gull [82326]		Breeding known to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Breeding known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Breeding known to occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area overfly marine area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat known to occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Hydroprogne caspia as Sterna caspia Caspian Tern [808]		Breeding known to occur within area
Limnodromus semipalmatus Asian Dowitcher [843]	Vulnerable	Species or species habitat known to occur within area overfly marine area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat known to occur within area overfly marine area
Motacilla flava Yellow Wagtail [644]		Species or species habitat known to occur within area overfly marine area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Onychoprion anaethetus as Sterna anaethetus Bridled Tern [82845]		Breeding known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Papasula abbotti Abbott's Booby [59297]	Endangered	Species or species habitat may occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Phaethon lepturus fulvus Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered within area	Foraging, feeding or related behaviour likely to occur
Phaethon rubricauda Red-tailed Tropicbird [994]		Breeding known to occur within area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area
Sternula albifrons as Sterna albifrons Little Tern [82849]		Breeding known to occur within area
Sula dactylatra Masked Booby [1021]		Breeding known to occur within area
Sula leucogaster Brown Booby [1022]		Breeding known to occur within area
Sula sula Red-footed Booby [1023]		Breeding known to occur within area
Thalasseus bengalensis as Sterna bengalensis Lesser Crested Tern [66546]		Breeding known to occur within area
Thalasseus bergii as Sterna bergii Greater Crested Tern [83000]		Breeding known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area overfly marine area
Fish		
Bhanotia fasciolata Corrugated Pipefish, Barbed Pipefish [66188]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Campichthys tricarinatus Three-keel Pipefish [66192]		Species or species habitat may occur within area
Choeroichthys brachysoma Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area
Choeroichthys suillus Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
Corythoichthys amplexus Fijian Banded Pipefish, Brown-banded Pipefish [66199]		Species or species habitat may occur within area
Corythoichthys flavofasciatus Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area
Corythoichthys intestinalis Australian Messmate Pipefish, Banded Pipefish [66202]		Species or species habitat may occur within area
Corythoichthys schultzi Schultz's Pipefish [66205]		Species or species habitat may occur within area
Cosmocampus banneri Roughridge Pipefish [66206]		Species or species habitat may occur within area
Doryrhamphus dactyliophorus Banded Pipefish, Ringed Pipefish [66210]		Species or species habitat may occur within area
Doryrhamphus excisus Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within area
Doryrhamphus janssi Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Halicampus brocki Brock's Pipefish [66219]	Species or species habitat may occur within area	
Halicampus dunckeri Red-hair Pipefish, Duncker's Pipefish [66220]		Species or species habitat may occur within area
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]	Species or species habitat may occur within area	
Halicampus spinirostris Spiny-snout Pipefish [66225]	Species or species habitat may occur within area	
Haliichthys taeniophorus Ribboned Pipehorse, Ribboned Seadragon [66226]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippocampus angustus Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area
Hippocampus histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse [66238]	Species or species habitat may occur within area	

Scientific Name	Threatened Category	Presence Text
Hippocampus spinosissimus Hedgehog Seahorse [66239]		Species or species habitat may occur within area
Micrognathus micronotopterus Tidepool Pipefish [66255]	Species or species habitat may occur within area	
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Trachyrhamphus longirostris Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
Mammal Dugong dugon Dugong [28]	Breeding known to occur within area	
Reptile Aipysurus apraefrontalis Short-nosed Sea Snake, Short-nosed Seasnake [1115]	Critically Endangered within area	Species or species habitat known to occur
Aipysurus duboisii Dubois' Sea Snake, Dubois' Seasnake, Reef Shallows Sea Snake [1116]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Aipysurus foliosquama Leaf-scaled Sea Snake, Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat may occur within area
Aipysurus fuscus Dusky Sea Snake [1119]	Species or species habitat known to occur within area	
Aipysurus laevis Olive Sea Snake, Olive-brown Sea Snake [1120]		Species or species habitat may occur within area
Aipysurus mosaicus as Aipysurus eydouxii Mosaic Sea Snake [87261]	Species or species habitat may occur within area	
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Crocodylus johnstoni Freshwater Crocodile, Johnston's Crocodile, Johnstone's Crocodile [1773]		Species or species habitat may occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Emydocephalus annulatus Eastern Turtle-headed Sea Snake [1125]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

Scientific Name	Threatened Category	Presence Text
Hydrelaps darwiniensis Port Darwin Sea Snake, Black-ringed Mangrove Sea Snake [1100]		Species or species habitat may occur within area
Hydrophis atriceps Black-headed Sea Snake [1101]		Species or species habitat may occur within area
Hydrophis coggeri Cogger's Sea Snake [25925]		Species or species habitat may occur within area
Hydrophis elegans Elegant Sea Snake, Bar-bellied Sea Snake [1104]		Species or species habitat may occur within area
Hydrophis hardwickii as Lapemis hardwickii Spine-bellied Sea Snake [93516]		Species or species habitat may occur within area
Hydrophis inornatus Plain Sea Snake [1107]		Species or species habitat may occur within area
Hydrophis kingii as Disteira kingii Spectacled Sea Snake [93511]		Species or species habitat may occur within area
Hydrophis macdowelli as Hydrophis mcdowelli MacDowell's Sea Snake, Small-headed Sea Snake, [75601]		Species or species habitat may occur within area
Hydrophis major as Disteira major Olive-headed Sea Snake [93512]		Species or species habitat may occur within area
Hydrophis ornatus Spotted Sea Snake, Ornate Reef Sea Snake [1111]		Species or species habitat may occur within area
Hydrophis peronii as Acalyptophis peronii Horned Sea Snake [93509]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Hydrophis platura as Pelamis platurus		
Yellow-bellied Sea Snake [93746]		Species or species habitat may occur within area
Hydrophis stokesii as Astrotia stokesii		
Stokes' Sea Snake [93510]		Species or species habitat may occur within area
Hydrophis zweiffei as Enhydrina schistosa		
Australian Beaked Sea Snake [93514]		Species or species habitat may occur within area
Lepidochelys olivacea		
Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour known to occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area

Whales and Other Cetaceans		[Resource Information]
Current Scientific Name	Status	Type of Presence
Mammal		
Balaenoptera borealis		
Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni		
Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus		
Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus		
Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Delphinus delphis		
Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
Feresa attenuata Pygmy Killer Whale [61]		Species or species habitat may occur within area
Globicephala macrorhynchus Short-finned Pilot Whale [62]		Species or species habitat may occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Kogia breviceps Pygmy Sperm Whale [57]		Species or species habitat may occur within area
Kogia sima Dwarf Sperm Whale [85043]		Species or species habitat may occur within area
Lagenodelphis hosei Fraser's Dolphin, Sarawak Dolphin [41]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]		Breeding known to occur within area
Mesoplodon densirostris Blainville's Beaked Whale, Dense- beaked Whale [74]		Species or species habitat may occur within area
Orcaella heinsohni Australian Snubfin Dolphin [81322]		Breeding known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Peponocephala electra Melon-headed Whale [47]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Sousa sahulensis Australian Humpback Dolphin [87942]	Breeding known to occur within area	
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area
Stenella longirostris Long-snouted Spinner Dolphin [29]	Species or species habitat may occur within area	
Steno bredanensis Rough-toothed Dolphin [30]	Species or species habitat may occur within area	
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]	Species or species habitat may occur within area	
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Australian Marine Parks	[Resource Information]
Park Name	Zone & IUCN Categories
Joseph Bonaparte Gulf	Multiple Use Zone (IUCN VI)
Kimberley	Multiple Use Zone (IUCN VI)

Park Name	Zone & IUCN Categories
Oceanic Shoals	Multiple Use Zone (IUCN VI)

Ashmore Reef Recreational Use Zone (IUCN IV)

Ashmore Reef Sanctuary Zone (IUCN Ia)

Cartier Island Sanctuary Zone (IUCN Ia)

Oceanic Shoals Special Purpose Zone (Trawl) (IUCN VI)

Habitat Critical to the Survival of Marine Turtles		[Resource Information]
Scientific Name	Behaviour	Presence
Aug - Sep		

Natator depressus
Flatback Turtle [59257] Nesting Known to occur

Dec - Jan Chelonia mydas
Green Turtle [1765] Nesting Known to occur

May - Jul Lepidochelys olivacea
Olive Ridley Turtle [1767]Nesting Known to occur

Extra Information

State and Territory Reserves		[Resource Information]
Protected Area Name	Reserve Type	State
Balanggarra	Indigenous Protected Area	WA
Browse Island	Nature Reserve	WA
Dambimangari	Indigenous Protected Area	WA
Lalang-garram / Camden Sound	Marine Park	WA
Lesueur Island	Nature Reserve	WA
Low Rocks	Nature Reserve	WA
Niiwalarra Islands	National Park	WA
North Kimberley	Marine Park	WA
Nort Lalang-garram	Marine Park	WA

Protected Area Name	Reserve Type	State
Pelican Island	Nature Reserve	WA
Prince Regent	National Park	WA
Unnamed WA41775	5(1)(h) Reserve	WA
Unnamed WA44677	5(1)(h) Reserve	WA
Uunguu	Indigenous Protected Area	WA

Nationally Important Wetlands [Resource Information]

Wetland Name	State
Ashmore Reef	EXT

EPBC Act Referrals [Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status
Marine Route Survey for Subsea Fibre Optic Data Cable System - Australia West	2024/09826		Referral Decision
Project Crux Cable Lay and Operation	2022/09441		Completed
Project Fitzroy Expansion Offshore Cable Lay	2023/09674		Referral Decision
Controlled action	2-D seismic survey Scott Reef	2000/125 Controlled Action	Post-Approval
Audacious Oil Field Standalone Development	2001/407	Controlled Action	Completed
Bonaparte Liquified Natural Gas Project	2011/6141	Controlled Action	Post-Approval
Conduct an exploration drilling campaign	2010/5718	Controlled Action	Completed
Decommissioning of Challis Oilfield	2003/942	Controlled Action	Post-Approval
Develop Ichthys gas-condensate field permit area W	2006/2767	Controlled Action	Completed
Development of Blacktip Gas Field	2003/1180	Controlled Action	Post-Approval
Development of Browse Basin Gas Fields (Upstream)	2008/4111	Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Controlled action			
Ichthys Gas Field, Offshore and onshore processing facilities and subsea pipeline	2008/4208	Controlled Action	Post-Approval
Montara 4, 5, and 6 Oil Production Wells, and Montara 3 Gas Re-Injection Well	2002/755	Controlled Action	Post-Approval
Prelude Floating Liquefied Natural Gas Facility and Gas Field Development	2008/4146	Controlled Action	Post-Approval
PTTEP AA Floating LNG Facility	2011/6025	Controlled Action	Completed
Not controlled action			
2D seismic survey, exploration permit NT/P67	2004/1587	Not Controlled Action	Completed
2D Seismic Survey in Permit Areas WA-318-P & WA-319-P, near Cape Londonderry	2004/1687	Not Controlled Action	Completed
3D marine seismic survey in WA 314P and WA 315P	2004/1927	Not Controlled Action	Completed
Adele Trend TQ3D Seismic Survey	2001/252	Not Controlled Action	Completed
AEC International Hydrocarbon Well Puffin 6	2000/36	Not Controlled Action	Completed
Audacious-3 oil drilling well	2003/1042	Not Controlled Action	Completed
Backpacker-1 Offshore Hydrocarbon Exploration Well	2001/300	Not Controlled Action	Completed
Coot-1 hydrocarbon exploration well, Permit Area AC/L2 or AC/L3	2001/296	Not Controlled Action	Completed
Crux-A and Crux-B appraisal wells, Petroleum Permit Area AC/P23	2006/2748	Not Controlled Action	Completed
Crux gas-liquids development in permit AC/P23	2006/3154	Not Controlled Action	Completed
Drilling of 12 Hydrocarbon Exploration Wells, Permit Area WA-371-P	2006/3005	Not Controlled Action	Completed
Drilling of exploration well Audacious-1 in AC/P17	2000/5	Not Controlled Action	Completed
Drilling of exploration wells, Permit areas WA-301-P to WA-305-P	2002/769	Not Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
Drilling of Marina-1 Exploration Well	2007/3586	Not Controlled Action	Completed
Echuca Shoals-2 Exploration of Appraisal Well	2006/3020	Not Controlled Action	Completed
Exploration Drilling in AC/P17, AC/P18 and AC/P24	2001/359	Not Controlled Action	Completed
Exploration Well AC/P23	2001/234	Not Controlled Action	Completed
Kaleidoscope exploration well	2001/182	Not Controlled Action	Completed
Marine Seismic Survey in WA-239-P	2000/24	Not Controlled Action	Completed
Marine Survey for the Australia-ASEAN Power Link AAPL	2020/8714	Not Controlled Action	Completed
Montara-3 Offshore Hydrocarbon Exploration Well Permit Area AC/RL3	2001/489	Not Controlled Action	Completed
Nexus Drilling Program NT-P66	2007/3745	Not Controlled Action	Completed
P30 Hydrocarbon Exploration Well	2001/293	Not Controlled Action	Completed
Project Highclere Geophysical Survey	2021/9023	Not Controlled Action	Completed
Puffin Oil wells 7, 8 & 9 development	2005/2336	Not Controlled Action	Completed
Saucepan 1 Exploration Well ACP23	2000/2	Not Controlled Action	Completed
Skua and Swift Oilfields	2006/3195	Not Controlled Action	Completed
Strumbo-1 Gas Exploration Well Permit Area WA-288-P	2002/884	Not Controlled Action	Completed
Thresher-1 Well	2000/84	Not Controlled Action	Completed
Not controlled action (particular manner)			
2 (3D) Marine Seismic Surveys	2009/4994	Not Controlled Action (Particular Manner)	Completed (Particular
2D and 3D Seismic Survey	2011/6197	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Manner)			
2D and 3D Seismic Survey WA-405-P	2009/5104	Not Controlled Action (Particular Manner)	Post-Approval
2D and 3D Seismic Survey WA-405-P	2008/4133	Not Controlled Action (Particular Manner)	Post-Approval
2D Marine Seismic Survey	2009/4728	Not Controlled Action (Particular Manner)	Post-Approval
2D marine seismic survey of Braveheart,Kurrajong,Sunshine and Crocodile	2006/2917	Not Controlled Action (Particular Manner)	Post-Approval
2D marine seismic survey within permit area WA-318-P	2007/3879	Not Controlled Action (Particular Manner)	Post-Approval
2D or 3D Marine Seismic Survey in Petroleum Permit Area AC/P35	2009/4864	Not Controlled Action (Particular Manner)	Post-Approval
2D Seismic Marine Survey	2001/363	Not Controlled Action (Particular Manner)	Post-Approval
2D Seismic survey	2009/5076	Not Controlled Action (Particular Manner)	Post-Approval
2D seismic survey in permit areas WA-274P and WA-281P	2004/1521	Not Controlled Action (Particular Manner)	Post-Approval
2D Seismic Survey in WA Permit Area TP/22 and Commonwealth Permit Area WA-280-P	2005/2100	Not Controlled Action (Particular Manner)	Post-Approval
3D Marine Seismic Survey	2008/4437	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
3D Marine Seismic Survey, Permit AC/P 23	2005/2364	Not Controlled Action (Particular Manner)	Post-Approval
3D Seismic Survey, Browse Basin, WA	2009/5048	Not Controlled Action (Particular Manner)	Post-Approval
3D Seismic Survey, near Scott Reef, Browse Basin	2005/2126	Not Controlled Action (Particular Manner)	Post-Approval
3D Seismic Survey, petroleum exploration permit AC/P33	2006/2918	Not Controlled Action (Particular Manner)	Post-Approval
3D seismic survey of AC/P4, AC/P17 and AC/P24	2006/2857	Not Controlled Action (Particular Manner)	Post-Approval
3D Seismic Survey WA-406-P Bonaparte Basin	2007/3904	Not Controlled Action (Particular Manner)	Post-Approval
AC/P37 3D Seismic Survey Ashmore Cartier	2007/3774	Not Controlled Action (Particular Manner)	Post-Approval
Auralandia 3D marine seismic survey Action (Particular Manner)	2011/5961	Not Controlled	Post-Approval
Aurora MC3D Marine Seismic Survey Action (Particular Manner)	2010/5510	Not Controlled	Post-Approval
Bassett 3D Marine Seismic Survey Action (Particular Manner)	2010/5538	Not Controlled	Post-Approval
Bonaparte 2D & 3D marine seismic survey	2011/5962	Not Controlled Action (Particular Manner)	Post-Approval
Bonaparte Seismic and Bathymetric Survey	2012/6295	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Manner)			
Braveheart 2D Infill Marine Seismic Survey 100km offshore	2008/4442	Not Controlled Action (Particular Manner)	Post-Approval
Braveheart 2D Marine Seismic Survey	2005/2322	Not Controlled Action (Particular Manner)	Post-Approval
Canis 3D Marine Seismic Survey	2008/4492	Not Controlled	Post-Approval
Action (Particular Manner)			
Cartier East and Cartier West 3D Marine Seismic Surveys	2009/5230	Not Controlled Action (Particular Manner)	Post-Approval
Caswell MC3D Marine Seismic Survey	2012/6594	Not Controlled Action (Particular Manner)	Post-Approval
Conduct an exploration drilling campaign	2011/5964	Not Controlled Action (Particular Manner)	Post-Approval
Deep Water Northwest Shelf 2D Seismic Survey	2007/3260	Not Controlled Action (Particular Manner)	Post-Approval
Drilling of Audacious-5 appraisal well	2008/4327	Not Controlled	Post-Approval
Action (Particular Manner)			
Drilling of Exploration & Appraisal Wells Braveheart-1 & Cornea-3	2009/5160	Not Controlled Action (Particular Manner)	Post-Approval
Drilling of two appraisal wells	2011/5840	Not Controlled	Post-Approval
Action (Particular Manner)			
Exploration Drilling Campaign	2011/6047	Not Controlled	Post-Approval
Action (Particular Manner)			

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Exploration Drilling Campaign, Browse Basin, WA-341-P, AC-P36 and WA-343-P	2013/6898	Not Controlled Action (Particular Manner)	Post-Approval
Exploration Drilling in Permit Areas WA-402-P & WA-403-P	2010/5297	Not Controlled Action (Particular Manner)	Post-Approval
Exploration Drilling Program - Permit areas - WA-314-P, WA-315-P, WA-398-P.	2008/4064	Not Controlled Action (Particular Manner)	Post-Approval
Fishburn2D Marine Seismic Survey	2012/6659	Not Controlled Action (Particular Manner)	Post-Approval
Floyd 3D and Chisel 3D Seismic Surveys	2011/6220	Not Controlled Action (Particular Manner)	Post-Approval
Gicea 3D Marine Seismic Survey	2008/4389	Not Controlled Action (Particular Manner)	Post-Approval
Gold 2D Marine Seismic Survey Permit Areas WA375P and WA376P	2009/4698	Not Controlled Action (Particular Manner)	Post-Approval
Ichthys 3D Marine Seismic Survey	2010/5550	Not Controlled Action (Particular Manner)	Post-Approval
Kingtree & Ironstone-1 Exploration Wells	2011/5935	Not Controlled Action (Particular Manner)	Post-Approval
Kraken, Lusca & Asperus 3D Marine Seismic Survey	2013/6730	Not Controlled Action (Particular Manner)	Post-Approval
Malita West 3D Seismic Survey WA-402-P and WA-403-P	2007/3936	Not Controlled Action (Particular Manner)	Post-Approval
Marine Environmental Survey 2012	2012/6310	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status	Not controlled action (particular manner)
Nova 3D Seismic Survey	2013/6825	Not Controlled Action (Particular Manner)	Post-Approval	
NT/P80 2010 2D Marine Seismic Survey	2010/5487	Not Controlled Action (Particular Manner)	Post-Approval	
Octantis 3D Marine Seismic Survey, Permit Area AC/P41 off northern Western Australia	2007/3369	Not Controlled Action (Particular Manner)	Post-Approval	
Offshore Exploration Drilling Campaign	2011/6222	Not Controlled Action (Particular Manner)	Post-Approval	
Offshore Fibre Optic Cable Network Construction & Operation, Port Hedland WA to Darwin NT	2014/7223	Not Controlled Action (Particular Manner)	Post-Approval	
Offshore Gas Exploration Drilling Campaign	2012/6384	Not Controlled Action (Particular Manner)	Post-Approval	
Petrel MC2D Marine Seismic Survey	2010/5368	Not Controlled Action (Particular Manner)	Post-Approval	
Sandalford 3D Seismic Survey	2012/6261	Not Controlled Action (Particular Manner)	Post-Approval	
Santos Petrel-7 Offshore Appraisal Drilling Programme (Bonaparte Basin)	2011/5934	Not Controlled Action (Particular Manner)	Post-Approval	
Schild MC3D Marine Seismic Survey	2012/6373	Not Controlled Action (Particular Manner)	Post-Approval	
Schild Phase 11 MC3D Marine Seismic Survey, Browse Basin	2013/6894	Not Controlled Action (Particular Manner)	Post-Approval	

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Searcher bathymetry & geochemical seismic survey, Brawse Basin,Timor Sea,WA	2013/6980	Not Controlled Action (Particular Manner)	Post-Approval
Sonar and Acoustic Trials (Particular Manner)	2001/345	Not Controlled Action	Post-Approval
Songa Venus Drilling and Testing Operations	2009/5122	Not Controlled Action (Particular Manner)	Post-Approval
Thoar 3D Marine Seismic Survey Action (Particular Manner)	2010/5668	Not Controlled	Post-Approval
Tiffany 3D Seismic Survey Action (Particular Manner)	2010/5339	Not Controlled	Post-Approval
Tow West Atlas wreck from present location to boundary of EEZ	2010/5652	Not Controlled Action (Particular Manner)	Post-Approval
Ursa 3D Marine Seismic Survey Action (Particular Manner)	2008/4634	Not Controlled	Post-Approval
Vampire 2D Non Exclusive Seismic Survey, WA	2010/5543	Not Controlled Action (Particular Manner)	Post-Approval
Westralia SPAN Marine Seismic Survey, WA & NT	2012/6463	Not Controlled Action (Particular Manner)	Post-Approval
Zeppelin 3D Seismic Survey Action (Particular Manner)	2011/6148	Not Controlled	Post-Approval
Referral decision			
2D Marine Seismic Survey	2008/4623	Referral Decision	Completed
BRSN08 3D Marine Seismic Survey	2008/4582	Referral Decision	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Referral decision			
Nova 3D Seismic Survey, WA 442-NT/P81, Joseph Bonaparte Gulf	2013/6820	Referral Decision	Completed
Puffin South-West Development of Oil Reserves	2007/3834	Referral Decision	Completed
Seismic Data Acquisition, Browse Basin	2010/5475	Referral Decision	Completed

Key Ecological Features [Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
Ancient coastline at 125 m depth contour	North-west
Ashmore Reef and Cartier Island and surrounding Commonwealth waters	North-west
Carbonate bank and terrace system of the Sahul Shelf	North-west
Continental Slope Demersal Fish Communities	North-west
Pinnacles of the Bonaparte Basin	North
Pinnacles of the Bonaparte Basin	North-west
Seringapatam Reef and Commonwealth waters in the Scott Reef Complex	North-west

Biologically Important Areas [Resource Information]

Scientific Name	Behaviour	Presence
Dolphins		
Orcaella heinsohni Australian Snubfin Dolphin [81322]	Breeding	Known to occur
Orcaella heinsohni Australian Snubfin Dolphin [81322]	Calving	Known to occur
Orcaella heinsohni Australian Snubfin Dolphin [81322]	Foraging	Known to occur
Orcaella heinsohni Australian Snubfin Dolphin [81322]	Foraging (high density prey)	Known to occur

Scientific Name	Behaviour	Presence
Orcaella heinsohni Australian Snubfin Dolphin [81322]	Resting	Known to occur
Sousa chinensis Indo-Pacific Humpback Dolphin [50]	Breeding	Known to occur
Sousa chinensis Indo-Pacific Humpback Dolphin [50]	Breeding	Likely to occur
Sousa chinensis Indo-Pacific Humpback Dolphin [50]	Calving	Known to occur
Sousa chinensis Indo-Pacific Humpback Dolphin [50]	Calving	Likely to occur
Sousa chinensis Indo-Pacific Humpback Dolphin [50]	Foraging	Likely to occur
Sousa chinensis Indo-Pacific Humpback Dolphin [50]	Foraging (high density prey)	Known to occur
Sousa chinensis Indo-Pacific Humpback Dolphin [50]	Foraging (high density prey)	Likely to occur
Sousa chinensis Indo-Pacific Humpback Dolphin [50]	Significant habitat	Known to occur
Sousa chinensis Indo-Pacific Humpback Dolphin [50]	Significant habitat - unknown behaviour	Likely to occur
Tursiops aduncus Indo-Pacific/Spotted Bottlenose Dolphin [68418]	Calving	Known to occur
Tursiops aduncus Indo-Pacific/Spotted Bottlenose Dolphin [68418]	Foraging	Known to occur
Dugong Dugong dugon Dugong [28]	Breeding	Known to occur

Scientific Name		Behaviour	Presence
Dugong dugon	Dugong [28]	Calving	Known to occur
Dugong dugon	Dugong [28]	Foraging	Known to occur
Dugong dugon	Dugong [28]	Foraging (high density seagrass beds)	Known to occur
Dugong dugon	Dugong [28]	Nursing	Known to occur
Marine Turtles Caretta caretta	Loggerhead Turtle [1763]	Foraging	Known to occur
Chelonia mydas	Green Turtle [1765]	Foraging	Likely to occur
Chelonia mydas	Green Turtle [1765]	Foraging	Known to occur
Chelonia mydas	Green Turtle [1765]	Internesting buffer	Known to occur
Chelonia mydas	Green Turtle [1765]	Internesting buffer	Likely to occur
Chelonia mydas	Green Turtle [1765]	Mating	Likely to occur
Chelonia mydas	Green Turtle [1765]	Nesting	Known to occur
Chelonia mydas	Green Turtle [1765]	Nesting	Likely to occur
Eretmochelys imbricata	Hawksbill Turtle [1766]	Foraging	Likely to occur
Eretmochelys imbricata	Hawksbill Turtle [1766]	Internesting buffer	Likely to occur

Scientific Name	Behaviour	Presence
Eretmochelys imbricata Hawksbill Turtle [1766]	Internesting buffer	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Nesting	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Nesting	Likely to occur
Lepidochelys olivacea Olive Ridley Turtle [1767]	Foraging	Known to occur
Natator depressus Flatback Turtle [59257]	Foraging	Known to occur
Natator depressus Flatback Turtle [59257]	Internesting buffer	Known to occur
Natator depressus Flatback Turtle [59257]	Nesting	Known to occur
Seabirds Ardenna pacifica Wedge-tailed Shearwater [84292]	Breeding	Known to occur
Fregata ariel Lesser Frigatebird [1012]	Breeding	Known to occur
Fregata minor Greater Frigatebird [1013]	Breeding	Known to occur
Phaethon lepturus White-tailed Tropicbird [1014]	Breeding	Known to occur
Sterna dougallii Roseate Tern [817]	Breeding	Known to occur
Sternula albifrons sinensis Little Tern [82850]	Breeding	Known to occur
Sternula albifrons sinensis Little Tern [82850]	Resting	Known to occur

Scientific Name	Behaviour	Presence
Sula leucogaster Brown Booby [1022]	Breeding	Known to occur
Sula sula Red-footed Booby [1023]	Breeding	Known to occur
Thalasseus bengalensis Lesser Crested Tern [66546]	Breeding	Known to occur
Sharks Rhincodon typus Whale Shark [66680]	Foraging	Known to occur
Whales Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Distribution	Known to occur
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Foraging	Known to occur
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Migration	Known to occur
Megaptera novaeangliae Humpback Whale [38]	Calving	Known to occur
Megaptera novaeangliae Humpback Whale [38]	Migration	Known to occur
Megaptera novaeangliae Humpback Whale [38]	Nursing	Known to occur
Megaptera novaeangliae Humpback Whale [38]	Resting	Known to occur

Caveat

PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

World and National Heritage properties;

Wetlands of International and National Importance;

Commonwealth and State/Territory reserves;

distribution of listed threatened, migratory and marine species;

listed threatened ecological communities; and

other information that may be useful as an indicator of potential habitat value.

DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

threatened species listed as extinct or considered vagrants;

some recently listed species and ecological communities;

some listed migratory and listed marine species, which are not listed as threatened species; and

migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded

seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements
This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:
-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact us page.

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EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 11-Jul-2024 Summary

Details

Matters of NES

Other Matters Protected by the EPBC Act Extra Information

Caveat Acknowledgements

Figure 1: NMR PMST area

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	3
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	82
Listed Migratory Species:	82

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	6
Commonwealth Heritage Places:	None
Listed Marine Species:	145
Whales and Other Cetaceans:	25
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	21
Habitat Critical to the Survival of Marine Turtles:	5

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	25
Regional Forest Agreements:	None
Nationally Important Wetlands:	7
EPBC Act Referrals:	80
Key Ecological Features (Marine):	10
Biologically Important Areas:	26
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside a Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area.

Feature Name Commonwealth Marine Areas (EPBC Act)

Commonwealth Marine Areas (EPBC Act) Commonwealth Marine Areas (EPBC Act)

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act. Number is the current name ID.

Scientific Name	Threatened Category	Presence Text
BIRD		

Arenaria interpres
Ruddy Turnstone [872] Vulnerable Roosting known to occur within area

Calidris acuminata
Sharp-tailed Sandpiper [874] Vulnerable Roosting known to occur within area

Calidris canutus
Red Knot, Knot [855] Vulnerable Species or species habitat known to occur within area

Calidris ferruginea
Curlew Sandpiper [856] Critically Endangered Species or species habitat known to occur within area

Calidris tenuirostris
Great Knot [862] Vulnerable Roosting known to occur within area

Charadrius leschenaultii
Greater Sand Plover, Large Sand Plover [877] Vulnerable Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Endangered	Species or species habitat likely to occur within area
Erythrura gouldiae Gouldian Finch [413]	Endangered	Species or species habitat likely to occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Falcunculus frontatus whitei Crested Shrike-tit (northern), Northern Shrike-tit [26013]	Vulnerable	Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat may occur within area
Geophaps smithii smithii Partridge Pigeon (eastern) [64441]	Vulnerable	Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat may occur within area
Limnodromus semipalmatus Asian Dowitcher [843]	Vulnerable	Species or species habitat likely to occur within area
Limosa lapponica baueri Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit [86380]	Endangered	Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]	Endangered	Roosting known to occur within area
Melanodryas cucullata melvillensis Tiwi Islands Hooded Robin, Hooded Robin (Tiwi Islands) [67092]	Critically Endangered	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Phaethon rubricauda westralis Red-tailed Tropicbird (Indian Ocean), Indian Ocean Red-tailed Tropicbird [91824]	Endangered	Species or species habitat likely to occur within area
Pluvialis squatarola Grey Plover [865]	Vulnerable	Roosting known to occur within area
Probosciger aterrimus macgillivrayi Palm Cockatoo (Australian) [67033]	Vulnerable	Species or species habitat likely to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area
Tyto novaehollandiae kimberli Masked Owl (northern) [26048]	Vulnerable	Species or species habitat known to occur within area
Tyto novaehollandiae melvillensis Tiwi Masked Owl, Tiwi Islands Masked Owl [26049]	Endangered	Species or species habitat known to occur within area
Xenus cinereus Terek Sandpiper [59300]	Vulnerable	Roosting known to occur within area
FISH		
Thunnus maccoyii Southern Bluefin Tuna [69402]	Conservation Dependent	Species or species habitat may occur within area
MAMMAL		
Antechinus bellus Fawn Antechinus [344]	Vulnerable	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
Conilurus penicillatus Brush-tailed Rabbit-rat, Brush-tailed Tree-rat, Pakooma [132]	Vulnerable	Species or species habitat known to occur within area
Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat known to occur within area
Hipposideros semoni Semon's Leaf-nosed Bat, Greater Wart-nosed Horseshoe-bat [180]	Vulnerable	Species or species habitat may occur within area
Isoodon auratus auratus Golden Bandicoot (mainland) [66665]	Vulnerable	Species or species habitat known to occur within area
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area
Mesembriomys gouldii gouldii Black-footed Tree-rat (Kimberley and mainland Northern Territory), Djintamoonga, Manbul [87618]	Endangered	Species or species habitat likely to occur within area
Mesembriomys gouldii melvillensis Black-footed Tree-rat (Melville Island) [87619]	Vulnerable	Species or species habitat known to occur within area
Mesembriomys gouldii rattoides Black-footed Tree-rat (north Queensland), Shaggy Rabbit-rat [87620]	Vulnerable	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Notomys aquilo Northern Hopping-mouse, Woorrentinta [123]	Endangered	Species or species habitat may occur within area
Petrogale concinna canescens Nabarlek (Top End) [87606]	Endangered	Species or species habitat may occur within area
Phascogale pirata Northern Brush-tailed Phascogale [82954]	Vulnerable	Species or species habitat likely to occur within area
Rhinolophus robertsi Large-eared Horseshoe Bat, Greater Large-eared Horseshoe Bat [87639]	Vulnerable	Species or species habitat may occur within area
Saccolaimus saccolaimus nudicluniatus Bare-rumped Sheath-tailed Bat, Bare-rumped Sheathtail Bat [66889]	Vulnerable	Species or species habitat likely to occur within area
Sminthopsis butleri Butler's Dunnart [302]	Vulnerable	Species or species habitat known to occur within area
Trichosurus vulpecula arnhemensis Northern Brushtail Possum [83091]	Vulnerable	Species or species habitat known to occur within area
Xeromys myoides Water Mouse, False Water Rat, Yirrkoo [66]	Vulnerable	Species or species habitat known to occur within area
PLANT		
Bruguiera x hainesii Haines's Orange Mangrove [91351]	Critically Endangered	Species or species habitat may occur within area
Burmannia championii listed as Burmannia sp. Bathurst Island (R.Fensham 1021) [93461] Endangered (listed as Burmannia sp. Bathurst Island		Species or species habitat likely to occur within area
Calophyllum bicolor [11371]	Vulnerable	Species or species habitat may occur within area

within area

Scientific Name	Threatened Category	Presence Text
[Dendrobium bigibbum](#)		
Cooktown Orchid [10306]	Vulnerable	Species or species habitat likely to occur within area
[Dendrobium carronii listed as Cepobaculum carronii](#)		
an orchid [10822]	Vulnerable	Species or species habitat likely to occur within area
[Dendrobium johannis](#)		
Chocolate Tea Tree Orchid [13585]	Vulnerable	Species or species habitat likely to occur within area
[Elaeocarpus miegei](#)		
[65147]	Endangered	Species or species habitat may occur within area
[Tarennoidea wallichii](#)		
[65173]	Endangered	Species or species habitat likely to occur within area
[Typhonium jonesii](#)		
a herb [62412]	Endangered	Species or species habitat likely to occur within area
[Typhonium mirabile](#)		
a herb [79227]	Endangered	Species or species habitat likely to occur within area
[Vappodes phalaenopsis](#)		
Cooktown Orchid [78894]	Vulnerable	Species or species habitat likely to occur within area
[Xylopia monosperma](#)		
a shrub [82030]	Endangered	Species or species habitat likely to occur within area
REPTILE		
[Acanthophis hawkei](#)		
Plains Death Adder [83821]	Vulnerable	Species or species habitat likely to occur within area
[Aipysurus apraefrontalis](#)		
Short-nosed Sea Snake, Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat likely to occur within area

within area

Scientific Name	Threatened Category	Presence Text
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Cryptoblepharus gurrmul Arafura Snake-eyed Skink [83106]	Endangered	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Congregation or aggregation known to occur within area
Egernia rugosa Yakka Skink [1420]	Vulnerable	Species or species habitat may occur within area
Elseya lavarackorum Gulf Snapping Turtle [67197]	Endangered	Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Breeding known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Tiliqua scincoides intermedia Northern Blue-tongued Skink [89838]	Critically Endangered	Species or species habitat likely to occur within area
Varanus mertensi Mertens' Water Monitor, Mertens's Water Monitor [1568]	Endangered	Species or species habitat likely to occur within area
Varanus mitchelli Mitchell's Water Monitor [1569]	Critically Endangered	Species or species habitat likely to occur within area

SHARK

Scientific Name	Threatened Category	Presence Text
[Carcharodon carcharias](#) White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
[Glyphis garricki](#) Northern River Shark, New Guinea River Shark [82454]	Endangered	Species or species habitat known to occur within area
[Glyphis glyphis](#) Speartooth Shark [82453]	Critically Endangered	Species or species habitat known to occur within area
[Pristis clavata](#) Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
[Pristis pristis](#) Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat known to occur within area
[Pristis zijsron](#) Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
[Rhincodon typus](#) Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
[Sphyrna lewini](#) Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat known to occur within area

Listed Migratory Species [Resource Information]

Scientific Name	Threatened Category	Presence Text
Migratory Marine Birds		
[Anous stolidus](#) Common Noddy [825]	Foraging, feeding or related behaviour known to occur within area	
[Apus pacificus](#) Fork-tailed Swift [678]	Species or species habitat likely to occur within area	

Scientific Name	Threatened Category	Presence Text
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Breeding known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Breeding known to occur within area
Onychoprion anaethetus Bridled Tern [82845]		Breeding known to occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat may occur within area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area
Sterna sumatrana Black-naped Tern [800]		Breeding known to occur within area
Sternula albifrons Little Tern [82849]		Breeding known to occur within area
Sula leucogaster Brown Booby [1022]		Breeding known to occur within area
Migratory Marine Species	Anoxypristis cuspidata Narrow Sawfish, Knifetooth Sawfish [68448]	Species or species habitat known to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat may occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Congregation or aggregation known to occur within area
Dugong dugon Dugong [28]		Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
[Isurus paucus](#) Longfin Mako [82947]		Species or species habitat likely to occur within area
[Lepidochelys olivacea](#) Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Breeding known to occur within area
[Megaptera novaeangliae](#) Humpback Whale [38]		Species or species habitat likely to occur within area
[Mobula alfredi as Manta alfredi](#) Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat likely to occur within area
[Mobula birostris as Manta birostris](#) Giant Manta Ray [90034]		Species or species habitat likely to occur within area
[Natator depressus](#) Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
[Orcaella heinsohni](#) Australian Snubfin Dolphin [81322]		Species or species habitat known to occur within area
[Orcinus orca](#) Killer Whale, Orca [46]		Species or species habitat may occur within area
[Physeter macrocephalus](#) Sperm Whale [59]		Species or species habitat may occur within area
[Pristis clavata](#) Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
[Pristis pristis](#) Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat known to occur within area
[Pristis zijsron](#) Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Sousa sahulensis as Sousa chinensis
Australian Humpback Dolphin [87942] Breeding known to occur within area

Tursiops aduncus (Arafura/Timor Sea populations)
Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900] Species or species habitat known to occur within area

Migratory Terrestrial Species Cecropis daurica
Red-rumped Swallow [80610] Species or species habitat known to occur within area

Cuculus optatus
Oriental Cuckoo, Horsfield's Cuckoo [86651] Species or species habitat may occur within area

Hirundapus caudacutus
White-throated Needletail [682] Vulnerable Species or species habitat may occur within area

Hirundo rustica
Barn Swallow [662] Species or species habitat may occur within area

Monarcha melanopsis
Black-faced Monarch [609] Species or species habitat may occur within area

Motacilla cinerea
Grey Wagtail [642] Species or species habitat may occur within area

Motacilla flava
Yellow Wagtail [644] Species or species habitat likely to occur within area

Myiagra cyanoleuca
Satin Flycatcher [612] Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Rhipidura rufifrons		
Rufous Fantail [592]		Species or species habitat likely to occur within area
Symposiachrus trivirgatus as Monarcha trivirgatus		
Spectacled Monarch [83946]		Species or species habitat known to occur within area
Migratory Wetlands Species	Acrocephalus orientalis	
Oriental Reed-Warbler [59570]		Species or species habitat may occur within area
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat known to occur within area
Arenaria interpres		
Ruddy Turnstone [872]	Vulnerable	Roosting known to occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]	Vulnerable	Roosting known to occur within area
Calidris alba		
Sanderling [875]		Roosting known to occur within area
Calidris canutus		
Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat likely to occur within area
Calidris ruficollis		
Red-necked Stint [860]		Roosting known to occur within area
Calidris tenuirostris		
Great Knot [862]	Vulnerable	Roosting known to occur within area

Scientific Name	Threatened Category	Presence Text
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Roosting may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat may occur within area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area
Glareola maldivarum Oriental Pratincole [840]		Roosting may occur within area
Limicola falcinellus Broad-billed Sandpiper [842]		Roosting known to occur within area
Limnodromus semipalmatus Asian Dowitcher [843]	Vulnerable	Species or species habitat likely to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]	Endangered	Roosting known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting known to occur within area

Scientific Name	Threatened Category	Presence Text
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola Grey Plover [865]	Vulnerable	Roosting known to occur within area
Thalasseus bergii Greater Crested Tern [83000]		Breeding known to occur within area
Tringa brevipes Grey-tailed Tattler [851]		Roosting known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area
Xenus cinereus Terek Sandpiper [59300]	Vulnerable	Roosting known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State
Attorney-General - Australian Government Solicitor	
Commonwealth Land - Australian Government Solicitor [70332]	NT
Defence	Defence - MT GOODWIN RADAR SITE [70063] NT
	Defence - QUAIL ISLAND BOMBING RANGE [70003] NT

Commonwealth Land Name	State
Defence - RIMBIJA ISLAND RAAF RADIO BEACON [70074]	NT

Unknown

Commonwealth Land - [71140]	NT
Commonwealth Land - [70995]	NT

Listed Marine Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text
Bird		
Acrocephalus orientalis		
Oriental Reed-Warbler [59570]		Species or species habitat may occur within area overfly marine area
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous stolidus		
Common Noddy [825]		Foraging, feeding or related behaviour known to occur within area
Anseranas semipalmata		
Magpie Goose [978]		Species or species habitat may occur within area overfly marine area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area
Arenaria interpres		
Ruddy Turnstone [872]	Vulnerable	Roosting known to occur within area
Bubulcus ibis as Ardea ibis		
Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area
Calidris acuminata		
Sharp-tailed Sandpiper [874]	Vulnerable	Roosting known to occur within area

Scientific Name	Threatened Category	Presence Text
Calidris alba Sanderling [875]		Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area overfly marine area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area overfly marine area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat likely to occur within area overfly marine area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area overfly marine area
Calidris tenuirostris Great Knot [862]	Vulnerable	Roosting known to occur within area overfly marine area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Cecropis daurica as Hirundo daurica Red-rumped Swallow [80610]		Species or species habitat known to occur within area overfly marine area
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat likely to occur within area overfly marine area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area

Scientific Name	Threatened Category	Presence Text
Charadrius ruficapillus Red-capped Plover [881]		Roosting known to occur within area

overfly marine area

Charadrius veredus Oriental Plover, Oriental Dotterel [882]	Roosting may occur within area overfly marine area	
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Breeding known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Breeding known to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat may occur within area overfly marine area
Gallinago megala Swinhoe's Snipe [864]	Roosting likely to occur within area overfly marine area	
Gallinago stenura Pin-tailed Snipe [841]	Roosting likely to occur within area overfly marine area	
Glareola maldivarum Oriental Pratincole [840]	Roosting may occur within area overfly marine area	
Haliaeetus leucogaster White-bellied Sea-Eagle [943]	Species or species habitat known to occur within area	
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]	Roosting known to occur within area overfly marine area	
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat may occur within area overfly

marine area

Scientific Name	Threatened Category	Presence Text
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area overfly marine area
Limicola falcinellus Broad-billed Sandpiper [842]		Roosting known to occur within area overfly marine area
Limnodromus semipalmatus Asian Dowitcher [843]	Vulnerable	Species or species habitat likely to occur within area overfly marine area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]	Endangered	Roosting known to occur within area overfly marine area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat may occur within area overfly marine area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area
Motacilla flava Yellow Wagtail [644]		Species or species habitat likely to occur within area overfly marine area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat likely to occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting known to occur within area overfly marine area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area
Onychoprion anaethetus as Sterna anaethetus Bridled Tern [82845]		Breeding known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat may occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola Grey Plover [865]	Vulnerable	Roosting known to occur within area overfly marine area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Roosting known to occur within area overfly marine area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area overfly marine area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Sterna sumatrana Black-naped Tern [800]		Breeding known to occur within area
Sternula albifrons as Sterna albifrons Little Tern [82849]		Breeding known to occur within area
Stiltia isabella Australian Pratincole [818]		Roosting known to occur within area overfly marine area
Sula leucogaster Brown Booby [1022]		Breeding known to occur within area
Symposiachrus trivirgatus as Monarcha trivirgatus Spectacled Monarch [83946]		Species or species habitat known to occur within area overfly marine area
Thalasseus bengalensis as Sterna bengalensis Lesser Crested Tern [66546]		Breeding known to occur within area
Thalasseus bergii as Sterna bergii Greater Crested Tern [83000]		Breeding known to occur within area
Tringa brevipes as Heteroscelus brevipes Grey-tailed Tattler [851]		Roosting known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area overfly marine area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area overfly marine area
Xenus cinereus Terek Sandpiper [59300]	Vulnerable	Roosting known to occur within area overfly marine area
Fish Acentronura tentaculata Shortpouch Pygmy Pipehorse [66187]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Bhanotia fasciolata Corrugated Pipefish, Barbed Pipefish [66188]		Species or species habitat may occur within area
Campichthys tricarinatus Three-keel Pipefish [66192]	Species or species habitat may occur within area	
Choeroichthys brachysoma Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area
Choeroichthys suillus Pig-snouted Pipefish [66198]	Species or species habitat may occur within area	
Corythoichthys amplexus Fijian Banded Pipefish, Brown-banded Pipefish [66199]		Species or species habitat may occur within area
Corythoichthys flavofasciatus Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area
Corythoichthys haematopterus Reef-top Pipefish [66201]	Species or species habitat may occur within area	
Corythoichthys intestinalis Australian Messmate Pipefish, Banded Pipefish [66202]		Species or species habitat may occur within area
Corythoichthys ocellatus Orange-spotted Pipefish, Ocellated Pipefish [66203]		Species or species habitat may occur within area
Corythoichthys schultzi Schultz's Pipefish [66205]	Species or species habitat may occur within area	
Cosmocampus banneri Roughridge Pipefish [66206]	Species or species habitat may occur within area	

Scientific Name	Threatened Category	Presence Text
Cosmocampus maxweberi Maxweber's Pipefish [66209]	Species or species habitat may occur within area	
Doryrhamphus dactyliophorus Banded Pipefish, Ringed Pipefish [66210]		Species or species habitat may occur within area
Doryrhamphus excisus Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within area
Doryrhamphus janssi Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area
Festucalex cinctus Girdled Pipefish [66214]	Species or species habitat may occur within area	
Filicampus tigris Tiger Pipefish [66217]	Species or species habitat may occur within area	
Halicampus brocki Brock's Pipefish [66219]	Species or species habitat may occur within area	
Halicampus dunckeri Red-hair Pipefish, Duncker's Pipefish [66220]		Species or species habitat may occur within area
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]	Species or species habitat may occur within area	
Halicampus macrorhynchus Whiskered Pipefish, Ornate Pipefish [66222]		Species or species habitat may occur within area
Halicampus spinirostris Spiny-snout Pipefish [66225]	Species or species habitat may occur within area	

Scientific Name	Threatened Category	Presence Text
[Haliichthys taeniophorus](#) Ribboned Pipehorse, Ribboned Seadragon [66226]		Species or species habitat may occur within area
[Hippichthys cyanospilos](#) Blue-speckled Pipefish, Blue-spotted Pipefish [66228]		Species or species habitat may occur within area
[Hippichthys heptagonus](#) Madura Pipefish, Reticulated Freshwater Pipefish [66229]		Species or species habitat may occur within area
[Hippichthys parvicarinatus](#) Short-keel Pipefish, Short-keeled Pipefish [66230]		Species or species habitat may occur within area
[Hippichthys penicillus](#) Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
[Hippichthys spicifer](#) Belly-barred Pipefish, Banded Freshwater Pipefish [66232]		Species or species habitat may occur within area
[Hippocampus angustus](#) Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area
[Hippocampus histrix](#) Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
[Hippocampus kuda](#) Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
[Hippocampus planifrons](#) Flat-face Seahorse [66238]		Species or species habitat may occur within area
[Hippocampus spinosissimus](#) Hedgehog Seahorse [66239]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Hippocampus trimaculatus Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720]		Species or species habitat may occur within area
Hippocampus zebra Zebra Seahorse [66241]		Species or species habitat may occur within area
Micrognathus brevirostris thorntail Pipefish, Thorn-tailed Pipefish [66254]		Species or species habitat may occur within area
Micrognathus micronotopterus Tidepool Pipefish [66255]		Species or species habitat may occur within area
Microphis brachyurus Short-tail Pipefish, Short-tailed River Pipefish [66257]		Species or species habitat may occur within area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Trachyrhamphus longirostris Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
Mammal		

Scientific Name	Threatened Category	Presence Text
Dugong dugon		
Dugong [28]	Species or species habitat known to occur within area	
Reptile Aipysurus apraefrontalis		
Short-nosed Sea Snake, Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat likely to occur within area
Aipysurus duboisii		
Dubois' Sea Snake, Dubois' Seasnake, Reef Shallows Sea Snake [1116]		Species or species habitat may occur within area
Aipysurus laevis		
Olive Sea Snake, Olive-brown Sea Snake [1120]		Species or species habitat may occur within area
Aipysurus mosaicus as Aipysurus eydouxii		
Mosaic Sea Snake [87261]	Species or species habitat may occur within area	
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Crocodylus johnstoni		
Freshwater Crocodile, Johnston's Crocodile, Johnstone's Crocodile [1773]		Species or species habitat may occur within area
Crocodylus porosus		
Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Congregation or aggregation known to occur within area
Emydocephalus annulatus Eastern Turtle-headed Sea Snake [1125]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Hydrelaps darwiniensis Port Darwin Sea Snake, Black-ringed Mangrove Sea Snake [1100]		Species or species habitat may occur within area
Hydrophis atriceps Black-headed Sea Snake [1101]	Species or species habitat may occur within area	
Hydrophis caerulescens Dwarf Sea Snake [1103]	Species or species habitat may occur within area	
Hydrophis coggeri Cogger's Sea Snake [25925]	Species or species habitat may occur within area	
Hydrophis czeblukovi Fine-spined Sea Snake [59233]	Species or species habitat may occur within area	
Hydrophis elegans Elegant Sea Snake, Bar-bellied Sea Snake [1104]		Species or species habitat may occur within area
Hydrophis hardwickii as Lapemis hardwickii Spine-bellied Sea Snake [93516]	Species or species habitat may occur within area	
Hydrophis inornatus Plain Sea Snake [1107]	Species or species habitat may occur within area	
Hydrophis kingii as Disteira kingii Spectacled Sea Snake [93511]	Species or species habitat may occur within area	
Hydrophis_macdowelli_as_Hydrophis_mcdowelli MacDowell's Sea Snake, Small-headed Sea Snake, [75601]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Hydrophis major as Disteira major Olive-headed Sea Snake [93512]		Species or species habitat may occur within area
Hydrophis melanosoma Black-banded Robust Sea Snake [1109]		Species or species habitat may occur within area
Hydrophis ornatus Spotted Sea Snake, Ornate Reef Sea Snake [1111]		Species or species habitat may occur within area
Hydrophis pacificus Pacific Sea Snake, Large-headed Sea Snake [1112]		Species or species habitat may occur within area
Hydrophis peronii as Acalyptophis peronii Horned Sea Snake [93509]		Species or species habitat may occur within area
Hydrophis platura as Pelamis platurus Yellow-bellied Sea Snake [93746]		Species or species habitat may occur within area
Hydrophis stokesii as Astrotia stokesii Stokes' Sea Snake [93510]		Species or species habitat may occur within area
Hydrophis vorisi Estuarine Sea Snake [25927]		Species or species habitat may occur within area
Hydrophis zweiffei as Enhydrina schistosa Australian Beaked Sea Snake [93514]		Species or species habitat may occur within area
Laticauda colubrina Yellow-lipped Sea Krait [1092]		Species or species habitat may occur within area
Laticauda laticaudata a sea krait [1093]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Breeding known to occur within area
Microcephalophis gracilis as Hydrophis gracilis Graceful Small-headed Sea Snake, Slender Sea Snake [87375]		Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Parahydrophis mertoni Arafura Smooth Sea Snake, Northern Mangrove Sea Snake [1090]		Species or species habitat may occur within area

Whales and Other Cetaceans [Resource Information]

Current Scientific Name	Status	Type of Presence
Mammal		
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Feresa attenuata Pygmy Killer Whale [61]		Species or species habitat may occur within area
Globicephala macrorhynchus Short-finned Pilot Whale [62]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Kogia breviceps Pygmy Sperm Whale [57]		Species or species habitat may occur within area
Kogia sima Dwarf Sperm Whale [85043]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat likely to occur within area
Orcaella heinsohni Australian Snubfin Dolphin [81322]		Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Peponocephala electra Melon-headed Whale [47]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Sousa sahulensis Australian Humpback Dolphin [87942]		Breeding known to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area
Stenella longirostris Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area
Steno bredanensis Rough-toothed Dolphin [30]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Australian Marine Parks [Resource Information]

Park Name	Zone & IUCN Categories
Limmen	Habitat Protection Zone (IUCN IV)
Oceanic Shoals	Habitat Protection Zone (IUCN IV)
Wessel	Habitat Protection Zone (IUCN IV)
West Cape York	Habitat Protection Zone (IUCN IV)
Arafura	Multiple Use Zone (IUCN VI)
Joseph Bonaparte Gulf	Multiple Use Zone (IUCN VI)
Oceanic Shoals	Multiple Use Zone (IUCN VI)

Park Name	Zone & IUCN Categories
Oceanic Shoals	Multiple Use Zone (IUCN VI)
Gulf of Carpentaria	National Park Zone (IUCN II)
Oceanic Shoals	National Park Zone (IUCN II)
West Cape York	National Park Zone (IUCN II)
West Cape York	National Park Zone (IUCN II)
Arafura	Special Purpose Zone (IUCN VI)
Arnhem	Special Purpose Zone (IUCN VI)
Joseph Bonaparte Gulf	Special Purpose Zone (IUCN VI)
West Cape York	Special Purpose Zone (IUCN VI)
Arafura	Special Purpose Zone (Trawl) (IUCN VI)
Gulf of Carpentaria	Special Purpose Zone (Trawl) (IUCN VI)
Gulf of Carpentaria	Special Purpose Zone (Trawl) (IUCN VI)
Oceanic Shoals	Special Purpose Zone (Trawl) (IUCN VI)
Wessel	Special Purpose Zone (Trawl) (IUCN VI)

Habitat Critical to the Survival of Marine Turtles [Resource Information]

Scientific Name	Behaviour	Presence
Aug - Sep		
Natator depressus Flatback Turtle [59257]	Nesting	Known to occur
Dec - Jan Chelonia mydas Green Turtle [1765]	Nesting	Known to occur
Dermochelys coriacea Leatherback Turtle [1768]	Nesting	Known to occur
May - Jul		

Scientific Name	Behaviour	Presence
[Lepidochelys olivacea](#) Olive Ridley Turtle [1767]	Nesting	Known to occur
Nov - May [Eretmochelys imbricata](#) Hawksbill Turtle [1766]	Nesting	Known to occur

Extra Information

State and Territory Reserves		[Resource Information]
Protected Area Name	Reserve Type	State
Anindilyakwa	Indigenous Protected Area	NT
Anindilyakwa	Indigenous Protected Area	NT
Barranyi (North Island)	National Park	NT
Crocodile Islands Maringa	Indigenous Protected Area	NT
Crocodile Islands Maringa	Indigenous Protected Area	NT
Dhimurru	Indigenous Protected Area	NT
Djelk	Indigenous Protected Area	NT
Djelk - Stage 2	Indigenous Protected Area	NT
Eight Mile Creek	Fish Habitat Area (A)	QLD
Finucane Island	National Park	QLD
Garig Gunak Barlu	Marine Park	NT
Keep River	Proposed National Parks Act park or park addition	NT
Limmen	National Park	NT
Limmen Bight	Marine Park	NT
Marthakal	Indigenous Protected Area	NT
Morning Inlet - Bynoe River	Fish Habitat Area (A)	QLD

Protected Area Name	Reserve Type	State
Nassau River	Fish Habitat Area (A)	QLD
Nijinda Durlga	Indigenous Protected Area	QLD
Pine River Bay	Fish Habitat Area (A)	QLD
Pungalina - Seven Emu	Private Nature Reserve	NT
Rutland Plains	Nature Refuge	QLD
South-East Arnhem Land	Indigenous Protected Area	NT
Thuwathu/Bujimulla	Indigenous Protected Area	QLD
Thuwathu/Bujimulla	Indigenous Protected Area	QLD
Yanyuwa (Barni - Wardimantha Awara)	Indigenous Protected Area	NT

Nationally Important Wetlands [Resource Information]

Wetland Name	State
Cobourg Peninsula System	NT
Finniss Floodplain and Fog Bay Systems	NT
Jardine River Wetlands Aggregation	QLD
Limmen Bight (Port Roper) Tidal Wetlands System	NT
Northeast Karumba Plain Aggregation	QLD
Southeast Karumba Plain Aggregation	QLD
Southern Gulf Aggregation	QLD

EPBC Act Referrals [Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status
Arnhem Space Centre Operations (Down Range Recovery)	2023/09657	Assessment	
Aurukun Bauxite Project	2020/8624	Assessment	
Darwin Pipeline Duplication (DPD) Project	2022/09372	Post-Approval	
Darwin Pipeline Duplication DPD Project	2022/9166	Completed	

Title of referral	Reference	Referral Outcome	Assessment Status
Marine Route Survey for Subsea Fibre Optic Data Cable System - Australia West	2024/09826	Completed	
Tiwi H2 Project	2022/09347	Assessment	
Controlled action			
Andranangoo Creek & Lethbridge Bay mineral sand mining	2005/2155	Controlled Action	Completed
Bauxite Hill Mining and Barging Project	2015/7538	Controlled Action	Post-Approval
Bauxite Hills Mine and Port Project	2012/6246	Controlled Action	Completed
Blacktip Project - Wharf Construction	2007/3293	Controlled Action	Completed
Bonaparte Liquified Natural Gas Project	2011/6141	Controlled Action	Post-Approval
Darwin to Moomba Gas Pipeline	2001/213	Controlled Action	Completed
Development of Blacktip Gas Field	2003/1180	Controlled Action	Post-Approval
Hardwood Plantation	2001/229	Controlled Action	Post-Approval
Ichthys Gas Field, Offshore and onshore processing facilities and subsea pipeline	2008/4208	Controlled Action	Post-Approval
Pisolite Hills bauxite mine and associated infrast	2008/4046	Controlled Action	Completed
PNG-Qld Gas Pipeline - Gove Lateral	2006/2615	Controlled Action	Completed
Roper Bar Iron Ore Mine and Transport Infrastructure	2011/6079	Controlled Action	Completed
Shipping Channel Enhancement	2010/5431	Controlled Action	Completed
Snake Bay Barramundi Sea Cage Farm	2005/2150	Controlled Action	Completed
South of the Embley Bauxite Mine Extension, including Construction of Port and Infrastructure	2008/4435	Controlled Action	Completed
South of the Embley Bauxite Mining Project	2010/5642	Controlled Action	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Controlled action			
Tassie Shoal Gas Reforming and Methanol Production Plants - NT/P48	2000/108	Controlled Action	Post-Approval
Tassie Shoal LNG Project	2003/1067	Controlled Action	Post-Approval
Trans-territory Gas Pipeline	2003/1186	Controlled Action	Completed
Not controlled action			
2D seismic survey, exploration permit NT/P67	2004/1587	Not Controlled Action	Completed
2D Seismic Survey in Permit Areas WA-318-P & WA-319-P, near Cape Londonderry	2004/1687	Not Controlled Action	Completed
Barossa-1 (NT/P69), Caldita-2 (NT/P61) exploration wells	2006/2793	Not Controlled Action	Completed
Caldita-1 Hydrocarbon Exploration Well, NT/P61	2004/1854	Not Controlled Action	Completed
Construction and operation of Radar Infrastructure	2004/1406	Not Controlled Action	Completed
Cox Peninsular Remediation Project, NT	2015/7587	Not Controlled Action	Completed
Dredging of Weipa South Channel	2003/1311	Not Controlled Action	Completed
Eastern Leases 2010 Exploration Drilling Program	2010/5455	Not Controlled Action	Completed
Geo-scientific survey	2005/2004	Not Controlled Action	Completed
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed
Marine Survey for the Australia-ASEAN Power Link AAPL	2020/8714	Not Controlled Action	Completed
Nexus Drilling Program NT-P66	2007/3745	Not Controlled Action	Completed
NT/P68 2007 Two Well Drilling Program	2007/3569	Not Controlled Action	Completed
Not controlled action (particular manner)			
2D and 3D Seismic Survey	2011/6197	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
2D Marine Seismic Survey	2009/4728	Not Controlled Action (Particular Manner)	Post-Approval
2D marine seismic survey of Braveheart,Kurrajong,Sunshine and Crocodile	2006/2917	Not Controlled Action (Particular Manner)	Post-Approval
2D Seismic survey	2009/5076	Not Controlled Action (Particular Manner)	Post-Approval
2D Seismic Survey, Permit Area Q23P	2009/4925	Not Controlled Action (Particular Manner)	Post-Approval
2D Seismic Survey in WA Permit Area TP/22 and Commonwealth Permit Area WA-280-P	2005/2100	Not Controlled Action (Particular Manner)	Post-Approval
2D Seismic Survey - Petroleum Exploration Area NT/P68, Eastern Bonaparte Basin	2006/2922	Not Controlled Action (Particular Manner)	Post-Approval
3D Marine Seismic Survey	2009/4681	Not Controlled Action (Particular Manner)	Post-Approval
3D Seismic Survey	2006/2729	Not Controlled Action (Particular Manner)	Post-Approval
3D Seismic Survey (NT/P68)	2006/2980	Not Controlled Action (Particular Manner)	Post-Approval
3D Seismic Survey (NT/P68)	2008/4121	Not Controlled Action (Particular Manner)	Post-Approval
Bonaparte 2D & 3D marine seismic survey	2011/5962	Not Controlled Action (Particular Manner)	Post-Approval
Bonaparte 3D & 2D Seismic Survey, in NT/P82, Timor Sea	2012/6398	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Manner)			
Bonaparte Basin Barossa Appraisal Drilling Campaign, NT	2012/6481	Not Controlled Action (Particular Manner)	Post-Approval
Bonaparte Basin Seabed Mapping Survey	2009/4951	Not Controlled Action (Particular Manner)	Post-Approval
Bonaparte Seismic and Bathymetric Survey	2012/6295	Not Controlled Action (Particular Manner)	Post-Approval
Caldita 3D Marine Seismic Survey - NT/P61, NT/P69, and acreage release area NT06-5	2006/3142	Not Controlled Action (Particular Manner)	Post-Approval
Dredging the outer shipping channels of Darwin Harbour	2013/6988	Not Controlled Action (Particular Manner)	Post-Approval
Eni Bathurst 3D Seismic Survey	2011/6118	Not Controlled	Post-Approval
Action (Particular Manner)			
Exploration Drilling in Permit Areas WA-402-P & WA-403-P	2010/5297	Not Controlled Action (Particular Manner)	Post-Approval
Joseph Bonaparte Gulf Seabed mapping survey	2010/5517	Not Controlled Action (Particular Manner)	Post-Approval
Kingtree & Ironstone-1 Exploration Wells	2011/5935	Not Controlled Action (Particular Manner)	Post-Approval
Malita West 3D Seismic Survey WA-402-P and WA-403-P	2007/3936	Not Controlled Action (Particular Manner)	Post-Approval
Marine Environmental Survey 2012	2012/6310	Not Controlled	Post-Approval
Action (Particular Manner)			

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Nova 3D Seismic Survey	2013/6825	Not Controlled Action (Particular Manner)	Post-Approval
NT/P74 & NT/P75 - 2D marine seismic survey	2008/4316	Not Controlled Action (Particular Manner)	Post-Approval
NT/P77 3D Marine Seismic Survey	2009/4683	Not Controlled Action (Particular Manner)	Post-Approval
NT/P80 2010 2D Marine Seismic Survey	2010/5487	Not Controlled Action (Particular Manner)	Post-Approval
Offshore Fibre Optic Cable Network Construction & Operation, Port Hedland WA to Darwin NT	2014/7223	Not Controlled Action (Particular Manner)	Post-Approval
Panda NT/P76 3D Seismic Acquisition Survey Program	2009/4992	Not Controlled Action (Particular Manner)	Post-Approval
Petrel MC2D Marine Seismic Survey	2010/5368	Not Controlled Action (Particular Manner)	Post-Approval
Removal of Potential Unexploded Ordnance within NAXA	2012/6503	Not Controlled Action (Particular Manner)	Post-Approval
Santos Petrel-7 Offshore Appraisal Drilling Programme (Bonaparte Basin)	2011/5934	Not Controlled Action (Particular Manner)	Post-Approval
Sonar and Acoustic Trials	2001/345	Not Controlled Action (Particular Manner)	Post-Approval
Sunshine Infill 2D and Mimosa 2D Marine Seismic Surveys	2009/4699	Not Controlled Action (Particular Manner)	Post-Approval
Two dimensional (2d) seismic survey in Gulf of Carpentaria	2013/6991	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference		Referral Outcome		Assessment Status
Not controlled action (particular manner)					
			Manner)		
Westralia SPAN Marine Seismic Survey, WA & NT	2012/6463		Not Action Manner)	Controlled (Particular	Post-Approval

Referral decision				
2D Marine Seismic Survey	2008/4623		Referral Decision	Completed
3D Seismic Survey (NT/P68)	2006/2949		Referral Decision	Completed
Capital Dredging Weipa South	2003/1302	Channel	Referral Decision	Completed
Groote Eylandt Offshore Marine Surveys	2010/5643		Referral Decision	Completed
Nova 3D Seismic Survey, WA 442-NT/P81, Joseph Bonaparte Gulf	2013/6820		Referral Decision	Completed

Key Ecological Features [Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
Carbonate bank and terrace system of the Sahul Shelf	North-west
Carbonate bank and terrace system of the Van Diemen Rise	North
Gulf of Carpentaria basin	North
Gulf of Carpentaria coastal zone	North
Pinnacles of the Bonaparte Basin	North-west
Pinnacles of the Bonaparte Basin	North
Plateaux and saddle north-west of the Wellesley Islands	North
Shelf break and slope of the Arafura Shelf	North
Submerged coral reefs of the Gulf of Carpentaria	North
Tributary Canyons of the Arafura Depression	North

Biologically Important Areas [Resource Information]

Scientific Name	Behaviour	Presence
Dolphins		
Sousa chinensis Indo-Pacific Humpback Dolphin [50]	Breeding	Known to occur
Sousa chinensis Indo-Pacific Humpback Dolphin [50]	Foraging	Likely to occur
Tursiops aduncus Indo-Pacific/Spotted Bottlenose Dolphin [68418]	Breeding	Likely to occur
Marine Turtles	Caretta caretta	
Loggerhead Turtle [1763]	Foraging	Known to occur
Chelonia mydas Green Turtle [1765]	Foraging	Likely to occur
Chelonia mydas Green Turtle [1765]	Foraging	Known to occur
Chelonia mydas Green Turtle [1765]	Internesting	Likely to occur
Dermochelys coriacea Leatherback Turtle [1768]	Internesting	Likely to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Internesting	Likely to occur
Lepidochelys olivacea Olive Ridley Turtle [1767]	Foraging	Likely to occur
Lepidochelys olivacea Olive Ridley Turtle [1767]	Foraging	Known to occur
Lepidochelys olivacea Olive Ridley Turtle [1767]	Internesting	Likely to occur
Natator depressus Flatback Turtle [59257]	Foraging	Known to occur
Natator depressus Flatback Turtle [59257]	Internesting	Likely to occur
Natator depressus Flatback Turtle [59257]	Internesting buffer	Known to occur
Seabirds		

Scientific Name	Behaviour	Presence
Anous stolidus Common Noddy [825]	Breeding	Known to occur
Fregata ariel Lesser Frigatebird [1012]	Breeding	Known to occur
Fregata ariel Lesser Frigatebird [1012]	Foraging	Likely to occur
Onychoprion anaethetus Bridled Tern [82845]	Breeding	Known to occur
Onychoprion anaethetus Bridled Tern [82845]	Breeding (high numbers)	Known to occur
Sterna dougallii Roseate Tern [817]	Breeding	Known to occur
Sterna dougallii Roseate Tern [817]	Breeding (high numbers)	Known to occur
Sula leucogaster Brown Booby [1022]	Breeding	Known to occur
Thalasseus bengalensis Lesser Crested Tern [66546]	Breeding	Known to occur
Thalasseus bergii Crested Tern [83000]	Breeding	Known to occur
Thalasseus bergii Crested Tern [83000]	Breeding (high numbers)	Known to occur

Caveat

PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

World and National Heritage properties;

Wetlands of International and National Importance;

Commonwealth and State/Territory reserves;

distribution of listed threatened, migratory and marine species;

listed threatened ecological communities; and

other information that may be useful as an indicator of potential habitat value.

DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

threatened species listed as extinct or considered vagrants;

some recently listed species and ecological communities;

some listed migratory and listed marine species, which are not listed as threatened species; and

migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded

seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements
This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:
-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact us page.

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EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 10-Jun-2024 Summary

Details

Matters of NES

Other Matters Protected by the EPBC Act Extra Information

Caveat Acknowledgements

Figure 1: SWMR PMST sub area 1 (labelled '2')

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	1
National Heritage Places:	3
Wetlands of International Importance (Ramsar	6
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	3
Listed Threatened Ecological Communities:	9
Listed Threatened Species:	141
Listed Migratory Species:	84

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	240
Commonwealth Heritage Places:	4
Listed Marine Species:	123
Whales and Other Cetaceans:	39
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	29
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	63
Regional Forest Agreements:	1
Nationally Important Wetlands:	5
EPBC Act Referrals:	131
Key Ecological Features (Marine):	11
Biologically Important Areas:	33
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

World Heritage Properties [Resource Information]

Name	State	Legal Status
Australian Convict Sites (Fremantle Prison)	WA	Declared property

National Heritage Places [Resource Information]

Name	State	Legal Status
Historic		
Fremantle Prison (former)	WA	Listed place
Indigenous		
Cheetup Rock Shelter	WA	Listed place
Natural		
Fitzgerald River National Park	WA	Listed place

Wetlands of International Importance (Ramsar Wetlands) [Resource Information]

Ramsar Site Name	Proximity
Becher point wetlands	Within Ramsar site
Forrestdale and thomsons lakes	Within 10km of Ramsar site
Lake gore	Within Ramsar site
Lake warden system	Within 10km of Ramsar site
Peel-yalgorup system	Within Ramsar site
Vasse-wonnerup system	Within Ramsar site

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside a Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area.

Feature Name
Commonwealth Marine Areas (EPBC Act) Commonwealth Marine Areas (EPBC Act) Commonwealth Marine Areas (EPBC Act)

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text
Aquatic Root Mat Community 3 in Caves of the Leeuwin Naturaliste Ridge	Endangered	Community known to occur within area
Banksia Woodlands of the Swan Coastal Plain ecological community	Endangered	Community likely to occur within area
Empodisma peatlands of southwestern Australia	Endangered	Community likely to occur within area
Honeymyrtle shrubland on limestone ridges of the Swan Coastal Plain Bioregion	Critically Endangered	Community likely to occur within area
Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia	Endangered	Community likely to occur within area
Sedgelands in Holocene dune swales of the southern Swan Coastal Plain	Endangered	Community known to occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area
Thrombolite (microbial) community of coastal freshwater lakes of the Swan Coastal Plain (Lake Richmond)	Endangered	Community known to occur within area
Tuart (Eucalyptus gomphocephala) Woodlands and Forests of the Swan Coastal Plain ecological community	Critically Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act. Number is the current name ID.

Scientific Name	Threatened Category	Presence Text
BIRD		
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area
Aphelocephala leucopsis Southern Whiteface [529]	Vulnerable	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Ardenna grisea Sooty Shearwater [82651]	Vulnerable	Species or species habitat may occur within area
Arenaria interpres Ruddy Turnstone [872]	Vulnerable	Roosting known to occur within area
Atrichornis clamosus Noisy Scrub-bird, Tjimiluk [654]	Endangered	Species or species habitat known to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Vulnerable	Roosting known to occur within area
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat known to occur within area
Cereopsis novaehollandiae grisea Cape Barren Goose (south-western), Recherche Cape Barren Goose [25978]	Vulnerable	Breeding known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area

Scientific Name	Threatened Category	Presence Text
Dasyornis longirostris Western Bristlebird [515]	Endangered	Species or species habitat known to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat likely to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit [86432]	Endangered	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Limosa limosa Black-tailed Godwit [845]	Endangered	Roosting known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area
Pezoporus flaviventris Western Ground Parrot, Kyloring [84650]	Critically Endangered	Species or species habitat may occur within area
Phaethon rubricauda westralis Red-tailed Tropicbird (Indian Ocean), Indian Ocean Red-tailed Tropicbird [91824]	Endangered	Species or species habitat known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Pluvialis squatarola Grey Plover [865]	Vulnerable	Roosting known to occur within area
Psophodes nigrogularis nigrogularis Western Heath Whipbird [64449]	Endangered	Species or species habitat known to occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

Scientific Name	Threatened Category	Presence Text
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area
Xenus cinereus Terek Sandpiper [59300]	Vulnerable	Roosting known to occur within area
Zanda baudinii listed as Calyptorhynchus baudinii Baudin's Cockatoo, Baudin's Black-Cockatoo, Long-billed Black-cockatoo [87736]	Endangered	Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Zanda latirostris listed as Calyptorhynchus latirostris		
Carnaby's Black Cockatoo, Short-billed Black-cockatoo [87737]	Endangered	Breeding known to occur within area
CRUSTACEAN		
Engaewa pseudoreducta		
Margaret River Burrowing Crayfish [82674]	Critically Endangered	Species or species habitat may occur within area
Engaewa reducta		
Dunsborough Burrowing Crayfish [82675]	Critically Endangered	Species or species habitat may occur within area
FISH		
Galaxias truttaceus (Western Australian population)		
Western Trout Minnow [89857]	Endangered	Species or species habitat known to occur within area
Galaxiella nigrostriata		
Blackstriped Dwarf Galaxias, Black-stripe Minnow [88677]	Endangered	Species or species habitat known to occur within area
Hoplostethus atlanticus		
Orange Roughy, Deep-sea Perch, Red Roughy [68455]	Conservation Dependent	Species or species habitat likely to occur within area
Nannatherina balstoni		
Balston's Pygmy Perch [66698]	Vulnerable	Species or species habitat known to occur within area
Thunnus maccoyii		
Southern Bluefin Tuna [69402]	Conservation Dependent	Species or species habitat known to occur within area
INSECT		
Hesperocolletes douglasi		
Douglas' Broad-headed Bee, Rottnest Bee [66734]	Critically Endangered	Species or species habitat may occur within area
Trioza barrettae		
Banksia brownii plant louse [87805]	Endangered	Species or species habitat known to occur within area
MAMMAL		

Scientific Name	Threatened Category	Presence Text
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Foraging, feeding or related behaviour known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Bettongia penicillata ogilbyi Woylie [66844]	Endangered	Species or species habitat known to occur within area
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat known to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat may occur within area
Myrmecobius fasciatus Numbat [294]	Endangered	Species or species habitat may occur within area
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Endangered	Breeding known to occur within area
Parantechinus apicalis Dibbler [313]	Endangered	Species or species habitat known to occur within area
Petrogale lateralis hacketti Recherche Rock-wallaby [66849]	Vulnerable	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Petrogale lateralis lateralis Black-flanked Rock-wallaby, Moororong, Black-footed Rock Wallaby [66647]	Endangered	Translocated population known to occur within area
Phascogale calura Red-tailed Phascogale, Red-tailed Wambenger, Kenngoor [316]	Vulnerable	Species or species habitat may occur within area
Potorous gilbertii Gilbert's Potoroo, Ngilkat [66642]	Critically Endangered	Species or species habitat known to occur within area
Pseudocheirus occidentalis Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Critically Endangered	Breeding known to occur within area
Pseudomys shortridgei Heath Mouse, Dayang, Heath Rat [77]	Endangered	Species or species habitat likely to occur within area
Setonix brachyurus Quokka [229]	Vulnerable	Species or species habitat known to occur within area
OTHER		
Westralunio carteri Carter's Freshwater Mussel, Freshwater Mussel [86266]	Vulnerable	Species or species habitat known to occur within area
PLANT		
Adenanthos dobagii Fitzgerald Woollybush [21253]	Endangered	Species or species habitat likely to occur within area
Adenanthos ellipticus Oval-leaf Adenanthos [4570]	Vulnerable	Species or species habitat likely to occur within area
Andersonia gracilis Slender Andersonia [14470]	Endangered	Species or species habitat may occur within area
Andersonia pinaster Two Peoples Bay Andersonia [67444]	Vulnerable	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Anigozanthos bicolor subsp. minor Little Kangaroo Paw, Two-coloured Kangaroo Paw, Small Two-colour Kangaroo Paw [21241]	Endangered	Species or species habitat likely to occur within area
Banksia brownii Brown's Banksia, Feather-leaved Banksia [8277]	Critically Endangered	Species or species habitat known to occur within area
Banksia nivea subsp. uliginosa Swamp Honeypot [82766]	Endangered	Species or species habitat may occur within area
Banksia squarrosa subsp. argillacea Whicher Range Dryandra [82769]	Vulnerable	Species or species habitat likely to occur within area
Banksia verticillata Granite Banksia, Albany Banksia, River Banksia [8333]	Vulnerable	Species or species habitat known to occur within area
Boronia clavata Bremer Boronia [5538]	Endangered	Species or species habitat may occur within area
Brachyscias verecundus Ironstone Brachyscias [81321]	Critically Endangered	Species or species habitat may occur within area
Caladenia busselliana Bussell's Spider-orchid [24369]	Endangered	Species or species habitat likely to occur within area
Caladenia caesarea subsp. maritima Cape Spider-orchid [64856]	Endangered	Species or species habitat known to occur within area
Caladenia excelsa Giant Spider-orchid [56717]	Endangered	Species or species habitat likely to occur within area
Caladenia granitora [65292]	Endangered	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Caladenia harringtoniae Harrington's Spider-orchid, Pink Spider-orchid [56786]	Vulnerable	Species or species habitat may occur within area
Caladenia huegelii King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat known to occur within area
Caladenia lodgeana Lodge's Spider-orchid [68664]	Critically Endangered	Species or species habitat likely to occur within area
Caladenia procera Carbunup King Spider Orchid [68679]	Critically Endangered	Species or species habitat known to occur within area
Caladenia viridescens Dunsborough Spider-orchid [56776]	Endangered	Species or species habitat known to occur within area
Calectasia cyanea Blue Tinsel Lily [7669]	Critically Endangered	Species or species habitat likely to occur within area
Chamelaucium lullfitzii listed as Chamelaucium sp. Gingin (N.G.Marchant 6) Gingin Wax [92777]	Endangered (listed as Chamelaucium sp. Gingin	Species or species habitat likely to occur within area
Chamelaucium sp. S coastal plain (R.D.Royce 4872) Royce's Waxflower [87814]	Vulnerable	Species or species habitat likely to occur within area
Chordifex abortivus Manypeaks Rush [64868]	Endangered	Species or species habitat likely to occur within area
Commersonia apella Many-flowered Commersonia [86877]	Critically Endangered	Species or species habitat known to occur within area
Coopernookia georgei Mauve Coopernookia [21218]	Endangered	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Daviesia obovata Paddle-leaf Daviesia [17311]	Endangered	Species or species habitat likely to occur within area
Diuris drummondii Tall Donkey Orchid [4365]	Vulnerable	Species or species habitat likely to occur within area
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat known to occur within area
Diuris purdiei Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat may occur within area
Drakaea elastica Glossy-leafed Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753]	Endangered	Species or species habitat likely to occur within area
Drakaea micrantha Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat likely to occur within area
Eucalyptus argutifolia Yanchep Mallee, Wabling Hill Mallee [24263]	Vulnerable	Species or species habitat may occur within area
Eucalyptus insularis Twin Peak Island Mallee [3057]	Endangered	Species or species habitat likely to occur within area
Eucalyptus x phylacis Meelup Mallee [87817]	Endangered	Species or species habitat known to occur within area
Gastrolobium papilio Butterfly-leaved Gastrolobium [78415]	Endangered	Species or species habitat may occur within area
Grevillea elongata Ironstone Grevillea [64578]	Vulnerable	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Grevillea infundibularis Fan-leaf Grevillea [5772]	Endangered	Species or species habitat likely to occur within area
Isopogon uncinatus Albany Cone Bush, Hook-leaf Isopogon [20871]	Endangered	Species or species habitat likely to occur within area
Kennedia glabrata Northcliffe Kennedia [16452]	Vulnerable	Species or species habitat known to occur within area
Lambertia echinata subsp. echinata Prickly Honeysuckle [56729]	Endangered	Species or species habitat known to occur within area
Lambertia echinata subsp. occidentalis Western Prickly Honeysuckle [64528]	Endangered	Species or species habitat may occur within area
Morelotia australiensis listed as Tetraria australiensis Southern Tetraria [92784]	Vulnerable	Species or species habitat may occur within area
Petrophile latericola Laterite Petrophile [64532]	Endangered	Species or species habitat may occur within area
Phaius australis Lesser Swamp-orchid [5872]	Endangered	Species or species habitat may occur within area
Reedia spathacea Reedia [2995]	Critically Endangered	Species or species habitat may occur within area
Ricinocarpos trichophorus Barrens Wedding Bush [19931]	Endangered	Species or species habitat may occur within area
Sphenotoma drummondii Mountain Paper-heath [21160]	Endangered	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Stylidium galioides		
Yellow Mountain Triggerplant [4666]	Vulnerable	Species or species habitat may occur within area
Synaphea sp. Fairbridge Farm (D.Papenfus 696)		
Selena's Synaphea [82881]	Critically Endangered	Species or species habitat may occur within area
Verticordia crebra		
[55678]	Vulnerable	Species or species habitat likely to occur within area
Verticordia densiflora var. pedunculata		
Long-stalked Featherflower [55689]	Endangered	Species or species habitat may occur within area
Verticordia plumosa var. ananeotes		
Tufted Plumed Featherflower [23871]	Endangered	Species or species habitat may occur within area
Verticordia plumosa var. vassensis		
Vasse Featherflower [55804]	Endangered	Species or species habitat may occur within area
Wurmbea calcicola		
Naturaliste Nancy [64691]	Endangered	Species or species habitat known to occur within area

REPTILE

Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area

Scientific Name	Threatened Category	Presence Text
[Natator depressus](#) Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

SHARK

[Carcharias taurus (west coast population)](#) Grey Nurse Shark (west coast population) [68752]	Vulnerable	Congregation or aggregation known to occur within area
[Carcharodon carcharias](#) White Shark, Great White Shark [64470]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
[Centrophorus uyato](#) Little Gulper Shark [68446]	Conservation Dependent	Species or species habitat likely to occur within area
[Galeorhinus galeus](#) School Shark, Eastern School Shark, Snapper Shark, Tope, Soupfin Shark [68453]	Conservation Dependent	Species or species habitat may occur within area
[Pristis pristis](#) Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area
[Rhincodon typus](#) Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
[Sphyrna lewini](#) Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat known to occur within area

Listed Migratory Species [Resource Information]

Scientific Name	Threatened Category	Presence Text
Migratory Marine Birds		
[Anous stolidus](#) Common Noddy [825]		Species or species habitat likely to occur within area
[Apus pacificus](#) Fork-tailed Swift [678]		Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Breeding known to occur within area
Ardenna grisea Sooty Shearwater [82651]	Vulnerable	Species or species habitat may occur within area
Ardenna pacifica Wedge-tailed Shearwater [84292]		Breeding known to occur within area
Ardenna tenuirostris Short-tailed Shearwater [82652]		Breeding known to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat likely to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area
Hydroprogne caspia Caspian Tern [808]		Breeding known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Onychoprion anaethetus
Bridled Tern [82845] Breeding known to occur within area

Phaethon rubricauda
Red-tailed Tropicbird [994] Breeding known to occur within area

Phoebetria fusca
Sooty Albatross [1075] Vulnerable Species or species habitat likely to occur within area

Sterna dougallii
Roseate Tern [817] Breeding known to occur within area

Sternula albifrons
Little Tern [82849] Species or species habitat may occur within area

Thalassarche carteri
Indian Yellow-nosed Albatross [64464] Vulnerable Species or species habitat likely to occur within area

Thalassarche cauta
Shy Albatross [89224] Endangered Foraging, feeding or related behaviour likely to occur within area

Thalassarche chrysostoma
Grey-headed Albatross [66491] Endangered Species or species habitat may occur within area

Thalassarche impavida
Campbell Albatross, Campbell Black-browed Albatross [64459] Vulnerable Species or species habitat may occur within area

Thalassarche melanophris
Black-browed Albatross [66472] Vulnerable Foraging, feeding or related behaviour likely to occur within area

Scientific Name	Threatened Category	Presence Text
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area
Migratory Marine Species Balaenoptera bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Foraging, feeding or related behaviour known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour likely to occur within area
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat likely to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area

Scientific Name	Threatened Category	Presence Text
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered within area	Foraging, feeding or related behaviour known to occur
Eubalaena australis as Balaena glacialis australis Southern Right Whale [40]	Endangered	Breeding known to occur within area
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]	Species or species habitat likely to occur within area	
Lagenorhynchus obscurus Dusky Dolphin [43]	Species or species habitat likely to occur within area	
Lamna nasus Porbeagle, Mackerel Shark [83288]	Species or species habitat likely to occur within area	
Megaptera novaeangliae Humpback Whale [38]	Foraging, feeding or related behaviour known to occur within area	
Mobula alfredi as Manta alfredi Reef Manta Ray, Coastal Manta Ray [90033]	Species or species habitat known to occur within area	
Mobula birostris as Manta birostris Giant Manta Ray [90034]	Species or species habitat known to occur within area	
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Orcinus orca Killer Whale, Orca [46]	Species or species habitat may occur within area	

Scientific Name	Threatened Category	Presence Text
[Physeter macrocephalus](#) Sperm Whale [59]		Foraging, feeding or related behaviour known to occur within area
[Pristis pristis](#) Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area
[Rhincodon typus](#) Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Migratory Terrestrial Species [Motacilla cinerea](#) Grey Wagtail [642]		Species or species habitat known to occur within area
Migratory Wetlands Species [Actitis hypoleucos](#) Common Sandpiper [59309]		Species or species habitat known to occur within area
[Arenaria interpres](#) Ruddy Turnstone [872]	Vulnerable	Roosting known to occur within area
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]	Vulnerable	Roosting known to occur within area
[Calidris alba](#) Sanderling [875]		Roosting known to occur within area
[Calidris canutus](#) Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Calidris pugnax as Philomachus pugnax Ruff [91256]		Roosting known to occur within area

Calidris ruficollis
Red-necked Stint [860] Roosting known to occur within area

Calidris subminuta
Long-toed Stint [861] Roosting known to occur within area

Calidris tenuirostris
Great Knot [862] Vulnerable Roosting known to occur within area

Charadrius bicinctus
Double-banded Plover [895] Roosting known to occur within area

Charadrius leschenaultii
Greater Sand Plover, Large Sand Plover [877] Vulnerable Species or species habitat known to occur within area

Charadrius mongolus
Lesser Sand Plover, Mongolian Plover [879] Endangered Roosting known to occur within area

Gallinago megala
Swinhoe's Snipe [864] Roosting likely to occur within area

Gallinago stenura
Pin-tailed Snipe [841] Roosting likely to occur within area

Glareola maldivarum
Oriental Pratincole [840] Species or species habitat known to occur within area

Limicola falcinellus
Broad-billed Sandpiper [842] Roosting known to occur within area

Limosa lapponica
Bar-tailed Godwit [844] Species or species habitat known to occur within area

Limosa limosa
Black-tailed Godwit [845] Endangered Roosting known to occur within area

Scientific Name	Threatened Category	Presence Text
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area

Numenius minutus
Little Curlew, Little Whimbrel [848] Roosting likely to occur within area

Numenius phaeopus
Whimbrel [849]Roosting known to occur within area

Pandion haliaetus
Osprey [952] Breeding known to occur within area

Phalaropus lobatus
Red-necked Phalarope [838] Roosting known to occur within area

Pluvialis fulva
Pacific Golden Plover [25545] Roosting known to occur within area

Pluvialis squatarola
Grey Plover [865] Vulnerable Roosting known to occur within area

Thalasseus bergii
Greater Crested Tern [83000] Breeding known to occur within area

Tringa brevipes
Grey-tailed Tattler [851] Roosting known to occur within area

Tringa glareola
Wood Sandpiper [829] Roosting known to occur within area

Tringa nebularia
Common Greenshank, Greenshank Endangered Species or species habitat known to occur within area [832]

Tringa stagnatilis
Marsh Sandpiper, Little Greenshank Roosting known to occur within area [833]

Tringa totanus
Common Redshank, Redshank [835] Roosting known to occur within area

Scientific Name	Threatened Category	Presence Text
Xenus cinereus		
Terek Sandpiper [59300]	Vulnerable	Roosting known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State
Defence	

Defence - ARTILLERY BARRACKS - FREMANTLE [50155] WA Defence - CAMPBELL BARRACKS - SWANBOURNE [50183] WA Defence - CAMPBELL BARRACKS - SWANBOURNE [50184] WA Defence - CAMPBELL BARRACKS - SWANBOURNE [50186] WA Defence - CAMPBELL BARRACKS - SWANBOURNE [50185] WA Defence - CAMPBELL BARRACKS - SWANBOURNE [50181] WA Defence - CAMPBELL BARRACKS - SWANBOURNE [50187] WA Defence - CAMPBELL BARRACKS - SWANBOURNE [50182] WA

Defence - HMAS STIRLING-ROCKINGHAM ;HMAS STIRLING - GARDEN WA ISLAND [50117]

Defence - HMAS STIRLING-ROCKINGHAM ;HMAS STIRLING - GARDEN WA ISLAND [50133]

Defence - HMAS STIRLING-ROCKINGHAM ;HMAS STIRLING - GARDEN WA ISLAND [50134]

Defence - HMAS STIRLING-ROCKINGHAM ;HMAS STIRLING - GARDEN WA ISLAND [50132]

Defence - HMAS STIRLING-ROCKINGHAM ;HMAS STIRLING - GARDEN WA ISLAND [50131]

Defence - ROCKINGHAM - NAVY CPSO [50135] WA

Defence - SWANBOURNE RIFLE RANGE [50188]WA

Commonwealth Land Name	State
Defence - SWANBOURNE RIFLE RANGE [50191]	WA
Unknown Commonwealth Land - [50504]	WA
Commonwealth Land - [50503]	WA
Commonwealth Land - [50507]	WA
Commonwealth Land - [50506]	WA
Commonwealth Land - [50495]	WA
Commonwealth Land - [50505]	WA
Commonwealth Land - [50425]	WA
Commonwealth Land - [50473]	WA
Commonwealth Land - [50424]	WA
Commonwealth Land - [50493]	WA
Commonwealth Land - [50567]	WA
Commonwealth Land - [50633]	WA
Commonwealth Land - [50566]	WA
Commonwealth Land - [50483]	WA
Commonwealth Land - [50467]	WA
Commonwealth Land - [50487]	WA
Commonwealth Land - [50551]	WA
Commonwealth Land - [50558]	WA
Commonwealth Land - [50431]	WA
Commonwealth Land - [50550]	WA
Commonwealth Land - [50518]	WA
Commonwealth Land - [50437]	WA
Commonwealth Land - [50422]	WA
Commonwealth Land - [51437]	WA
Commonwealth Land - [50579]	WA

Commonwealth Land Name	State
Commonwealth Land - [50631]	WA
Commonwealth Land - [51480]	WA
Commonwealth Land - [50470]	WA
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Commonwealth Heritage Places [Resource Information]

Name	State	Status
Historic		
Artillery Barracks	WA	Listed place
Cliff Point Historic Site	WA	Listed place
J Gun Battery	WA	Listed place
Natural		
Garden Island	WA	Listed place

Listed Marine Species [Resource Information]

Scientific Name	Threatened Category	Presence Text
Bird		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous stolidus		
Common Noddy [825]		Species or species habitat likely to occur within area
Anous tenuirostris melanops		
Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area
Ardenna carneipes as Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Breeding known to occur within area
Ardenna grisea as Puffinus griseus Sooty Shearwater [82651]	Vulnerable	Species or species habitat may occur within area
Ardenna pacifica as Puffinus pacificus Wedge-tailed Shearwater [84292]		Breeding known to occur within area
Ardenna tenuirostris as Puffinus tenuirostris Short-tailed Shearwater [82652]		Breeding known to occur within area
Arenaria interpres Ruddy Turnstone [872]	Vulnerable	Roosting known to occur within area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Roosting known to occur within area
Calidris alba Sanderling [875]		Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area overfly marine area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text

Calidris melanotos
Pectoral Sandpiper [858] Species or species habitat known to occur within area overfly marine area

Calidris pugnax as Philomachus pugnax
Ruff [91256] Roosting known to occur within area overfly marine area

Calidris ruficollis
Red-necked Stint [860] Roosting known to occur within area overfly marine area

Calidris subminuta
Long-toed Stint [861] Roosting known to occur within area overfly marine area

Calidris tenuirostris
Great Knot [862] Vulnerable Roosting known to occur within area overfly marine area

Cereopsis novaehollandiae grisea Cape Barren Goose (south-western), Recherche Cape Barren Goose [25978] Vulnerable Breeding known to occur within area overfly marine area

Chalcites osculans as Chrysococcyx osculans
Black-eared Cuckoo [83425] Species or species habitat likely to occur within area overfly marine area

Charadrius bicinctus
Double-banded Plover [895] Roosting known to occur within area overfly marine area

Charadrius leschenaultii
Greater Sand Plover, Large Sand Plover [877] Vulnerable Species or species habitat known to occur within area

Charadrius mongolus
Lesser Sand Plover, Mongolian Plover [879] Endangered Roosting known to occur within area

Charadrius ruficapillus
Red-capped Plover [881] Roosting known to occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Chroicocephalus novaehollandiae as Larus novaehollandiae Silver Gull [82326]	Breeding known to occur within area	
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat likely to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area
Eudyptula minor Little Penguin [1085]		Breeding known to occur within area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area overfly marine area
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area overfly marine area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat known to occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text

Haliaeetus leucogaster
White-bellied Sea-Eagle [943] Species or species habitat known to occur within area

Halobaena caerulea
Blue Petrel [1059] Vulnerable Species or species habitat may occur within area

Himantopus himantopus
Pied Stilt, Black-winged Stilt [870] Roosting known to occur within area overfly marine area

Hydroprogne caspia as Sterna caspia
Caspian Tern [808] Breeding known to occur within area

Larus dominicanus
Kelp Gull [809] Breeding known to occur within area

Larus pacificus
Pacific Gull [811] Breeding known to occur within area

Limicola falcinellus
Broad-billed Sandpiper [842] Roosting known to occur within area overfly marine area

Limosa lapponica
Bar-tailed Godwit [844] Species or species habitat known to occur within area

Limosa limosa
Black-tailed Godwit [845] Endangered Roosting known to occur within area overfly marine area

Macronectes giganteus
Southern Giant-Petrel, Southern Giant Petrel [1060] Endangered Species or species habitat may occur within area

Macronectes halli
Northern Giant Petrel [1061] Vulnerable Foraging, feeding or related behaviour likely to occur within area

Scientific Name	Threatened Category	Presence Text
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat known to occur within area overfly marine area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area overfly marine area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area
Onychoprion anaethetus as Sterna anaethetus Bridled Tern [82845]		Breeding known to occur within area
Onychoprion fuscatus as Sterna fuscata Sooty Tern [90682]		Breeding known to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Pelagodroma marina White-faced Storm-Petrel [1016]		Breeding known to occur within area
Phaethon rubricauda Red-tailed Tropicbird [994]		Breeding known to occur within area
Phalacrocorax fuscescens Black-faced Cormorant [59660]		Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Phalaropus lobatus Red-necked Phalarope [838]		Roosting known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola Grey Plover [865]	Vulnerable	Roosting known to occur within area overfly marine area
Pterodroma macroptera Great-winged Petrel [1035]		Breeding known to occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Puffinus assimilis Little Shearwater [59363]		Breeding known to occur within area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Roosting known to occur within area overfly marine area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area overfly marine area
Stercorarius antarcticus as Catharacta skua Brown Skua [85039]		Species or species habitat may occur within area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area
Sternula albifrons as Sterna albifrons Little Tern [82849]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Sternula nereis as Sterna nereis Fairy Tern [82949]		Breeding known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area
Thalasseus bergii as Sterna bergii Greater Crested Tern [83000]		Breeding known to occur within area
Thinornis cucullatus as Thinornis rubricollis Hooded Plover, Hooded Dotterel [87735]		Species or species habitat known to occur within area overfly marine area
Tringa brevipes as Heteroscelus brevipes Grey-tailed Tattler [851]		Roosting known to occur within area
Tringa glareola Wood Sandpiper [829]		Roosting known to occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
[Tringa nebularia](#) Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area overfly marine area
[Tringa stagnatilis](#) Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area overfly marine area
[Tringa totanus](#) Common Redshank, Redshank [835]		Roosting known to occur within area overfly marine area
[Xenus cinereus](#) Terek Sandpiper [59300]	Vulnerable	Roosting known to occur within area overfly marine area
Fish [Acentronura australe](#) Southern Pygmy Pipehorse [66185]		Species or species habitat may occur within area
[Campichthys galei](#) Gale's Pipefish [66191]		Species or species habitat may occur within area
[Choeroichthys suillus](#) Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
[Halicampus brocki](#) Brock's Pipefish [66219]		Species or species habitat may occur within area
[Heraldia nocturna](#) Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
[Hippocampus angustus](#) Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area
[Hippocampus breviceps](#) Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Hippocampus subelongatus West Australian Seahorse [66722]	Species or species habitat may occur within area	
Histiogamphelus cristatus Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area
Leptoichthys fistularius Brushtail Pipefish [66248]	Species or species habitat may occur within area	
Lissocampus caudalis Australian Smooth Pipefish, Smooth Pipefish [66249]		Species or species habitat may occur within area
Lissocampus fatiloquus Prophet's Pipefish [66250]	Species or species habitat may occur within area	
Lissocampus runa Javelin Pipefish [66251]	Species or species habitat may occur within area	
Maroubra perserrata Sawtooth Pipefish [66252]	Species or species habitat may occur within area	
Mitotichthys meraculus Western Crested Pipefish [66259]	Species or species habitat may occur within area	
Nannocampus subosseus Bonyhead Pipefish, Bony-headed Pipefish [66264]		Species or species habitat may occur within area
Notiocampus ruber Red Pipefish [66265]	Species or species habitat may occur within area	
Phycodurus eques Leafy Seadragon [66267]	Species or species habitat may occur within area	

Scientific Name	Threatened Category	Presence Text
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
Pugnaso curtirostris Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Vanacampus phillipi Port Phillip Pipefish [66284]		Species or species habitat may occur within area
Vanacampus poecilolaemus Longsnout Pipefish, Australian Long- snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area
Mammal Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Endangered	Breeding known to occur within area
Reptile Aipysurus pooleorum Shark Bay Sea Snake [66061]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Hydrophis kingii as Disteira kingii Spectacled Sea Snake [93511]		Species or species habitat may occur within area
Hydrophis platura as Pelamis platurus Yellow-bellied Sea Snake [93746]		Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

Whales and Other Cetaceans		[Resource Information]
Current Scientific Name	Status	Type of Presence
Mammal Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area

Current Scientific Name	Status	Type of Presence
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Foraging, feeding or related behaviour known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Berardius arnuxii Arnoux's Beaked Whale [70]		Species or species habitat may occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour likely to occur within area
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area
Feresa attenuata Pygmy Killer Whale [61]		Species or species habitat may occur within area
Globicephala macrorhynchus Short-finned Pilot Whale [62]		Species or species habitat may occur within area
Globicephala melas Long-finned Pilot Whale [59282]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area

Hyperoodon planifrons
Southern Bottlenose Whale [71] Species or species habitat may occur within area

Kogia breviceps
Pygmy Sperm Whale [57] Species or species habitat may occur within area

Kogia sima
Dwarf Sperm Whale [85043] Species or species habitat may occur within area

Lagenorhynchus obscurus
Dusky Dolphin [43] Species or species habitat likely to occur within area

Lissodelphis peronii
Southern Right Whale Dolphin [44] Species or species habitat may occur within area

Megaptera novaeangliae
Humpback Whale [38] Foraging, feeding or related behaviour known to occur within area

Mesoplodon bowdoini
Andrew's Beaked Whale [73] Species or species habitat may occur within area

Mesoplodon densirostris Blainville's Beaked Whale, Dense- beaked Whale [74]		Species or species habitat may occur within area
Mesoplodon ginkgodens Gingko-toothed Beaked Whale, Gingko-toothed Whale, Gingko Beaked Whale [59564]		Species or species habitat may occur within area
Mesoplodon grayi Gray's Beaked Whale, Scamperdown Whale [75]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
Mesoplodon hectori Hector's Beaked Whale [76]		Species or species habitat may occur within area
Mesoplodon layardii Strap-toothed Beaked Whale, Strap-toothed Whale, Layard's Beaked Whale [25556]		Species or species habitat may occur within area
Mesoplodon mirus True's Beaked Whale [54]		Species or species habitat may occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Peponocephala electra Melon-headed Whale [47]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Foraging, feeding or related behaviour known to occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area
Stenella longirostris Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area
Steno bredanensis Rough-toothed Dolphin [30]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
Tasmacetus shepherdi Shepherd's Beaked Whale, Tasman Beaked Whale [55]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]	Species or species habitat may occur within area	
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Australian Marine Parks

[Resource Information]

Park Name	Zone & IUCN Categories
Geographe	Habitat Protection Zone (IUCN IV)
Perth Canyon	Habitat Protection Zone (IUCN IV)
Perth Canyon	Habitat Protection Zone (IUCN IV)
South-west Corner	Habitat Protection Zone (IUCN IV)
Geographe	Multiple Use Zone (IUCN VI)
Perth Canyon	Multiple Use Zone (IUCN VI)
Perth Canyon	Multiple Use Zone (IUCN VI)
South-west Corner	Multiple Use Zone (IUCN VI)
South-west Corner	Multiple Use Zone (IUCN VI)
South-west Corner	Multiple Use Zone (IUCN VI)
South-west Corner	Multiple Use Zone (IUCN VI)
Bremer	National Park Zone (IUCN II)
Geographe	National Park Zone (IUCN II)

Park Name	Zone & IUCN Categories
Perth Canyon	National Park Zone (IUCN II)

Perth Canyon National Park Zone (IUCN II)

South-west Corner National Park Zone (IUCN II)

South-west Corner National Park Zone (IUCN II)

South-west Corner National Park Zone (IUCN II)

South-west Corner National Park Zone (IUCN II)

South-west Corner National Park Zone (IUCN II)

South-west Corner National Park Zone (IUCN II)

South-west Corner National Park Zone (IUCN II)

South-west Corner National Park Zone (IUCN II)

South-west Corner Special Purpose Zone (IUCN VI)

South-west Corner Special Purpose Zone (IUCN VI)

Bremer Special Purpose Zone (Mining Exclusion) (IUCN VI)

Bremer Special Purpose Zone (Mining Exclusion) (IUCN VI)

Geographe Special Purpose Zone (Mining Exclusion) (IUCN VI)

South-west Corner Special Purpose Zone (Mining Exclusion) (IUCN VI)

South-west Corner Special Purpose Zone (Mining Exclusion) (IUCN VI)

Extra Information

State and Territory Reserves		[Resource Information]
Protected Area Name	Reserve Type	State
Arpenteur	Nature Reserve	WA
Bald Island	Nature Reserve	WA
Bold Park	Botanic Gardens	WA
Broadwater	Nature Reserve	WA
Cape Le Grand	National Park	WA

Protected Area Name	Reserve Type	State
Carnac Island	Nature Reserve	WA
Cottesloe Reef	Fish Habitat Protection Area	WA
D'Entrecasteaux	National Park	WA
Doubtful Islands	Nature Reserve	WA
Eclipse Island	Nature Reserve	WA
Fitzgerald River	National Park	WA
Flinders Bay	Nature Reserve	WA
Hamelin Island	Nature Reserve	WA
Investigator Island	Nature Reserve	WA
Jerdacuttup Lakes	Nature Reserve	WA
Leeuwin-Naturaliste	National Park	WA
Locke	Nature Reserve	WA
Marmion	Marine Park	WA
Mount Manypeaks	Nature Reserve	WA
Ngari Capes	Marine Park	WA
NTWA Bushland covenant (0085A)	Conservation Covenant	WA
NTWA Bushland covenant (0085B)	Conservation Covenant	WA
NTWA Bushland covenant (0173)	Conservation Covenant	WA
NTWA Bushland covenant (0178)	Conservation Covenant	WA
Penguin Island	Conservation Park	WA
Port Kennedy Scientific Park	Nature Reserve	WA
Quagering	Nature Reserve	WA
Quarram	Nature Reserve	WA
Recherche Archipelago	Nature Reserve	WA
Rottnest Island	State Reserve	WA
Shoalwater Bay Islands	Nature Reserve	WA

Protected Area Name	Reserve Type	State
Shoalwater Islands	Marine Park	WA
St Alouarn Island	Nature Reserve	WA
Stokes	National Park	WA
Sugar Loaf Rock	Nature Reserve	WA
Swan River	Management Area	WA
Torndirrup	National Park	WA
Two Peoples Bay	Nature Reserve	WA
Unnamed WA25836	Nature Reserve	WA
Unnamed WA26620	Nature Reserve	WA
Unnamed WA26885	Nature Reserve	WA
Unnamed WA27888	Nature Reserve	WA
Unnamed WA32478	5(1)(h) Reserve	WA
Unnamed WA41568	Nature Reserve	WA
Unnamed WA41597	Nature Reserve	WA
Unnamed WA42379	5(1)(h) Reserve	WA
Unnamed WA42469	Nature Reserve	WA
Unnamed WA42879	Nature Reserve	WA
Unnamed WA43903	Nature Reserve	WA
Unnamed WA44004	Nature Reserve	WA
Unnamed WA44676	5(1)(h) Reserve	WA
Unnamed WA44685	5(1)(h) Reserve	WA
Unnamed WA44709	5(1)(h) Reserve	WA
Unnamed WA48837	Nature Reserve	WA
Unnamed WA48955	5(1)(h) Reserve	WA
Unnamed WA48968	5(1)(h) Reserve	WA
Unnamed WA49220	Conservation Park	WA
Unnamed WA49385	Nature Reserve	WA

Protected Area Name	Reserve Type	State
Unnamed WA50017	Nature Reserve	WA
Walpole-Nornalup	National Park	WA
Waychinicup	National Park	WA
West Cape Howe	National Park	WA
Yalgorup	National Park	WA

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included. Please see the associated resource information for specific caveats and use limitations associated with RFA boundary information.

RFA Name	State
South West WA RFA	Western Australia

Nationally Important Wetlands [Resource Information]

Wetland Name	State
Becher Point Wetlands	WA
Doggerup Creek System	WA
Rottnest Island Lakes	WA
Swan-Canning Estuary	WA
Vasse-Wonnerup Wetland System	WA

EPBC Act Referrals [Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status
Fremantle District Police Complex Project	2022/09345	Completed	
H2Perth hydrogen and ammonia project	2023/09559	Completed	
Installation of additional potable water tank	2023/09518	Assessment	
Marine Route Survey for Subsea Fibre Optic Data Cable System - Australia West	2024/09826	Referral Decision	
WA Offshore Windfarm	2021/8961	Completed	
Controlled action			
Aerial Application of Lavicide to Vasse-Wonnerup Wetlands	2010/5593	Controlled Action	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Controlled action			
Airborne sonar trials	2001/540	Controlled Action	Completed
Albany Port Authority dredging project	2006/2540	Controlled Action	Post-Approval
All weather access track road between Windy Harbour and Nelson Location 7965	2011/6121	Controlled Action	Post-Approval
Busselton Foreshore Redevelopment from West Street to Ford Road	2013/6830	Controlled Action	Post-Approval
Cape View Resort at Lot 190 Little Colin Street	2006/3070	Controlled Action	Post-Approval
Construction of a Deepwater, General Container Port	2009/5178	Controlled Action	Proposed Decision
Construction of New Perth Bunbury Highway project	2005/2193	Controlled Action	Post-Approval
Dawson Beach Estate Stage 2	2005/2153	Controlled Action	Post-Approval
Development Guide Plan for 46 ha Residential Subdivision	2008/4102	Controlled Action	Post-Approval
Development of Busselton Health Campus	2011/6011	Controlled Action	Post-Approval
Development of Kwinana Quay port facility	2008/4387	Controlled Action	Completed
Develop Trails and a Wetlands Demonstration Site and Centre	2008/4439	Controlled Action	Post-Approval
Eastern Link Project, Busselton WA	2018/8155	Controlled Action	Post-Approval
Industry Zone	2010/5337	Controlled Action	Post-Approval
Lennox Weir Removal, 12kms west Busselton	2021/8915	Controlled Action	Assessment Approach
Lower Vasse River Sediment Removal	2021/9051	Controlled Action	Post-Approval
Mangles Bay Marina Based Tourist Precinct	2010/5659	Controlled Action	Post-Approval
Neighbourhood Shopping Centre and Mixed Business Centre, Ocean Road, Dawesville	2006/3155	Controlled Action	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Controlled action			
Old Broadwater Farm Estate Subdivision - Stage 3	2009/5231	Controlled Action	Post-Approval
Peel's Retreat Estate - Residential development	2006/3063	Controlled Action	Post-Approval
Peppermint Park Residential Subdivision - Stage 5	2008/4028	Controlled Action	Post-Approval
Point Grey Marina Project	2010/5515	Controlled Action	Post-Approval
Point Grey Residential Development - Terrestrial Component	2011/5825	Controlled Action	Post-Approval
Ravensthorpe Nickel Project	2001/172	Controlled Action	Post-Approval
Residential Development, Lot 3 & 4 Dorsett Street	2006/2774	Controlled Action	Completed
Residential development Lot 3, 500 Bussell Highway, WA	2013/7098	Controlled Action	Post-Approval
Residential development Lots 8 & 9 King Street	2006/2787	Controlled Action	Completed
retirement units & aged care facility development	2007/3533	Controlled Action	Post-Approval
Shark Hazard Mitigation Drum Line Program, WA	2014/7174	Controlled Action	Completed
Shenton Park Subdivision	2004/1479	Controlled Action	Completed
Smiths Beach Project, Yallingup - Coastal Tourism Village	2021/9141	Controlled Action	Referral Publication
Southern Bluefin Tuna Farm	2005/2165	Controlled Action	Completed
Subdivision Lot 1 Dawesville Rd	2005/2394	Controlled Action	Post-Approval
Three Turning Pockets West of Busselton Townsite	2002/846	Controlled Action	Post-Approval
Tourism Villa Facility Development	2008/4025	Controlled Action	Post-Approval
tourist and residential development	2007/3483	Controlled Action	Post-Approval
Upgrade of Ford Road	2005/2113	Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Controlled action			
Urban development, multiple lots	2019/8494	Controlled Action	Assessment
Northerly Street, Vasse, WA			Approach
Vasse Diversion Drain Upgrade	2017/7932	Controlled Action	Post-Approval
Warders Hotel, Block 1 Warders Cottages, Fremantle, WA	2018/8144	Controlled Action	Post-Approval
Not controlled action			
'Looping 10' gas transmission pipeline from Kwinana to Hopelands	2005/2212 Action	Not Controlled	Completed
25 Lot Residential Subdivision	2009/4830 Action	Not Controlled	Completed
Aerial application of mosquito larvicides to Vasse Wonnerup Wetlands, WA	2016/7780 Action	Not Controlled	Completed
APX-West Fibre-optic telecommunications cable system, WA to Singapore	2013/7102 Action	Not Controlled	Completed
Bushfire Mitigation Works - City of Mandurah	2020/8674 Action	Not Controlled	Completed
Busselton to Flinders Bay Rails to Trails Project, WA	2013/6835 Action	Not Controlled	Completed
Cape Naturaliste Road Shared Pathway, Dunsborough, WA	2018/8282 Action	Not Controlled	Completed
Causeway Bridge Duplication, Busselton, WA	2018/8309 Action	Not Controlled	Completed
Caves Road widening project between Dunsborough and Yallingup(20.3 -24.6 SLK), WA	2015/7475 Action	Not Controlled	Completed
Clear Lot 503, 54 Ocean Road Dawesville, WA	2014/7375 Action	Not Controlled	Completed
Construction and operation of an 8 turbine wind farm at Rous Head Harbour, Frema	2003/933 Action	Not Controlled	Completed
Construction of Secret Harbour High School	2004/1489 Action	Not Controlled	Completed
CTBT - Cape Leeuwin Hydroacoustic Station Proposal	2000/27 Action	Not Controlled	Completed
Disposal of residential properties, Fremantle, WA	2019/8593 Action	Not Controlled	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
Eastport canal estate development stage 5	2007/3737 Action	Not Controlled	Completed
Establishment of a National Lifestyle Village	2011/6081 Action	Not Controlled	Completed
Expansion of berthing facilities at Kwinana Bulk Terminal	2006/2509 Action	Not Controlled	Completed
Expansion of existing Ammonium Nitrate Production Facility	2005/1941 Action	Not Controlled	Completed
Expedition 369-Australian Cretaceous Climate and Tectonics, Australian EEZ waters	2017/7891 Action	Not Controlled	Completed
Florida Estate Residential Subdivision Development Stage 13	2011/6045 Action	Not Controlled	Completed
Florida North residential development, Lot 9008, Ocean Road, Dawesville, WA	2015/7462 Action	Not Controlled	Completed
Fremantle Ports Inner Harbour Capital Dredging Proposal	2005/2477 Action	Not Controlled	Completed
Gas-fired Power Station	2005/2213	Not Controlled Action	Completed
Geo-science Investigations	2005/2069	Not Controlled	Completed Action
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522 Action	Not Controlled	Completed
INDIGO Central Submarine Telecommunications Cable	2017/8127 Action	Not Controlled	Completed
Kennedy Bay urban development, Port Kennedy, WA	2014/7122 Action	Not Controlled	Completed
Kennedy Park Estate Residential Development	2003/1044 Action	Not Controlled	Completed
Kwinana Gas-Fired Power Station	2005/2101	Not Controlled	Completed Action
Limestone quarry expansion	2005/2268	Not Controlled	Completed Action
Limestone Quarry Expansion, Lots 3618 and 1794, Finn Road	2005/2332 Action	Not Controlled	Completed
Lot 101 Mandurah Road, Madora Bay, WA	2012/6466 Action	Not Controlled	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
Oman Australia Cable Installation, WA	2021/8922 Action	Not Controlled	Completed
Oman Australia Cable - Marine Route Survey	2020/8731 Action	Not Controlled	Completed
Palm Beach Caravan Park Redevelopment, Rockingham, WA	2013/6853 Action	Not Controlled	Completed
Redevelopment of Lots 3 & 4, Kent Street	2007/3243 Action	Not Controlled	Completed
Residential & Light Industrial Development, Vasse WA	2013/6932 Action	Not Controlled	Completed
Residential development, Lot 42, Farmhouse Court, Bovell, WA	2014/7195 Action	Not Controlled	Completed
Re-zoning of Land for Future Residential Development Purposes	2009/4908 Action	Not Controlled	Completed
Rottnest Lodge Redevelopment	2019/8565 Action	Not Controlled	Completed
Seismic Survey, Bremer Basin, Mentelle Basin and Zeewyck Sub-basin	2004/1700 Action	Not Controlled	Completed
Sepia Depression Ocean Outlet Landline Duplication	2012/6248 Action	Not Controlled	Completed
Vasse Hotel and Supermarket Redevelopment	2001/288 Action	Not Controlled	Completed
Warders' Cottages Block 2 'W2'	2022/9148 Action	Not Controlled	Completed
Warders' Cottages W2 minor works, Fremantle, WA	2018/8185 Action	Not Controlled	Completed
Wind Farm development	2005/2105	Not Controlled Action	Completed
Not controlled action (particular manner)			
2D seismic survey	2007/3273	Not Controlled Action (Particular Manner)	Post-Approval
2D seismic survey	2008/4493	Not Controlled Action (Particular Manner)	Post-Approval

3D Marine Seismic Survey Within WA-382-P	2007/3799	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Aerial Mosquito Spraying Vasse-Wonnerup System	2005/1952	Not Controlled Action (Particular Manner)	Post-Approval
Ambergate North Residential Development	2009/4802	Not Controlled Action (Particular Manner)	Post-Approval
Arcadia Petroleum - BR12 3D Marine Seismic Survey	2012/6476	Not Controlled Action (Particular Manner)	Post-Approval
Australian Underwater Discovery Centre	2021/9019	Not Controlled Action (Particular Manner)	Post-Approval
Australia to Singapore Fibre Optic Submarine Cable System	2011/6127	Not Controlled Action (Particular Manner)	Post-Approval
Bremer Basin 2D Marine Seismic Survey, WA	2009/5013	Not Controlled Action (Particular Manner)	Post-Approval
CETO 6 Garden Island Project, offshore WA	2016/7635	Not Controlled Action (Particular Manner)	Post-Approval
CETO 6 Geophysical and Geotechnical Surveys	2014/7408	Not Controlled Action (Particular Manner)	Post-Approval
City of Cockburn Sporting Facilties	2005/2139	Not Controlled Action (Particular Manner)	Post-Approval
Construction of urea production plant and supporting infrastructure	2009/5067	Not Controlled Action (Particular Manner)	Post-Approval
Coodanup residential development	2006/3073	Not Controlled Action (Particular Manner)	Post-Approval
Extension of existing mains water supply pipeline	2009/4686	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Manner)			
Grand Southern Margin 2D Marine Seismic Survey	2008/4599	Not Controlled Action (Particular Manner)	Post-Approval
INDIGO Marine Cable Route Survey (INDIGO)	2017/7996	Not Controlled Action (Particular Manner)	Post-Approval
Lake Richmond Boardwalk installation, Rockingham, WA	2013/6977	Not Controlled Action (Particular Manner)	Post-Approval
Laying a submarine optical fibre telecommunications cable, Perth to Singapore and Jakarta	2014/7332	Not Controlled Action (Particular Manner)	Post-Approval
Marine Environmental Survey	2012/6275	Not Controlled	Post-Approval
Action (Particular Manner)			
Monaghan's Roundabout Project - Intersection of Bussell Highway and Caves Road, Shire of Busselton	2007/3515	Not Controlled Action (Particular Manner)	Post-Approval
Multipurpose development stage 1 within 340ha	2004/1913	Not Controlled Action (Particular Manner)	Post-Approval
Novacare Lifestyle Village	2001/311	Not Controlled	Post-Approval
Action (Particular Manner)			
Road upgrades and walk trail development	2009/4958	Not Controlled Action (Particular Manner)	Post-Approval
South Busselton Primary School	2001/290	Not Controlled	Post-Approval
Action (Particular Manner)			
South West Metropolitan Railway Project	2003/1175	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Subdivision and development of residential dwelling on part Lot 1, Bussell Highw	2006/3023	Not Controlled Action (Particular Manner)	Post-Approval
Referral decision			
3D Marine Seismic survey	2007/3725	Referral Decision	Completed
3D Seismic Survey	2012/6245	Referral Decision	Completed
Ambergate North Residential Community (4896 lots)	2008/4617	Referral Decision	Completed
CO2 3D Seismic Survey Vlaming Sub-Basin	2012/6343	Referral Decision	Completed
Grand Southern Margin 2D Marine Seismic Survey	2008/4573	Referral Decision	Completed
Kennedy Bay Urban Development,PortKennedy,Rockingh	2013/7022	Referral Decision	Completed
Lots 1-5 Bluerise Cove & Lots 801 & 124 Pleasant Grove Rezoning and Subdivision	2008/4295	Referral Decision	Completed
Narelle 3D Marine Seismic Survey	2008/4575	Referral Decision	Completed
Residential Subdivision Lot 801 Pleasant Grove Circle, Falcon, WA	2012/6507	Referral Decision	Referral Publication
Riverbank and Country Road Estates Lot 43 Bussell Highway	2005/2367	Referral Decision	Completed
Sonar Trials and Acoustic Trials	2001/538	Referral Decision	Completed
Water quality improvement trial, Lower Vasse River, Busselton, WA	2013/6975	Referral Decision	Completed

Key Ecological Features [Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
Albany Canyons group and adjacent shelf break	South-west
Ancient coastline at 90-120m depth	South-west
Cape Mentelle upwelling	South-west

Name	Region
Commonwealth marine environment surrounding the Recherche Archipelago	South-west
Commonwealth marine environment within and adjacent	South-west to Geographe Bay
Commonwealth marine environment within and adjacent	South-west to the west coast inshore lagoons
Diamantina Fracture Zone	South-west
Naturaliste Plateau	South-west
Perth Canyon and adjacent shelf break, and other west coast canyons	South-west
Western demersal slope and associated fish communities	South-west
Western rock lobster	South-west

Biologically Important Areas [Resource Information]

Scientific Name	Behaviour	Presence
Seabirds		
Ardenna carneipes Flesh-footed Shearwater [82404]	Aggregation	Known to occur
Ardenna carneipes Flesh-footed Shearwater [82404]	Foraging (in high numbers)	Known to occur
Ardenna pacifica Wedge-tailed Shearwater [84292]	Foraging (in high numbers)	Known to occur
Ardenna tenuirostris Short-tailed Shearwater [82652]	Foraging (in high numbers)	Known to occur
Eudyptula minor Little Penguin [1085] (provisioning young)	Foraging	Known to occur
Hydroprogne caspia Caspian Tern [808] (provisioning young)	Foraging	Known to occur
Larus pacificus Pacific Gull [811]	Foraging (in high numbers)	Former Range

Scientific Name	Behaviour	Presence
Larus pacificus Pacific Gull [811]	Foraging (in high numbers)	Known to occur
Onychoprion anaethetus Bridled Tern [82845]	Foraging (in high numbers)	Known to occur
Onychoprion fuscata Sooty Tern [82847]	Foraging	Known to occur
Pelagodroma marina White-faced Storm petrel [1016]	Foraging (in high numbers)	Known to occur
Phalacrocorax fuscescens Black-faced Cormorant [59660]	Foraging	Known to occur
Pterodroma macroptera macroptera Great-winged Petrel (macroptera race) [1035]	Foraging (provisioning young)	Known to occur
Pterodroma mollis Soft-plumaged Petrel [1036]	Foraging (in high numbers)	Known to occur
Puffinus assimilis tunneyi Little Shearwater [59363]	Foraging (in high numbers)	Known to occur
Sterna dougallii Roseate Tern [817]	Foraging	Known to occur
Sternula nereis Fairy Tern [82949]	Foraging (in high numbers)	Known to occur
Thalassarche chlororhynchos bassi Indian Yellow-nosed Albatross [85249]	Foraging (in high numbers)	Known to occur
Seals Neophoca cinerea Australian Sea Lion [22]	Foraging (male)	Likely to occur

Scientific Name		Behaviour	Presence
[Neophoca cinerea](#)			
Australian Sea Lion [22]		Foraging (male and female)	Known to occur
[Neophoca cinerea](#)			
Australian Sea Lion [22]		Foraging (male and female)	Likely to occur
Sharks	[Carcharodon carcharias](#)		
White Shark [64470]		Foraging	Known to occur
Whales	[Balaenoptera musculus](#)		
Blue and Pygmy Blue Whale [36]		Foraging (abundant food source)	Known to occur
[Balaenoptera musculus](#)			
Blue and Pygmy Blue Whale [36]		Foraging (high density)	Known to occur
[Balaenoptera musculus](#)			
Blue and Pygmy Blue Whale [36]		Foraging (on migration)	Known to occur
[Balaenoptera musculus brevicauda](#)			
Pygmy Blue Whale [81317]		Distribution	Known to occur
[Balaenoptera musculus brevicauda](#)			
Pygmy Blue Whale [81317]		Foraging Area (annual high use area)	Known to occur
[Balaenoptera musculus brevicauda](#)			
Pygmy Blue Whale [81317]		Known Foraging Area	Known to occur
[Balaenoptera musculus brevicauda](#)			
Pygmy Blue Whale [81317]		Migration	Known to occur
[Megaptera novaeangliae](#)			
Humpback Whale [38]		Migration (north)	Known to occur
[Megaptera novaeangliae](#)			
Humpback Whale [38]		Migration (north and south)	Known to occur

Scientific Name	Behaviour	Presence
Megaptera novaeangliae Humpback Whale [38]	Migration (south)	Known to occur
Physeter macrocephalus Sperm Whale [59]	Foraging (abundant food source)	Known to occur

Caveat

PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

World and National Heritage properties;

Wetlands of International and National Importance;

Commonwealth and State/Territory reserves;

distribution of listed threatened, migratory and marine species;

listed threatened ecological communities; and

other information that may be useful as an indicator of potential habitat value.

DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

threatened species listed as extinct or considered vagrants;

some recently listed species and ecological communities;

some listed migratory and listed marine species, which are not listed as threatened species; and

migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded

seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements
This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:
-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact us page.

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EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 10-Jun-2024

Summary Details
Matters of NES
Other Matters Protected by the EPBC Act Extra Information
Caveat Acknowledgements

Figure 1: SWMR sub area 2 (labelled '3' and '4)

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	1
National Heritage Places:	3
Wetlands of International Importance (Ramsar	6
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	3
Listed Threatened Ecological Communities:	9
Listed Threatened Species:	141
Listed Migratory Species:	84

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	240
Commonwealth Heritage Places:	4
Listed Marine Species:	123
Whales and Other Cetaceans:	39
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	29
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	63
Regional Forest Agreements:	1
Nationally Important Wetlands:	5
EPBC Act Referrals:	131
Key Ecological Features (Marine):	11
Biologically Important Areas:	33
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

World Heritage Properties [Resource Information]

Name	State	Legal Status
Australian Convict Sites (Fremantle Prison)	WA	Declared property

National Heritage Places [Resource Information]

Name	State	Legal Status
Historic		
Fremantle Prison (former)	WA	Listed place
Indigenous		
Cheetup Rock Shelter	WA	Listed place
Natural		
Fitzgerald River National Park	WA	Listed place

Wetlands of International Importance (Ramsar Wetlands) [Resource Information]

Ramsar Site Name	Proximity
Becher point wetlands	Within Ramsar site
Forrestdale and thomsons lakes	Within 10km of Ramsar site
Lake gore	Within Ramsar site
Lake warden system	Within 10km of Ramsar site
Peel-yalgorup system	Within Ramsar site
Vasse-wonnerup system	Within Ramsar site

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside a Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area.

Feature Name
Commonwealth Marine Areas (EPBC Act) Commonwealth Marine Areas (EPBC Act) Commonwealth Marine Areas (EPBC Act)

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text
Aquatic Root Mat Community 3 in Caves of the Leeuwin Naturaliste Ridge	Endangered	Community known to occur within area
Banksia Woodlands of the Swan Coastal Plain ecological community	Endangered	Community likely to occur within area
Empodisma peatlands of southwestern Australia	Endangered	Community likely to occur within area
Honeymyrtle shrubland on limestone ridges of the Swan Coastal Plain Bioregion	Critically Endangered	Community likely to occur within area
Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia	Endangered	Community likely to occur within area
Sedgelands in Holocene dune swales of the southern Swan Coastal Plain	Endangered	Community known to occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area
Thrombolite (microbial) community of coastal freshwater lakes of the Swan Coastal Plain (Lake Richmond)	Endangered	Community known to occur within area
Tuart (Eucalyptus gomphocephala) Woodlands and Forests of the Swan Coastal Plain ecological community	Critically Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act. Number is the current name ID.

Scientific Name	Threatened Category	Presence Text
BIRD		
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area
Aphelocephala leucopsis Southern Whiteface [529]	Vulnerable	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Ardenna grisea Sooty Shearwater [82651]	Vulnerable	Species or species habitat may occur within area
Arenaria interpres Ruddy Turnstone [872]	Vulnerable	Roosting known to occur within area
Atrichornis clamosus Noisy Scrub-bird, Tjimiluk [654]	Endangered	Species or species habitat known to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Vulnerable	Roosting known to occur within area
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat known to occur within area
Cereopsis novaehollandiae grisea Cape Barren Goose (south-western), Recherche Cape Barren Goose [25978]	Vulnerable	Breeding known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area

Scientific Name	Threatened Category	Presence Text
Dasyornis longirostris Western Bristlebird [515]	Endangered	Species or species habitat known to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat likely to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit [86432]	Endangered	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Limosa limosa Black-tailed Godwit [845]	Endangered	Roosting known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area
Pezoporus flaviventris Western Ground Parrot, Kyloring [84650]	Critically Endangered	Species or species habitat may occur within area
Phaethon rubricauda westralis Red-tailed Tropicbird (Indian Ocean), Indian Ocean Red-tailed Tropicbird [91824]	Endangered	Species or species habitat known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Pluvialis squatarola Grey Plover [865]	Vulnerable	Roosting known to occur within area
Psophodes nigrogularis nigrogularis Western Heath Whipbird [64449]	Endangered	Species or species habitat known to occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

Scientific Name	Threatened Category	Presence Text
[Rostratula australis](#) Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area
[Sternula nereis nereis](#) Australian Fairy Tern [82950]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
[Thalassarche carteri](#) Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area
[Thalassarche cauta](#) Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
[Thalassarche chrysostoma](#) Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area
[Thalassarche impavida](#) Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
[Thalassarche melanophris](#) Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
[Thalassarche steadi](#) White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area
[Tringa nebularia](#) Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area
[Xenus cinereus](#) Terek Sandpiper [59300]	Vulnerable	Roosting known to occur within area
[Zanda baudinii listed as Calyptorhynchus baudinii](#) Baudin's Cockatoo, Baudin's Black-Cockatoo, Long-billed Black-cockatoo [87736]	Endangered	Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Zanda latirostris listed as Calyptorhynchus latirostris		
Carnaby's Black Cockatoo, Short-billed Black-cockatoo [87737]	Endangered	Breeding known to occur within area
CRUSTACEAN		
Engaewa pseudoreducta		
Margaret River Burrowing Crayfish [82674]	Critically Endangered	Species or species habitat may occur within area
Engaewa reducta		
Dunsborough Burrowing Crayfish [82675]	Critically Endangered	Species or species habitat may occur within area
FISH		
Galaxias truttaceus (Western Australian population)		
Western Trout Minnow [89857]	Endangered	Species or species habitat known to occur within area
Galaxiella nigrostriata		
Blackstriped Dwarf Galaxias, Black-stripe Minnow [88677]	Endangered	Species or species habitat known to occur within area
Hoplostethus atlanticus		
Orange Roughy, Deep-sea Perch, Red Roughy [68455]	Conservation Dependent	Species or species habitat likely to occur within area
Nannatherina balstoni		
Balston's Pygmy Perch [66698]	Vulnerable	Species or species habitat known to occur within area
Thunnus maccoyii		
Southern Bluefin Tuna [69402]	Conservation Dependent	Species or species habitat known to occur within area
INSECT		
Hesperocolletes douglasi		
Douglas' Broad-headed Bee, Rottnest Bee [66734]	Critically Endangered	Species or species habitat may occur within area
Trioza barrettae		
Banksia brownii plant louse [87805]	Endangered	Species or species habitat known to occur within area
MAMMAL		

Scientific Name	Threatened Category	Presence Text
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Foraging, feeding or related behaviour known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Bettongia penicillata ogilbyi Woylie [66844]	Endangered	Species or species habitat known to occur within area
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat known to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat may occur within area
Myrmecobius fasciatus Numbat [294]	Endangered	Species or species habitat may occur within area
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Endangered	Breeding known to occur within area
Parantechinus apicalis Dibbler [313]	Endangered	Species or species habitat known to occur within area
Petrogale lateralis hacketti Recherche Rock-wallaby [66849]	Vulnerable	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Petrogale lateralis lateralis Black-flanked Rock-wallaby, Mororong, Black-footed Rock Wallaby [66647]	Endangered	Translocated population known to occur within area
Phascogale calura Red-tailed Phascogale, Red-tailed Wambenger, Kenngoor [316]	Vulnerable	Species or species habitat may occur within area
Potorous gilbertii Gilbert's Potoroo, Ngilkat [66642]	Critically Endangered	Species or species habitat known to occur within area
Pseudocheirus occidentalis Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Critically Endangered	Breeding known to occur within area
Pseudomys shortridgei Heath Mouse, Dayang, Heath Rat [77]	Endangered	Species or species habitat likely to occur within area
Setonix brachyurus Quokka [229]	Vulnerable	Species or species habitat known to occur within area
OTHER		
Westralunio carteri Carter's Freshwater Mussel, Freshwater Mussel [86266]	Vulnerable	Species or species habitat known to occur within area
PLANT		
Adenanthos dobagii Fitzgerald Woollybush [21253]	Endangered	Species or species habitat likely to occur within area
Adenanthos ellipticus Oval-leaf Adenanthos [4570]	Vulnerable	Species or species habitat likely to occur within area
Andersonia gracilis Slender Andersonia [14470]	Endangered	Species or species habitat may occur within area
Andersonia pinaster Two Peoples Bay Andersonia [67444]	Vulnerable	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Anigozanthos bicolor subsp. minor Little Kangaroo Paw, Two-coloured Kangaroo Paw, Small Two-colour Kangaroo Paw [21241]	Endangered	Species or species habitat likely to occur within area
Banksia brownii Brown's Banksia, Feather-leaved Banksia [8277]	Critically Endangered	Species or species habitat known to occur within area
Banksia nivea subsp. uliginosa Swamp Honeypot [82766]	Endangered	Species or species habitat may occur within area
Banksia squarrosa subsp. argillacea Whicher Range Dryandra [82769]	Vulnerable	Species or species habitat likely to occur within area
Banksia verticillata Granite Banksia, Albany Banksia, River Banksia [8333]	Vulnerable	Species or species habitat known to occur within area
Boronia clavata Bremer Boronia [5538]	Endangered	Species or species habitat may occur within area
Brachyscias verecundus Ironstone Brachyscias [81321]	Critically Endangered	Species or species habitat may occur within area
Caladenia busselliana Bussell's Spider-orchid [24369]	Endangered	Species or species habitat likely to occur within area
Caladenia caesarea subsp. maritima Cape Spider-orchid [64856]	Endangered	Species or species habitat known to occur within area
Caladenia excelsa Giant Spider-orchid [56717]	Endangered	Species or species habitat likely to occur within area
Caladenia granitora [65292]	Endangered	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Caladenia harringtoniae Harrington's Spider-orchid, Pink Spider-orchid [56786]	Vulnerable	Species or species habitat may occur within area
Caladenia huegelii King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat known to occur within area
Caladenia lodgeana Lodge's Spider-orchid [68664]	Critically Endangered	Species or species habitat likely to occur within area
Caladenia procera Carbunup King Spider Orchid [68679]	Critically Endangered	Species or species habitat known to occur within area
Caladenia viridescens Dunsborough Spider-orchid [56776]	Endangered	Species or species habitat known to occur within area
Calectasia cyanea Blue Tinsel Lily [7669]	Critically Endangered	Species or species habitat likely to occur within area
Chamelaucium lullfitzii listed as Chamelaucium sp. Gingin (N.G.Marchant 6) Gingin Wax [92777]	Endangered (listed as Chamelaucium sp. Gingin	Species or species habitat likely to occur within area
Chamelaucium sp. S coastal plain (R.D.Royce 4872) Royce's Waxflower [87814]	Vulnerable	Species or species habitat likely to occur within area
Chordifex abortivus Manypeaks Rush [64868]	Endangered	Species or species habitat likely to occur within area
Commersonia apella Many-flowered Commersonia [86877]	Critically Endangered	Species or species habitat known to occur within area
Coopernookia georgei Mauve Coopernookia [21218]	Endangered	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Daviesia obovata Paddle-leaf Daviesia [17311]	Endangered	Species or species habitat likely to occur within area
Diuris drummondii Tall Donkey Orchid [4365]	Vulnerable	Species or species habitat likely to occur within area
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat known to occur within area
Diuris purdiei Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat may occur within area
Drakaea elastica Glossy-leafed Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753]	Endangered	Species or species habitat likely to occur within area
Drakaea micrantha Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat likely to occur within area
Eucalyptus argutifolia Yanchep Mallee, Wabling Hill Mallee [24263]	Vulnerable	Species or species habitat may occur within area
Eucalyptus insularis Twin Peak Island Mallee [3057]	Endangered	Species or species habitat likely to occur within area
Eucalyptus x phylacis Meelup Mallee [87817]	Endangered	Species or species habitat known to occur within area
Gastrolobium papilio Butterfly-leaved Gastrolobium [78415]	Endangered	Species or species habitat may occur within area
Grevillea elongata Ironstone Grevillea [64578]	Vulnerable	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Grevillea infundibularis Fan-leaf Grevillea [5772]	Endangered	Species or species habitat likely to occur within area
Isopogon uncinatus Albany Cone Bush, Hook-leaf Isopogon [20871]	Endangered	Species or species habitat likely to occur within area
Kennedia glabrata Northcliffe Kennedia [16452]	Vulnerable	Species or species habitat known to occur within area
Lambertia echinata subsp. echinata Prickly Honeysuckle [56729]	Endangered	Species or species habitat known to occur within area
Lambertia echinata subsp. occidentalis Western Prickly Honeysuckle [64528]	Endangered	Species or species habitat may occur within area
Morelotia australiensis listed as Tetraria australiensis Southern Tetraria [92784]	Vulnerable	Species or species habitat may occur within area
Petrophile latericola Laterite Petrophile [64532]	Endangered	Species or species habitat may occur within area
Phaius australis Lesser Swamp-orchid [5872]	Endangered	Species or species habitat may occur within area
Reedia spathacea Reedia [2995]	Critically Endangered	Species or species habitat may occur within area
Ricinocarpos trichophorus Barrens Wedding Bush [19931]	Endangered	Species or species habitat may occur within area
Sphenotoma drummondii Mountain Paper-heath [21160]	Endangered	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Stylidium galioides		
Yellow Mountain Triggerplant [4666]	Vulnerable	Species or species habitat may occur within area
Synaphea sp. Fairbridge Farm (D.Papenfus 696)		
Selena's Synaphea [82881]	Critically Endangered	Species or species habitat may occur within area
Verticordia crebra		
[55678]	Vulnerable	Species or species habitat likely to occur within area
Verticordia densiflora var. pedunculata		
Long-stalked Featherflower [55689]	Endangered	Species or species habitat may occur within area
Verticordia plumosa var. ananeotes		
Tufted Plumed Featherflower [23871]	Endangered	Species or species habitat may occur within area
Verticordia plumosa var. vassensis		
Vasse Featherflower [55804]	Endangered	Species or species habitat may occur within area
Wurmbea calcicola		
Naturaliste Nancy [64691]	Endangered	Species or species habitat known to occur within area

REPTILE

Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area

Scientific Name	Threatened Category	Presence Text
[Natator depressus](#) Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

SHARK

[Carcharias taurus (west coast population)](#) Grey Nurse Shark (west coast population) [68752]	Vulnerable	Congregation or aggregation known to occur within area
[Carcharodon carcharias](#) White Shark, Great White Shark [64470]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
[Centrophorus uyato](#) Little Gulper Shark [68446]	Conservation Dependent	Species or species habitat likely to occur within area
[Galeorhinus galeus](#) School Shark, Eastern School Shark, Snapper Shark, Tope, Soupfin Shark [68453]	Conservation Dependent	Species or species habitat may occur within area
[Pristis pristis](#) Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area
[Rhincodon typus](#) Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
[Sphyrna lewini](#) Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat known to occur within area

Listed Migratory Species [Resource Information]

Scientific Name	Threatened Category	Presence Text
Migratory Marine Birds		
[Anous stolidus](#) Common Noddy [825]		Species or species habitat likely to occur within area
[Apus pacificus](#) Fork-tailed Swift [678]		Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Breeding known to occur within area
Ardenna grisea Sooty Shearwater [82651]	Vulnerable	Species or species habitat may occur within area
Ardenna pacifica Wedge-tailed Shearwater [84292]		Breeding known to occur within area
Ardenna tenuirostris Short-tailed Shearwater [82652]		Breeding known to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat likely to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area
Hydroprogne caspia Caspian Tern [808]		Breeding known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Onychoprion anaethetus
Bridled Tern [82845] Breeding known to occur within area

Phaethon rubricauda
Red-tailed Tropicbird [994] Breeding known to occur within area

Phoebetria fusca
Sooty Albatross [1075] Vulnerable Species or species habitat likely to occur within area

Sterna dougallii
Roseate Tern [817] Breeding known to occur within area

Sternula albifrons
Little Tern [82849] Species or species habitat may occur within area

Thalassarche carteri
Indian Yellow-nosed Albatross [64464] Vulnerable Species or species habitat likely to occur within area

Thalassarche cauta
Shy Albatross [89224] Endangered Foraging, feeding or related behaviour likely to occur within area

Thalassarche chrysostoma
Grey-headed Albatross [66491] Endangered Species or species habitat may occur within area

Thalassarche impavida
Campbell Albatross, Campbell Black-browed Albatross [64459] Vulnerable Species or species habitat may occur within area

Thalassarche melanophris
Black-browed Albatross [66472] Vulnerable Foraging, feeding or related behaviour likely to occur within area

Scientific Name	Threatened Category	Presence Text
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area
Migratory Marine Species Balaenoptera bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Foraging, feeding or related behaviour known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour likely to occur within area
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat likely to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area

Scientific Name	Threatened Category	Presence Text
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered within area	Foraging, feeding or related behaviour known to occur
Eubalaena australis as Balaena glacialis australis Southern Right Whale [40]	Endangered	Breeding known to occur within area
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]	Species or species habitat likely to occur within area	
Lagenorhynchus obscurus Dusky Dolphin [43]	Species or species habitat likely to occur within area	
Lamna nasus Porbeagle, Mackerel Shark [83288]	Species or species habitat likely to occur within area	
Megaptera novaeangliae Humpback Whale [38]	Foraging, feeding or related behaviour known to occur within area	
Mobula alfredi as Manta alfredi Reef Manta Ray, Coastal Manta Ray [90033]	Species or species habitat known to occur within area	
Mobula birostris as Manta birostris Giant Manta Ray [90034]	Species or species habitat known to occur within area	
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Orcinus orca Killer Whale, Orca [46]	Species or species habitat may occur within area	

Scientific Name	Threatened Category	Presence Text
[Physeter macrocephalus](#) Sperm Whale [59]		Foraging, feeding or related behaviour known to occur within area
[Pristis pristis](#) Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area
[Rhincodon typus](#) Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Migratory Terrestrial Species [Motacilla cinerea](#) Grey Wagtail [642]	Species or species habitat known to occur within area	
Migratory Wetlands Species [Actitis hypoleucos](#) Common Sandpiper [59309]		Species or species habitat known to occur within area
[Arenaria interpres](#) Ruddy Turnstone [872]	Vulnerable	Roosting known to occur within area
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]	Vulnerable	Roosting known to occur within area
[Calidris alba](#) Sanderling [875]		Roosting known to occur within area
[Calidris canutus](#) Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Calidris pugnax as Philomachus pugnax Ruff [91256]		Roosting known to occur within area

Calidris ruficollis
Red-necked Stint [860] Roosting known to occur within area

Calidris subminuta
Long-toed Stint [861] Roosting known to occur within area

Calidris tenuirostris
Great Knot [862] Vulnerable Roosting known to occur within area

Charadrius bicinctus
Double-banded Plover [895] Roosting known to occur within area

Charadrius leschenaultii
Greater Sand Plover, Large Sand Plover [877] Vulnerable Species or species habitat known to occur within area

Charadrius mongolus
Lesser Sand Plover, Mongolian Plover [879] Endangered Roosting known to occur within area

Gallinago megala
Swinhoe's Snipe [864] Roosting likely to occur within area

Gallinago stenura
Pin-tailed Snipe [841] Roosting likely to occur within area

Glareola maldivarum
Oriental Pratincole [840] Species or species habitat known to occur within area

Limicola falcinellus
Broad-billed Sandpiper [842] Roosting known to occur within area

Limosa lapponica
Bar-tailed Godwit [844] Species or species habitat known to occur within area

Limosa limosa
Black-tailed Godwit [845] Endangered Roosting known to occur within area

Scientific Name	Threatened Category	Presence Text
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area

Numenius minutus
Little Curlew, Little Whimbrel [848] Roosting likely to occur within area

Numenius phaeopus
Whimbrel [849]Roosting known to occur within area

Pandion haliaetus
Osprey [952] Breeding known to occur within area

Phalaropus lobatus
Red-necked Phalarope [838] Roosting known to occur within area

Pluvialis fulva
Pacific Golden Plover [25545] Roosting known to occur within area

Pluvialis squatarola
Grey Plover [865] Vulnerable Roosting known to occur within area

Thalasseus bergii
Greater Crested Tern [83000] Breeding known to occur within area

Tringa brevipes
Grey-tailed Tattler [851] Roosting known to occur within area

Tringa glareola
Wood Sandpiper [829] Roosting known to occur within area

Tringa nebularia
Common Greenshank, Greenshank Endangered Species or species habitat known to occur within area [832]

Tringa stagnatilis
Marsh Sandpiper, Little Greenshank Roosting known to occur within area [833]

Tringa totanus
Common Redshank, Redshank [835] Roosting known to occur within area

Scientific Name	Threatened Category	Presence Text
Xenus cinereus		
Terek Sandpiper [59300]	Vulnerable	Roosting known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State
Defence	

Defence - ARTILLERY BARRACKS - FREMANTLE [50155] WA Defence - CAMPBELL BARRACKS - SWANBOURNE [50183] WA Defence - CAMPBELL BARRACKS - SWANBOURNE [50185] WA Defence - CAMPBELL BARRACKS - SWANBOURNE [50184] WA Defence - CAMPBELL BARRACKS - SWANBOURNE [50186] WA Defence - CAMPBELL BARRACKS - SWANBOURNE [50181] WA Defence - CAMPBELL BARRACKS - SWANBOURNE [50187] WA Defence - CAMPBELL BARRACKS - SWANBOURNE [50182] WA

Defence - HMAS STIRLING-ROCKINGHAM ;HMAS STIRLING - GARDEN WA ISLAND [50117]

Defence - HMAS STIRLING-ROCKINGHAM ;HMAS STIRLING - GARDEN WA ISLAND [50134]

Defence - HMAS STIRLING-ROCKINGHAM ;HMAS STIRLING - GARDEN WA ISLAND [50133]

Defence - HMAS STIRLING-ROCKINGHAM ;HMAS STIRLING - GARDEN WA ISLAND [50131]

Defence - HMAS STIRLING-ROCKINGHAM ;HMAS STIRLING - GARDEN WA ISLAND [50132]

Defence - ROCKINGHAM - NAVY CPSO [50135] WA

Defence - SWANBOURNE RIFLE RANGE [50188]WA

Commonwealth Land Name	State
Defence - SWANBOURNE RIFLE RANGE [50191]	WA
Unknown Commonwealth Land - [50495]	WA
Commonwealth Land - [50505]	WA
Commonwealth Land - [50424]	WA
Commonwealth Land - [50493]	WA
Commonwealth Land - [50507]	WA
Commonwealth Land - [50506]	WA
Commonwealth Land - [50487]	WA
Commonwealth Land - [50483]	WA
Commonwealth Land - [50425]	WA
Commonwealth Land - [50473]	WA
Commonwealth Land - [50564]	WA
Commonwealth Land - [50566]	WA
Commonwealth Land - [50567]	WA
Commonwealth Land - [50467]	WA
Commonwealth Land - [50551]	WA
Commonwealth Land - [50558]	WA
Commonwealth Land - [50431]	WA
Commonwealth Land - [50550]	WA
Commonwealth Land - [50633]	WA
Commonwealth Land - [50437]	WA
Commonwealth Land - [50422]	WA
Commonwealth Land - [50518]	WA
Commonwealth Land - [51105]	WA
Commonwealth Land - [50605]	WA
Commonwealth Land - [51437]	WA

Commonwealth Land Name	State
Commonwealth Land - [50579]	WA
Commonwealth Land - [50631]	WA
Commonwealth Land - [50638]	WA
Commonwealth Land - [50517]	WA
Commonwealth Land - [50470]	WA
Commonwealth Land - [50478]	WA
Commonwealth Land - [50510]	WA
Commonwealth Land - [50511]	WA
Commonwealth Land - [50412]	WA
Commonwealth Land - [50501]	WA
Commonwealth Land - [50498]	WA
Commonwealth Land - [50416]	WA
Commonwealth Land - [50504]	WA
Commonwealth Land - [50419]	WA
Commonwealth Land - [50418]	WA
Commonwealth Land - [50503]	WA
Commonwealth Land - [50496]	WA
Commonwealth Land - [50628]	WA
Commonwealth Land - [50629]	WA
Commonwealth Land - [50573]	WA
Commonwealth Land - [50446]	WA
Commonwealth Land - [50485]	WA
Commonwealth Land - [50608]	WA
Commonwealth Land - [50600]	WA
Commonwealth Land - [51889]	WA
Commonwealth Land - [50500]	WA
Commonwealth Land - [50486]	WA

Commonwealth Land Name	State
Commonwealth Land - [50475]	WA
Commonwealth Land - [50456]	WA
Commonwealth Land - [50457]	WA
Commonwealth Land - [52281]	WA
Commonwealth Land - [50455]	WA
Commonwealth Land - [50529]	WA
Commonwealth Land - [50471]	WA
Commonwealth Land - [50525]	WA
Commonwealth Land - [50522]	WA
Commonwealth Land - [50570]	WA
Commonwealth Land - [50527]	WA
Commonwealth Land - [51890]	WA
Commonwealth Land - [50571]	WA
Commonwealth Land - [50492]	WA
Commonwealth Land - [50452]	WA
Commonwealth Land - [50624]	WA
Commonwealth Land - [50621]	WA
Commonwealth Land - [50620]	WA
Commonwealth Land - [50623]	WA
Commonwealth Land - [50622]	WA
Commonwealth Land - [50450]	WA
Commonwealth Land - [50451]	WA
Commonwealth Land - [50454]	WA
Commonwealth Land - [50458]	WA
Commonwealth Land - [50639]	WA
Commonwealth Land - [50632]	WA
Commonwealth Land - [50463]	WA

Commonwealth Land Name	State
Commonwealth Land - [50589]	WA
Commonwealth Land - [51480]	WA
Commonwealth Land - [50634]	WA
Commonwealth Land - [50635]	WA
Commonwealth Land - [50466]	WA
Commonwealth Land - [50464]	WA
Commonwealth Land - [51487]	WA
Commonwealth Land - [50557]	WA
Commonwealth Land - [50569]	WA
Commonwealth Land - [50401]	WA
Commonwealth Land - [50539]	WA
Commonwealth Land - [50538]	WA
Commonwealth Land - [50531]	WA
Commonwealth Land - [50530]	WA
Commonwealth Land - [50533]	WA
Commonwealth Land - [50415]	WA
Commonwealth Land - [52119]	WA
Commonwealth Land - [50438]	WA
Commonwealth Land - [50613]	WA
Commonwealth Land - [50389]	WA
Commonwealth Land - [50442]	WA
Commonwealth Land - [50443]	WA
Commonwealth Land - [50441]	WA
Commonwealth Land - [50447]	WA
Commonwealth Land - [52200]	WA
Commonwealth Land - [50484]	WA
Commonwealth Land - [50523]	WA

Commonwealth Land Name	State
Commonwealth Land - [50387]	WA
Commonwealth Land - [51987]	WA
Commonwealth Land - [50388]	WA
Commonwealth Land - [50434]	WA
Commonwealth Land - [50449]	WA
Commonwealth Land - [50536]	WA
Commonwealth Land - [50433]	WA
Commonwealth Land - [50432]	WA
Commonwealth Land - [50580]	WA
Commonwealth Land - [50581]	WA
Commonwealth Land - [50617]	WA
Commonwealth Land - [50526]	WA
Commonwealth Land - [50465]	WA
Commonwealth Land - [51411]	WA
Commonwealth Land - [51117]	WA
Commonwealth Land - [50524]	WA
Commonwealth Land - [52242]	WA
Commonwealth Land - [51895]	WA
Commonwealth Land - [50565]	WA
Commonwealth Land - [50404]	WA
Commonwealth Land - [50619]	WA
Commonwealth Land - [50618]	WA
Commonwealth Land - [50611]	WA
Commonwealth Land - [50610]	WA
Commonwealth Land - [50614]	WA
Commonwealth Land - [50612]	WA
Commonwealth Land - [50616]	WA

Commonwealth Land Name	State
Commonwealth Land - [50615]	WA
Commonwealth Land - [50453]	WA
Commonwealth Land - [50568]	WA
Commonwealth Land - [51891]	WA
Commonwealth Land - [51894]	WA
Commonwealth Land - [51892]	WA
Commonwealth Land - [51893]	WA
Commonwealth Land - [50535]	WA
Commonwealth Land - [50532]	WA
Commonwealth Land - [50537]	WA
Commonwealth Land - [50534]	WA
Commonwealth Land - [50509]	WA
Commonwealth Land - [52279]	WA
Commonwealth Land - [50627]	WA
Commonwealth Land - [50497]	WA
Commonwealth Land - [50637]	WA
Commonwealth Land - [50459]	WA
Commonwealth Land - [50476]	WA
Commonwealth Land - [50474]	WA
Commonwealth Land - [50578]	WA
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Commonwealth Land - [50577]	WA
Commonwealth Land - [50572]	WA
Commonwealth Land - [50479]	WA
Commonwealth Land - [50591]	WA
Commonwealth Land - [50590]	WA
Commonwealth Land - [50604]	WA

Commonwealth Land Name	State
Commonwealth Land - [50599]	WA
Commonwealth Land - [50603]	WA
Commonwealth Land - [50601]	WA
Commonwealth Land - [50472]	WA
Commonwealth Land - [50491]	WA
Commonwealth Land - [50597]	WA
Commonwealth Land - [50595]	WA
Commonwealth Land - [50512]	WA
Commonwealth Land - [50462]	WA
Commonwealth Land - [50516]	WA
Commonwealth Land - [50520]	WA
Commonwealth Land - [50481]	WA
Commonwealth Land - [50480]	WA
Commonwealth Land - [50488]	WA
Commonwealth Land - [50482]	WA
Commonwealth Land - [50423]	WA
Commonwealth Land - [50390]	WA
Commonwealth Land - [50427]	WA
Commonwealth Land - [50521]	WA
Commonwealth Land - [50444]	WA
Commonwealth Land - [50428]	WA
Commonwealth Land - [50641]	WA
Commonwealth Land - [50640]	WA
Commonwealth Land - [52199]	WA
Commonwealth Land - [50421]	WA
Commonwealth Land - [50609]	WA
Commonwealth Land - [50420]	WA

Commonwealth Land Name	State
Commonwealth Land - [50499]	WA
Commonwealth Land - [50514]	WA
Commonwealth Land - [50490]	WA
Commonwealth Land - [50548]	WA
Commonwealth Land - [50549]	WA
Commonwealth Land - [50544]	WA
Commonwealth Land - [50545]	WA
Commonwealth Land - [50546]	WA
Commonwealth Land - [51974]	WA
Commonwealth Land - [50528]	WA
Commonwealth Land - [51116]	WA
Commonwealth Land - [51115]	WA
Commonwealth Land - [50468]	WA
Commonwealth Land - [51436]	WA
Commonwealth Land - [50602]	WA
Commonwealth Land - [51113]	WA
Commonwealth Land - [50552]	WA
Commonwealth Land - [51119]	WA
Commonwealth Land - [50543]	WA
Commonwealth Land - [50542]	WA
Commonwealth Land - [50417]	WA
Commonwealth Land - [50596]	WA
Commonwealth Land - [50555]	WA
Commonwealth Land - [50556]	WA
Commonwealth Land - [50554]	WA
Commonwealth Land - [50547]	WA
Commonwealth Land - [50540]	WA

Commonwealth Land Name	State
Commonwealth Land - [50541]	WA
Commonwealth Land - [50469]	WA
Commonwealth Land - [51488]	WA
Commonwealth Land - [50636]	WA
Commonwealth Land - [50445]	WA
Commonwealth Land - [50460]	WA
Commonwealth Land - [50513]	WA
Commonwealth Land - [50515]	WA
Commonwealth Land - [50519]	WA
Commonwealth Land - [50461]	WA

Commonwealth Heritage Places [Resource Information]

Name	State	Status
Historic		
Artillery Barracks	WA	Listed place
Cliff Point Historic Site	WA	Listed place
J Gun Battery	WA	Listed place
Natural		
Garden Island	WA	Listed place

Listed Marine Species [Resource Information]

Scientific Name	Threatened Category	Presence Text
Bird		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous stolidus		
Common Noddy [825]		Species or species habitat likely to occur within area
Anous tenuirostris melanops		
Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area
Ardenna carneipes as Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Breeding known to occur within area
Ardenna grisea as Puffinus griseus Sooty Shearwater [82651]	Vulnerable	Species or species habitat may occur within area
Ardenna pacifica as Puffinus pacificus Wedge-tailed Shearwater [84292]		Breeding known to occur within area
Ardenna tenuirostris as Puffinus tenuirostris Short-tailed Shearwater [82652]		Breeding known to occur within area
Arenaria interpres Ruddy Turnstone [872]	Vulnerable	Roosting known to occur within area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Roosting known to occur within area
Calidris alba Sanderling [875]		Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area overfly marine area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area overfly marine area
Calidris pugnax as Philomachus pugnax Ruff [91256]		Roosting known to occur within area overfly marine area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area overfly marine area
Calidris subminuta Long-toed Stint [861]		Roosting known to occur within area overfly marine area
Calidris tenuirostris Great Knot [862]	Vulnerable	Roosting known to occur within area overfly marine area
Cereopsis novaehollandiae grisea Cape Barren Goose (south-western), Recherche Cape Barren Goose [25978]	Vulnerable	Breeding known to occur within area overfly marine area
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat likely to occur within area overfly marine area
Charadrius bicinctus Double-banded Plover [895]		Roosting known to occur within area overfly marine area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Roosting known to occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Chroicocephalus novaehollandiae as Larus novaehollandiae Silver Gull [82326]	Breeding known to occur within area	
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat likely to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area
Eudyptula minor Little Penguin [1085]		Breeding known to occur within area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area overfly marine area
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area overfly marine area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat known to occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text

Haliaeetus leucogaster
White-bellied Sea-Eagle [943] Species or species habitat known to occur within area

Halobaena caerulea
Blue Petrel [1059] Vulnerable Species or species habitat may occur within area

Himantopus himantopus
Pied Stilt, Black-winged Stilt [870] Roosting known to occur within area overfly marine area

Hydroprogne caspia as Sterna caspia
Caspian Tern [808] Breeding known to occur within area

Larus dominicanus
Kelp Gull [809] Breeding known to occur within area

Larus pacificus
Pacific Gull [811] Breeding known to occur within area

Limicola falcinellus
Broad-billed Sandpiper [842] Roosting known to occur within area overfly marine area

Limosa lapponica
Bar-tailed Godwit [844] Species or species habitat known to occur within area

Limosa limosa
Black-tailed Godwit [845] Endangered Roosting known to occur within area overfly marine area

Macronectes giganteus
Southern Giant-Petrel, Southern Giant Petrel [1060] Endangered Species or species habitat may occur within area

Macronectes halli
Northern Giant Petrel [1061] Vulnerable Foraging, feeding or related behaviour likely to occur within area

Scientific Name	Threatened Category	Presence Text
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat known to occur within area overfly marine area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area overfly marine area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area
Onychoprion anaethetus as Sterna anaethetus Bridled Tern [82845]		Breeding known to occur within area
Onychoprion fuscatus as Sterna fuscata Sooty Tern [90682]		Breeding known to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Pelagodroma marina White-faced Storm-Petrel [1016]		Breeding known to occur within area
Phaethon rubricauda Red-tailed Tropicbird [994]		Breeding known to occur within area
Phalacrocorax fuscescens Black-faced Cormorant [59660]		Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Phalaropus lobatus Red-necked Phalarope [838]		Roosting known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola Grey Plover [865]	Vulnerable	Roosting known to occur within area overfly marine area
Pterodroma macroptera Great-winged Petrel [1035]		Breeding known to occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Puffinus assimilis Little Shearwater [59363]		Breeding known to occur within area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Roosting known to occur within area overfly marine area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area overfly marine area
Stercorarius antarcticus as Catharacta skua Brown Skua [85039]		Species or species habitat may occur within area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area
Sternula albifrons as Sterna albifrons Little Tern [82849]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Sternula nereis as Sterna nereis Fairy Tern [82949]		Breeding known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area
Thalasseus bergii as Sterna bergii Greater Crested Tern [83000]		Breeding known to occur within area
Thinornis cucullatus as Thinornis rubricollis Hooded Plover, Hooded Dotterel [87735]		Species or species habitat known to occur within area overfly marine area
Tringa brevipes as Heteroscelus brevipes Grey-tailed Tattler [851]		Roosting known to occur within area
Tringa glareola Wood Sandpiper [829]		Roosting known to occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
[Tringa nebularia](#) Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area overfly marine area
[Tringa stagnatilis](#) Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area overfly marine area
[Tringa totanus](#) Common Redshank, Redshank [835]		Roosting known to occur within area overfly marine area
[Xenus cinereus](#) Terek Sandpiper [59300]	Vulnerable	Roosting known to occur within area overfly marine area
Fish [Acentronura australe](#) Southern Pygmy Pipehorse [66185]		Species or species habitat may occur within area
[Campichthys galei](#) Gale's Pipefish [66191]		Species or species habitat may occur within area
[Choeroichthys suillus](#) Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
[Halicampus brocki](#) Brock's Pipefish [66219]		Species or species habitat may occur within area
[Heraldia nocturna](#) Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
[Hippocampus angustus](#) Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area
[Hippocampus breviceps](#) Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Hippocampus subelongatus West Australian Seahorse [66722]	Species or species habitat may occur within area	
Histiogamphelus cristatus Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area
Leptoichthys fistularius Brushtail Pipefish [66248]	Species or species habitat may occur within area	
Lissocampus caudalis Australian Smooth Pipefish, Smooth Pipefish [66249]		Species or species habitat may occur within area
Lissocampus fatiloquus Prophet's Pipefish [66250]	Species or species habitat may occur within area	
Lissocampus runa Javelin Pipefish [66251]	Species or species habitat may occur within area	
Maroubra perserrata Sawtooth Pipefish [66252]	Species or species habitat may occur within area	
Mitotichthys meraculus Western Crested Pipefish [66259]	Species or species habitat may occur within area	
Nannocampus subosseus Bonyhead Pipefish, Bony-headed Pipefish [66264]		Species or species habitat may occur within area
Notiocampus ruber Red Pipefish [66265]	Species or species habitat may occur within area	
Phycodurus eques Leafy Seadragon [66267]	Species or species habitat may occur within area	

Scientific Name	Threatened Category	Presence Text
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
Pugnaso curtirostris Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Vanacampus phillipi Port Phillip Pipefish [66284]		Species or species habitat may occur within area
Vanacampus poecilolaemus Longsnout Pipefish, Australian Long- snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area
Mammal Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Endangered	Breeding known to occur within area
Reptile Aipysurus pooleorum Shark Bay Sea Snake [66061]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Hydrophis kingii as Disteira kingii Spectacled Sea Snake [93511]		Species or species habitat may occur within area
Hydrophis platura as Pelamis platurus Yellow-bellied Sea Snake [93746]		Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

Whales and Other Cetaceans		[Resource Information]
Current Scientific Name	Status	Type of Presence
Mammal Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur

Current Scientific Name	Status	Type of Presence
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Foraging, feeding or related behaviour known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Berardius arnuxii Arnoux's Beaked Whale [70]		Species or species habitat may occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour likely to occur within area
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area
Feresa attenuata Pygmy Killer Whale [61]		Species or species habitat may occur within area
Globicephala macrorhynchus Short-finned Pilot Whale [62]		Species or species habitat may occur within area
Globicephala melas Long-finned Pilot Whale [59282]		Species or species habitat may occur

Current Scientific Name	Status	Type of Presence
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area

Hyperoodon planifrons
Southern Bottlenose Whale [71] Species or species habitat may occur within area

Kogia breviceps
Pygmy Sperm Whale [57] Species or species habitat may occur within area

Kogia sima
Dwarf Sperm Whale [85043] Species or species habitat may occur within area

Lagenorhynchus obscurus
Dusky Dolphin [43] Species or species habitat likely to occur within area

Lissodelphis peronii
Southern Right Whale Dolphin [44] Species or species habitat may occur within area

Megaptera novaeangliae
Humpback Whale [38] Foraging, feeding or related behaviour known to occur within area

Mesoplodon bowdoini
Andrew's Beaked Whale [73] Species or species habitat may occur within area

Mesoplodon densirostris Blainville's Beaked Whale, Dense- beaked Whale [74]		Species or species habitat may occur within area
Mesoplodon ginkgodens Gingko-toothed Beaked Whale, Gingko-toothed Whale, Gingko Beaked Whale [59564]		Species or species habitat may occur within area
Mesoplodon grayi Gray's Beaked Whale, Scamperdown Whale [75]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
Mesoplodon hectori Hector's Beaked Whale [76]		Species or species habitat may occur within area
Mesoplodon layardii Strap-toothed Beaked Whale, Strap-toothed Whale, Layard's Beaked Whale [25556]		Species or species habitat may occur within area
Mesoplodon mirus True's Beaked Whale [54]		Species or species habitat may occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Peponocephala electra Melon-headed Whale [47]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Foraging, feeding or related behaviour known to occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area
Stenella longirostris Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area
Steno bredanensis Rough-toothed Dolphin [30]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
Tasmacetus shepherdi Shepherd's Beaked Whale, Tasman Beaked Whale [55]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]	Species or species habitat may occur within area	
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Australian Marine Parks

[Resource Information]

Park Name	Zone & IUCN Categories
Geographe	Habitat Protection Zone (IUCN IV)
Perth Canyon	Habitat Protection Zone (IUCN IV)
Perth Canyon	Habitat Protection Zone (IUCN IV)
South-west Corner	Habitat Protection Zone (IUCN IV)
Geographe	Multiple Use Zone (IUCN VI)
Perth Canyon	Multiple Use Zone (IUCN VI)
Perth Canyon	Multiple Use Zone (IUCN VI)
South-west Corner	Multiple Use Zone (IUCN VI)
South-west Corner	Multiple Use Zone (IUCN VI)
South-west Corner	Multiple Use Zone (IUCN VI)
South-west Corner	Multiple Use Zone (IUCN VI)
Bremer	National Park Zone (IUCN II)
Geographe	National Park Zone (IUCN II)

Park Name	Zone & IUCN Categories
Perth Canyon	National Park Zone (IUCN II)

Perth Canyon National Park Zone (IUCN II)

South-west Corner National Park Zone (IUCN II)

South-west Corner National Park Zone (IUCN II)

South-west Corner National Park Zone (IUCN II)

South-west Corner National Park Zone (IUCN II)

South-west Corner National Park Zone (IUCN II)

South-west Corner National Park Zone (IUCN II)

South-west Corner National Park Zone (IUCN II)

South-west Corner National Park Zone (IUCN II)

South-west Corner Special Purpose Zone (IUCN VI)

South-west Corner Special Purpose Zone (IUCN VI)

Bremer Special Purpose Zone (Mining Exclusion) (IUCN VI)

Bremer Special Purpose Zone (Mining Exclusion) (IUCN VI)

Geographe Special Purpose Zone (Mining Exclusion) (IUCN VI)

South-west Corner Special Purpose Zone (Mining Exclusion) (IUCN VI)

South-west Corner Special Purpose Zone (Mining Exclusion) (IUCN VI)

Extra Information

State and Territory Reserves		[Resource Information]
Protected Area Name	Reserve Type	State
Arpenteur	Nature Reserve	WA
Bald Island	Nature Reserve	WA
Bold Park	Botanic Gardens	WA
Broadwater	Nature Reserve	WA
Cape Le Grand	National Park	WA

Protected Area Name	Reserve Type	State
Carnac Island	Nature Reserve	WA
Cottesloe Reef	Fish Habitat Protection Area	WA
D'Entrecasteaux	National Park	WA
Doubtful Islands	Nature Reserve	WA
Eclipse Island	Nature Reserve	WA
Fitzgerald River	National Park	WA
Flinders Bay	Nature Reserve	WA
Hamelin Island	Nature Reserve	WA
Investigator Island	Nature Reserve	WA
Jerdacuttup Lakes	Nature Reserve	WA
Leeuwin-Naturaliste	National Park	WA
Locke	Nature Reserve	WA
Marmion	Marine Park	WA
Mount Manypeaks	Nature Reserve	WA
Ngari Capes	Marine Park	WA
NTWA Bushland covenant (0085A)	Conservation Covenant	WA
NTWA Bushland covenant (0085B)	Conservation Covenant	WA
NTWA Bushland covenant (0173)	Conservation Covenant	WA
NTWA Bushland covenant (0178)	Conservation Covenant	WA
Penguin Island	Conservation Park	WA
Port Kennedy Scientific Park	Nature Reserve	WA
Quagering	Nature Reserve	WA
Quarram	Nature Reserve	WA
Recherche Archipelago	Nature Reserve	WA
Rottnest Island	State Reserve	WA
Shoalwater Bay Islands	Nature Reserve	WA

Protected Area Name	Reserve Type	State
Shoalwater Islands	Marine Park	WA
St Alouarn Island	Nature Reserve	WA
Stokes	National Park	WA
Sugar Loaf Rock	Nature Reserve	WA
Swan River	Management Area	WA
Torndirrup	National Park	WA
Two Peoples Bay	Nature Reserve	WA
Unnamed WA25836	Nature Reserve	WA
Unnamed WA26620	Nature Reserve	WA
Unnamed WA26885	Nature Reserve	WA
Unnamed WA27888	Nature Reserve	WA
Unnamed WA32478	5(1)(h) Reserve	WA
Unnamed WA41568	Nature Reserve	WA
Unnamed WA41597	Nature Reserve	WA
Unnamed WA42379	5(1)(h) Reserve	WA
Unnamed WA42469	Nature Reserve	WA
Unnamed WA42879	Nature Reserve	WA
Unnamed WA43903	Nature Reserve	WA
Unnamed WA44004	Nature Reserve	WA
Unnamed WA44676	5(1)(h) Reserve	WA
Unnamed WA44685	5(1)(h) Reserve	WA
Unnamed WA44709	5(1)(h) Reserve	WA
Unnamed WA48837	Nature Reserve	WA
Unnamed WA48955	5(1)(h) Reserve	WA
Unnamed WA48968	5(1)(h) Reserve	WA
Unnamed WA49220	Conservation Park	WA
Unnamed WA49385	Nature Reserve	WA

Protected Area Name	Reserve Type	State
Unnamed WA50017	Nature Reserve	WA
Walpole-Nornalup	National Park	WA
Waychinicup	National Park	WA
West Cape Howe	National Park	WA
Yalgorup	National Park	WA

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included. Please see the associated resource information for specific caveats and use limitations associated with RFA boundary information.

RFA Name	State
South West WA RFA	Western Australia

Nationally Important Wetlands [Resource Information]

Wetland Name	State
Becher Point Wetlands	WA
Doggerup Creek System	WA
Rottnest Island Lakes	WA
Swan-Canning Estuary	WA
Vasse-Wonnerup Wetland System	WA

EPBC Act Referrals [Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status
Fremantle District Police Complex Project	2022/09345	Completed	
H2Perth hydrogen and ammonia project	2023/09559	Completed	
Installation of additional potable water tank	2023/09518	Assessment	
Marine Route Survey for Subsea Fibre Optic Data Cable System - Australia West	2024/09826	Referral Decision	
WA Offshore Windfarm	2021/8961	Completed	
Controlled action			
Aerial Application of Lavicide to Vasse-Wonnerup Wetlands	2010/5593	Controlled Action	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Controlled action			
Airborne sonar trials	2001/540	Controlled Action	Completed
Albany Port Authority dredging project	2006/2540	Controlled Action	Post-Approval
All weather access track road between Windy Harbour and Nelson Location 7965	2011/6121	Controlled Action	Post-Approval
Busselton Foreshore Redevelopment from West Street to Ford Road	2013/6830	Controlled Action	Post-Approval
Cape View Resort at Lot 190 Little Colin Street	2006/3070	Controlled Action	Post-Approval
Construction of a Deepwater, General Container Port	2009/5178	Controlled Action	Proposed Decision
Construction of New Perth Bunbury Highway project	2005/2193	Controlled Action	Post-Approval
Dawson Beach Estate Stage 2	2005/2153	Controlled Action	Post-Approval
Development Guide Plan for 46 ha Residential Subdivision	2008/4102	Controlled Action	Post-Approval
Development of Busselton Health Campus	2011/6011	Controlled Action	Post-Approval
Development of Kwinana Quay port facility	2008/4387	Controlled Action	Completed
Develop Trails and a Wetlands Demonstration Site and Centre	2008/4439	Controlled Action	Post-Approval
Eastern Link Project, Busselton WA	2018/8155	Controlled Action	Post-Approval
Industry Zone	2010/5337	Controlled Action	Post-Approval
Lennox Weir Removal, 12kms west Busselton	2021/8915	Controlled Action	Assessment Approach
Lower Vasse River Sediment Removal	2021/9051	Controlled Action	Post-Approval
Mangles Bay Marina Based Tourist Precinct	2010/5659	Controlled Action	Post-Approval
Neighbourhood Shopping Centre and Mixed Business Centre, Ocean Road, Dawesville	2006/3155	Controlled Action	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Controlled action			
Old Broadwater Farm Estate Subdivision - Stage 3	2009/5231	Controlled Action	Post-Approval
Peel's Retreat Estate - Residential development	2006/3063	Controlled Action	Post-Approval
Peppermint Park Residential Subdivision - Stage 5	2008/4028	Controlled Action	Post-Approval
Point Grey Marina Project	2010/5515	Controlled Action	Post-Approval
Point Grey Residential Development - Terrestrial Component	2011/5825	Controlled Action	Post-Approval
Ravensthorpe Nickel Project	2001/172	Controlled Action	Post-Approval
Residential Development, Lot 3 & 4 Dorsett Street	2006/2774	Controlled Action	Completed
Residential development Lot 3, 500 Bussell Highway, WA	2013/7098	Controlled Action	Post-Approval
Residential development Lots 8 & 9 King Street	2006/2787	Controlled Action	Completed
retirement units & aged care facility development	2007/3533	Controlled Action	Post-Approval
Shark Hazard Mitigation Drum Line Program, WA	2014/7174	Controlled Action	Completed
Shenton Park Subdivision	2004/1479	Controlled Action	Completed
Smiths Beach Project, Yallingup - Coastal Tourism Village	2021/9141	Controlled Action	Referral Publication
Southern Bluefin Tuna Farm	2005/2165	Controlled Action	Completed
Subdivision Lot 1 Dawesville Rd	2005/2394	Controlled Action	Post-Approval
Three Turning Pockets West of Busselton Townsite	2002/846	Controlled Action	Post-Approval
Tourism Villa Facility Development	2008/4025	Controlled Action	Post-Approval
tourist and residential development	2007/3483	Controlled Action	Post-Approval
Upgrade of Ford Road	2005/2113	Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Controlled action			
Urban development, multiple lots	2019/8494	Controlled Action	Assessment
Northerly Street, Vasse, WA			Approach
Vasse Diversion Drain Upgrade	2017/7932	Controlled Action	Post-Approval
Warders Hotel, Block 1 Warders Cottages, Fremantle, WA	2018/8144	Controlled Action	Post-Approval
Not controlled action			
'Looping 10' gas transmission pipeline from Kwinana to Hopelands	2005/2212 Action	Not Controlled	Completed
25 Lot Residential Subdivision	2009/4830 Action	Not Controlled	Completed
Aerial application of mosquito larvicides to Vasse Wonnerup Wetlands, WA	2016/7780 Action	Not Controlled	Completed
APX-West Fibre-optic telecommunications cable system, WA to Singapore	2013/7102 Action	Not Controlled	Completed
Bushfire Mitigation Works - City of Mandurah	2020/8674 Action	Not Controlled	Completed
Busselton to Flinders Bay Rails to Trails Project, WA	2013/6835 Action	Not Controlled	Completed
Cape Naturaliste Road Shared Pathway, Dunsborough, WA	2018/8282 Action	Not Controlled	Completed
Causeway Bridge Duplication, Busselton, WA	2018/8309 Action	Not Controlled	Completed
Caves Road widening project between Dunsborough and Yallingup(20.3 -24.6 SLK), WA	2015/7475 Action	Not Controlled	Completed
Clear Lot 503, 54 Ocean Road Dawesville, WA	2014/7375 Action	Not Controlled	Completed
Construction and operation of an 8 turbine wind farm at Rous Head Harbour, Frema	2003/933 Action	Not Controlled	Completed
Construction of Secret Harbour High School	2004/1489 Action	Not Controlled	Completed
CTBT - Cape Leeuwin Hydroacoustic Station Proposal	2000/27 Action	Not Controlled	Completed
Disposal of residential properties, Fremantle, WA	2019/8593 Action	Not Controlled	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
Eastport canal estate development stage 5	2007/3737 Action	Not Controlled	Completed
Establishment of a National Lifestyle Village	2011/6081 Action	Not Controlled	Completed
Expansion of berthing facilities at Kwinana Bulk Terminal	2006/2509 Action	Not Controlled	Completed
Expansion of existing Ammonium Nitrate Production Facility	2005/1941 Action	Not Controlled	Completed
Expedition 369-Australian Cretaceous Climate and Tectonics, Australian EEZ waters	2017/7891 Action	Not Controlled	Completed
Florida Estate Residential Subdivision Development Stage 13	2011/6045 Action	Not Controlled	Completed
Florida North residential development, Lot 9008, Ocean Road, Dawesville, WA	2015/7462 Action	Not Controlled	Completed
Fremantle Ports Inner Harbour Capital Dredging Proposal	2005/2477 Action	Not Controlled	Completed
Gas-fired Power Station	2005/2213	Not Controlled Action	Completed
Geo-science Investigations	2005/2069	Not Controlled	Completed Action
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522 Action	Not Controlled	Completed
INDIGO Central Submarine Telecommunications Cable	2017/8127 Action	Not Controlled	Completed
Kennedy Bay urban development, Port Kennedy, WA	2014/7122 Action	Not Controlled	Completed
Kennedy Park Estate Residential Development	2003/1044 Action	Not Controlled	Completed
Kwinana Gas-Fired Power Station	2005/2101	Not Controlled	Completed Action
Limestone quarry expansion	2005/2268	Not Controlled	Completed Action
Limestone Quarry Expansion, Lots 3618 and 1794, Finn Road	2005/2332 Action	Not Controlled	Completed
Lot 101 Mandurah Road, Madora Bay, WA	2012/6466 Action	Not Controlled	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
Oman Australia Cable Installation, WA	2021/8922	Not Controlled Action	Completed
Oman Australia Cable - Marine Route Survey	2020/8731	Not Controlled Action	Completed
Palm Beach Caravan Park Redevelopment, Rockingham, WA	2013/6853	Not Controlled Action	Completed
Redevelopment of Lots 3 & 4, Kent Street	2007/3243	Not Controlled Action	Completed
Residential & Light Industrial Development, Vasse WA	2013/6932	Not Controlled Action	Completed
Residential development, Lot 42, Farmhouse Court, Bovell, WA	2014/7195	Not Controlled Action	Completed
Re-zoning of Land for Future Residential Development Purposes	2009/4908	Not Controlled Action	Completed
Rottnest Lodge Redevelopment	2019/8565	Not Controlled Action	Completed
Seismic Survey, Bremer Basin, Mentelle Basin and Zeewyck Sub-basin	2004/1700	Not Controlled Action	Completed
Sepia Depression Ocean Outlet Landline Duplication	2012/6248	Not Controlled Action	Completed
Vasse Hotel and Supermarket Redevelopment	2001/288	Not Controlled Action	Completed
Warders' Cottages Block 2 'W2'	2022/9148	Not Controlled Action	Completed
Warders' Cottages W2 minor works, Fremantle, WA	2018/8185	Not Controlled Action	Completed
Wind Farm development	2005/2105	Not Controlled Action	Completed
Not controlled action (particular manner)			
2D seismic survey	2007/3273	Not Controlled Action (Particular Manner)	Post-Approval
2D seismic survey	2008/4493	Not Controlled Action (Particular Manner)	Post-Approval
3D Marine Seismic Survey Within WA-382-P	2007/3799	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Aerial Mosquito Spraying Vasse-Wonnerup System	2005/1952	Not Controlled Action (Particular Manner)	Post-Approval
Ambergate North Residential Development	2009/4802	Not Controlled Action (Particular Manner)	Post-Approval
Arcadia Petroleum - BR12 3D Marine Seismic Survey	2012/6476	Not Controlled Action (Particular Manner)	Post-Approval
Australian Underwater Discovery Centre	2021/9019	Not Controlled Action (Particular Manner)	Post-Approval
Australia to Singapore Fibre Optic Submarine Cable System	2011/6127	Not Controlled Action (Particular Manner)	Post-Approval
Bremer Basin 2D Marine Seismic Survey, WA	2009/5013	Not Controlled Action (Particular Manner)	Post-Approval
CETO 6 Garden Island Project, offshore WA	2016/7635	Not Controlled Action (Particular Manner)	Post-Approval
CETO 6 Geophysical and Geotechnical Surveys	2014/7408	Not Controlled Action (Particular Manner)	Post-Approval
City of Cockburn Sporting Facilties	2005/2139	Not Controlled Action (Particular Manner)	Post-Approval
Construction of urea production plant and supporting infrastructure	2009/5067	Not Controlled Action (Particular Manner)	Post-Approval
Coodanup residential development	2006/3073	Not Controlled Action (Particular Manner)	Post-Approval
Extension of existing mains water supply pipeline	2009/4686	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Manner)			
Grand Southern Margin 2D Marine Seismic Survey	2008/4599	Not Controlled Action (Particular Manner)	Post-Approval
INDIGO Marine Cable Route Survey (INDIGO)	2017/7996	Not Controlled Action (Particular Manner)	Post-Approval
Lake Richmond Boardwalk installation, Rockingham, WA	2013/6977	Not Controlled Action (Particular Manner)	Post-Approval
Laying a submarine optical fibre telecommunications cable, Perth to Singapore and Jakarta	2014/7332	Not Controlled Action (Particular Manner)	Post-Approval
Marine Environmental Survey	2012/6275	Not Controlled	Post-Approval
Action (Particular Manner)			
Monaghan's Roundabout Project - Intersection of Bussell Highway and Caves Road, Shire of Busselton	2007/3515	Not Controlled Action (Particular Manner)	Post-Approval
Multipurpose development stage 1 within 340ha	2004/1913	Not Controlled Action (Particular Manner)	Post-Approval
Novacare Lifestyle Village	2001/311	Not Controlled	Post-Approval
Action (Particular Manner)			
Road upgrades and walk trail development	2009/4958	Not Controlled Action (Particular Manner)	Post-Approval
South Busselton Primary School	2001/290	Not Controlled	Post-Approval
Action (Particular Manner)			
South West Metropolitan Railway Project	2003/1175	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Subdivision and development of residential dwelling on part Lot 1, Bussell Highw	2006/3023	Not Controlled Action (Particular Manner)	Post-Approval
Referral decision			
3D Marine Seismic survey	2007/3725	Referral Decision	Completed
3D Seismic Survey	2012/6245	Referral Decision	Completed
Ambergate North Residential Community (4896 lots)	2008/4617	Referral Decision	Completed
CO2 3D Seismic Survey Vlaming Sub-Basin	2012/6343	Referral Decision	Completed
Grand Southern Margin 2D Marine Seismic Survey	2008/4573	Referral Decision	Completed
Kennedy Bay Urban Development,PortKennedy,Rockingh	2013/7022	Referral Decision	Completed
Lots 1-5 Bluerise Cove & Lots 801 & 124 Pleasant Grove Rezoning and Subdivision	2008/4295	Referral Decision	Completed
Narelle 3D Marine Seismic Survey	2008/4575	Referral Decision	Completed
Residential Subdivision Lot 801 Pleasant Grove Circle, Falcon, WA	2012/6507	Referral Decision	Referral Publication
Riverbank and Country Road Estates Lot 43 Bussell Highway	2005/2367	Referral Decision	Completed
Sonar Trials and Acoustic Trials	2001/538	Referral Decision	Completed
Water quality improvement trial, Lower Vasse River, Busselton, WA	2013/6975	Referral Decision	Completed

Key Ecological Features [Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
Albany Canyons group and adjacent shelf break	South-west
Ancient coastline at 90-120m depth	South-west
Cape Mentelle upwelling	South-west

Name	Region
Commonwealth marine environment surrounding the Recherche Archipelago	South-west
Commonwealth marine environment within and adjacent	South-west to Geographe Bay
Commonwealth marine environment within and adjacent	South-west to the west coast inshore lagoons
Diamantina Fracture Zone	South-west
Naturaliste Plateau	South-west
Perth Canyon and adjacent shelf break, and other west coast canyons	South-west
Western demersal slope and associated fish communities	South-west
Western rock lobster	South-west

Biologically Important Areas			[Resource Information]
Scientific Name	Behaviour	Presence	
Seabirds			
Ardenna carneipes Flesh-footed Shearwater [82404]	Aggregation	Known to occur	
Ardenna carneipes Flesh-footed Shearwater [82404]	Foraging (in high numbers)	Known to occur	
Ardenna pacifica Wedge-tailed Shearwater [84292]	Foraging (in high numbers)	Known to occur	
Ardenna tenuirostris Short-tailed Shearwater [82652]	Foraging (in high numbers)	Known to occur	
Eudyptula minor Little Penguin [1085]	Foraging (provisioning young)	Known to occur	
Hydroprogne caspia Caspian Tern [808]	Foraging (provisioning young)	Known to occur	
Larus pacificus Pacific Gull [811]	Foraging (in high numbers)	Former Range	

Scientific Name	Behaviour	Presence
Larus pacificus Pacific Gull [811]	Foraging (in high numbers)	Known to occur
Onychoprion anaethetus Bridled Tern [82845]	Foraging (in high numbers)	Known to occur
Onychoprion fuscata Sooty Tern [82847]	Foraging	Known to occur
Pelagodroma marina White-faced Storm petrel [1016]	Foraging (in high numbers)	Known to occur
Phalacrocorax fuscescens Black-faced Cormorant [59660]	Foraging	Known to occur
Pterodroma macroptera macroptera Great-winged Petrel (macroptera race) [1035]	Foraging (provisioning young)	Known to occur
Pterodroma mollis Soft-plumaged Petrel [1036]	Foraging (in high numbers)	Known to occur
Puffinus assimilis tunneyi Little Shearwater [59363]	Foraging (in high numbers)	Known to occur
Sterna dougallii Roseate Tern [817]	Foraging	Known to occur
Sternula nereis Fairy Tern [82949]	Foraging (in high numbers)	Known to occur
Thalassarche chlororhynchos bassi Indian Yellow-nosed Albatross [85249]	Foraging (in high numbers)	Known to occur
Seals	Neophoca cinerea	
Australian Sea Lion [22]	Foraging (male)	Likely to occur

Scientific Name	Behaviour	Presence
Neophoca cinerea Australian Sea Lion [22]	Foraging (male and female)	Known to occur
Neophoca cinerea Australian Sea Lion [22]	Foraging (male and female)	Likely to occur
Sharks Carcharodon carcharias White Shark [64470]	Foraging	Known to occur
Whales Balaenoptera musculus Blue and Pygmy Blue Whale [36]	Foraging (abundant food source)	Known to occur
Balaenoptera musculus Blue and Pygmy Blue Whale [36]	Foraging (high density)	Known to occur
Balaenoptera musculus Blue and Pygmy Blue Whale [36]	Foraging (on migration)	Known to occur
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Distribution	Known to occur
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Foraging Area (annual high use area)	Known to occur
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Known Foraging Area	Known to occur
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Migration	Known to occur
Megaptera novaeangliae Humpback Whale [38]	Migration (north)	Known to occur
Megaptera novaeangliae Humpback Whale [38]	Migration (north and south)	Known to occur

Scientific Name	Behaviour	Presence
Megaptera novaeangliae		
Humpback Whale [38]	Migration (south)	Known to occur
Physeter macrocephalus		
Sperm Whale [59]	Foraging (abundant food source)	Known to occur

Caveat

PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

World and National Heritage properties;

Wetlands of International and National Importance;

Commonwealth and State/Territory reserves;

distribution of listed threatened, migratory and marine species;

listed threatened ecological communities; and

other information that may be useful as an indicator of potential habitat value.

DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

threatened species listed as extinct or considered vagrants;

some recently listed species and ecological communities;

some listed migratory and listed marine species, which are not listed as threatened species; and

migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded

seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements
This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:
-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact us page.

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APPENDIX B. SUPPORTING FIGURES FOR SECTION 2.3 METEOROLOGY AND OCEANOGRAPHY

Browse

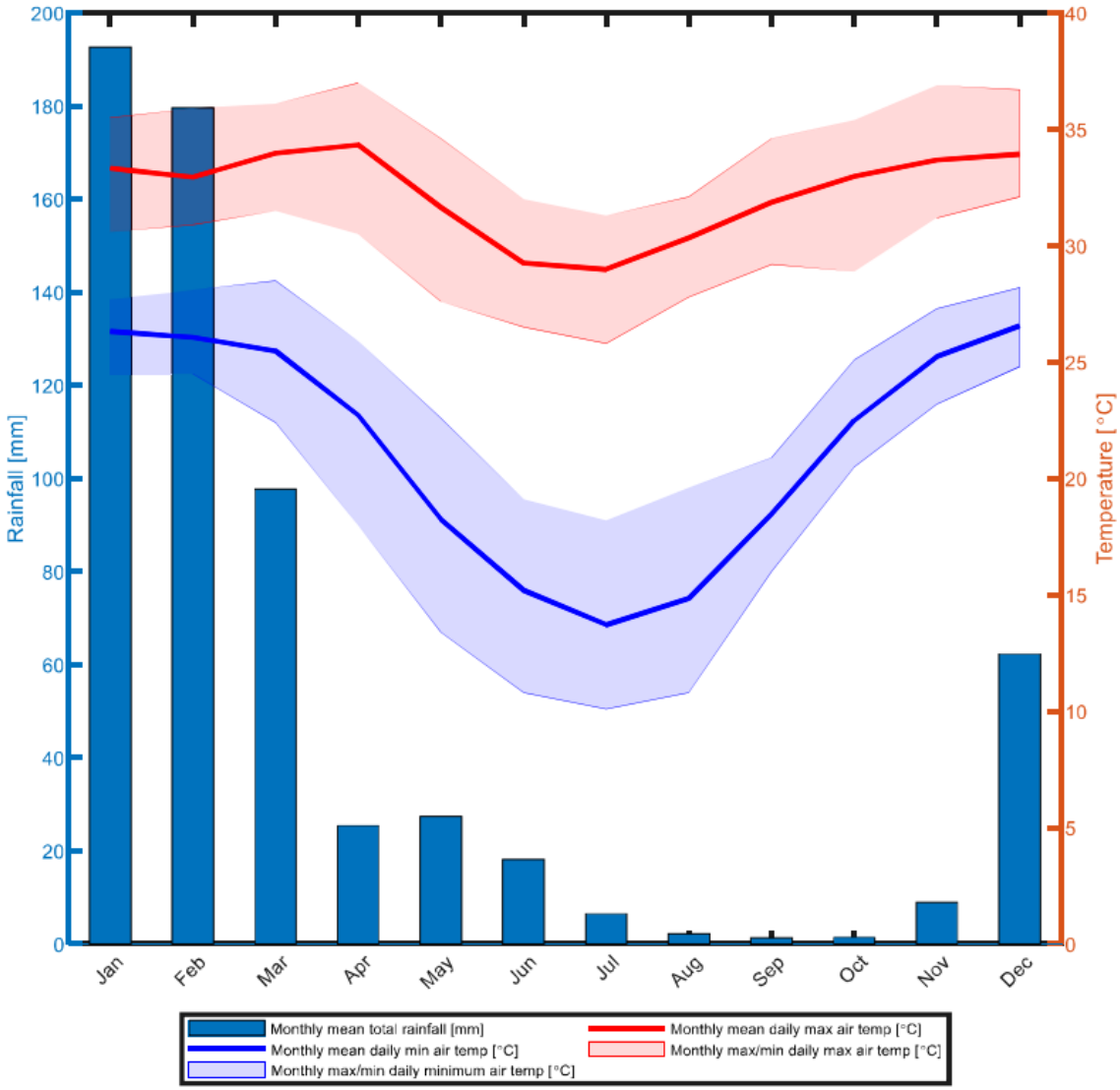

Figure 1. Monthly average total rainfall [mm] and air temperature [°C], calculated based on observations at the Broome Airport weather station from 1939-2020 (Bureau of Meteorology 2020). Bars show the monthly average total rainfall values, and thick blue and red lines denote monthly average daily minimum and maximum air temperatures, respectively. Shaded blue and red areas denote monthly recorded extremes of daily minimum and maximum air temperature, respectively.

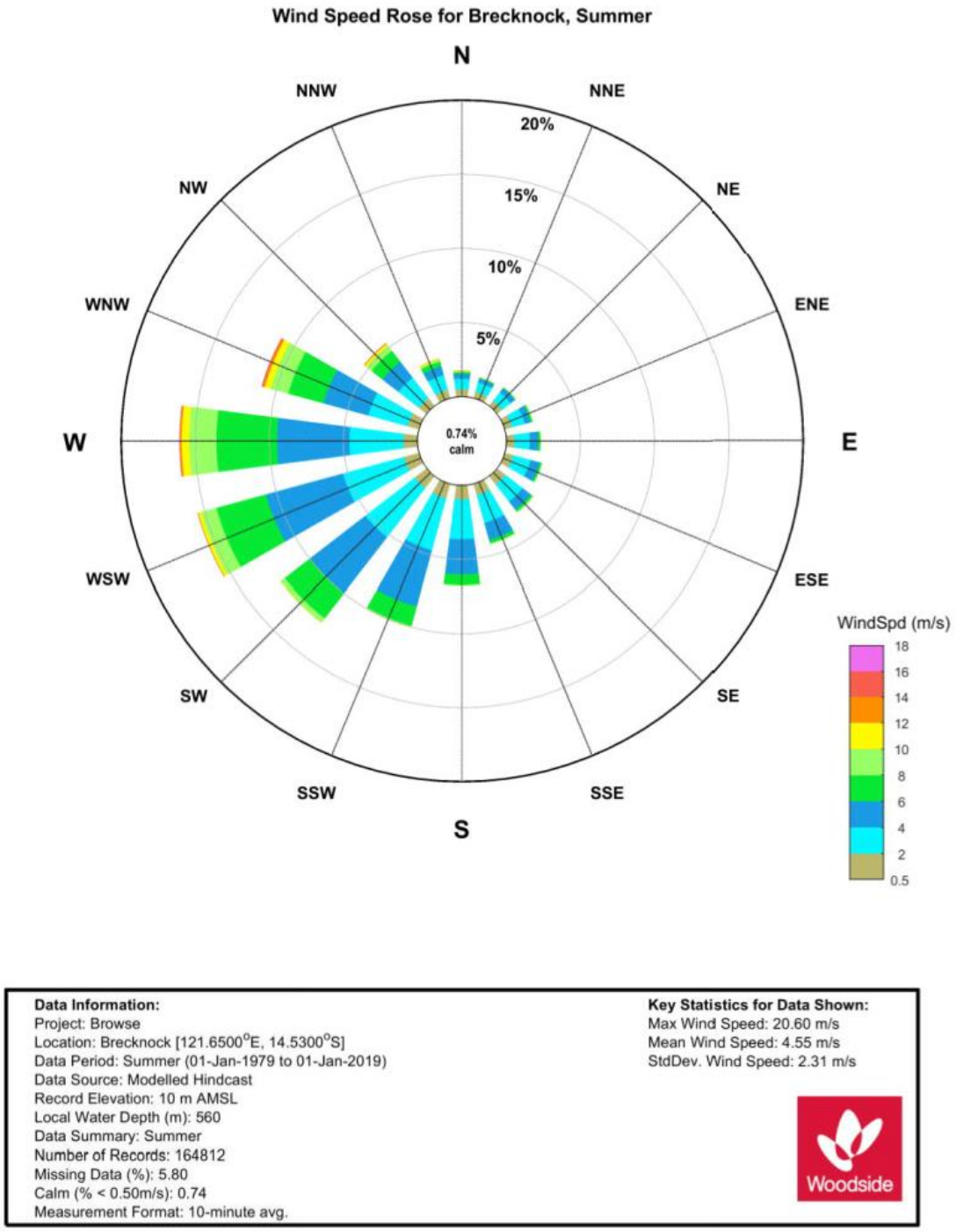

Figure 2. Summer distributions of 10-minute average wind speeds by 22.5° directional sectors at the Brecknock site (Metocean Solutions Ltd, 2019). Note tropical cyclone events were not included in this distribution. Winds at Brecknock in summer are predominantly from the WNW to SW due to the North West Monsoon (WEL, 2019).

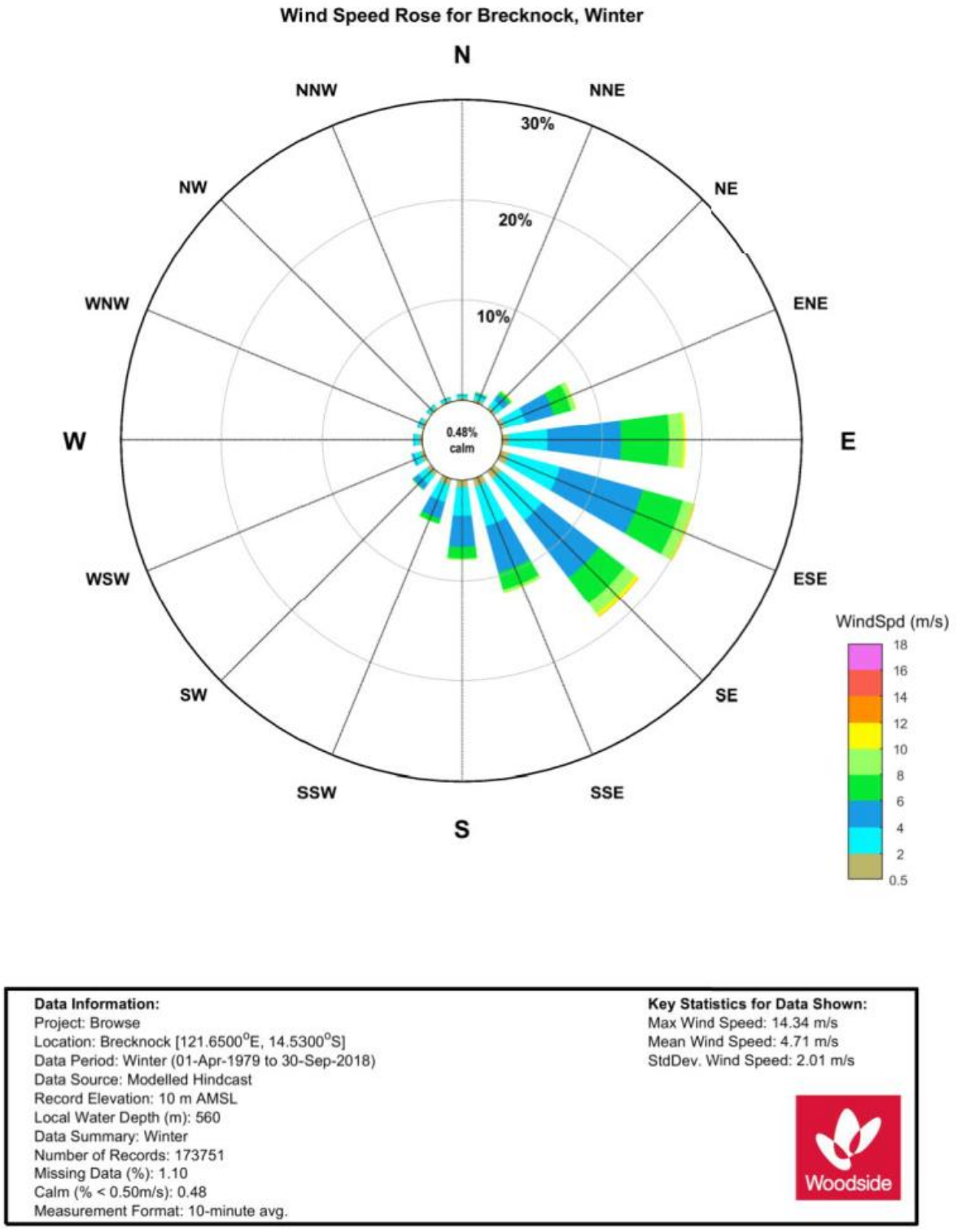

Figure 3. Winter distributions of 10-minute average wind speeds by 22.5° directional sectors at the Brecknock site (Metocean Solutions Ltd, 2019). Note tropical cyclone events were not included in this distribution. Winds at Brecknock in winter are predominantly from the E to SE due to the South East Trade Winds coming from the Australian mainland (WEL, 2019).

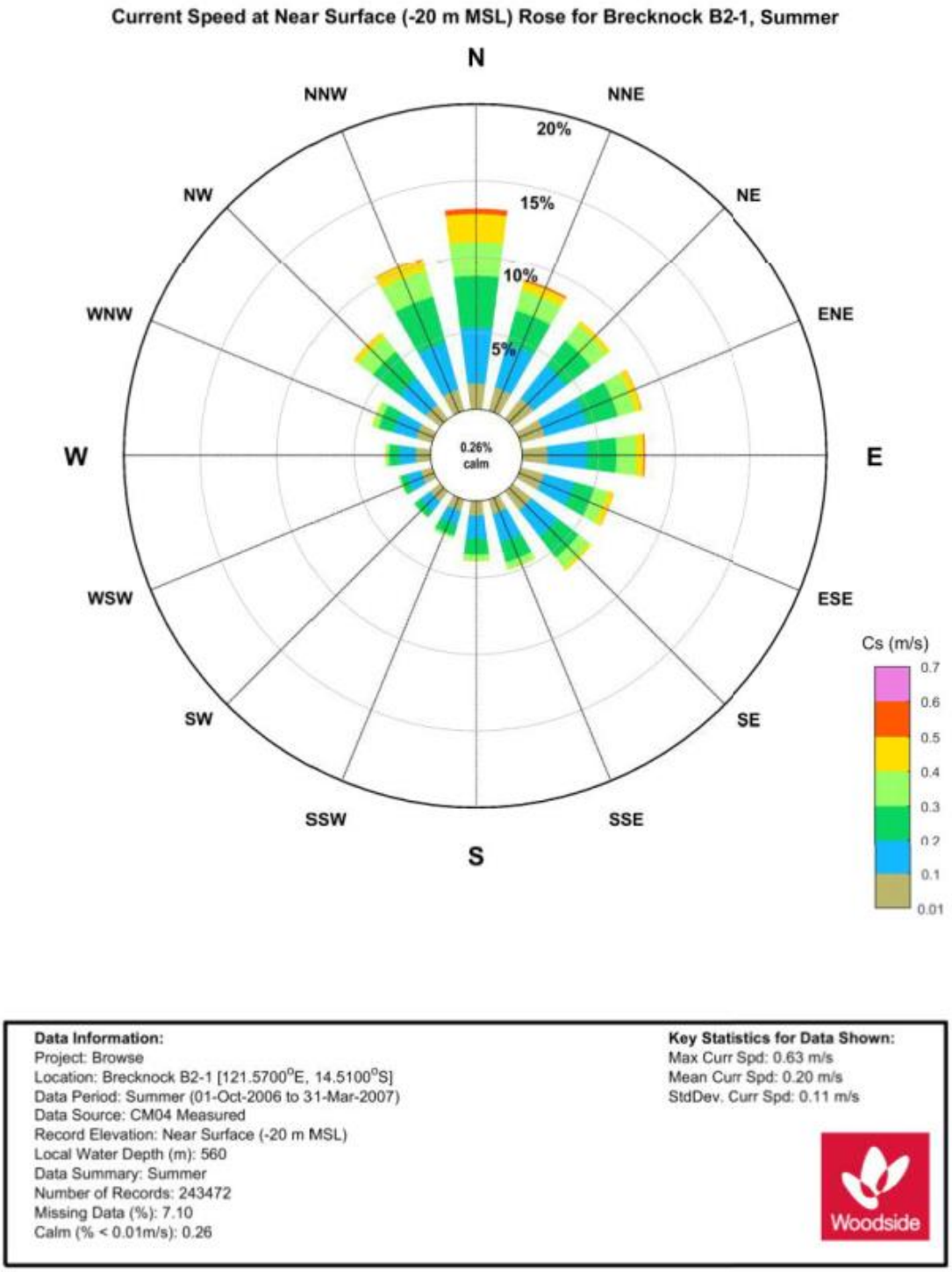

Figure 4. Summer (Nov-Apr) near surface combined frequency of 1-minute mean current speed and direction (towards) measured at Brecknock B2-1 location (cyclones removed) (RPS Metocean Ltd. 2008).

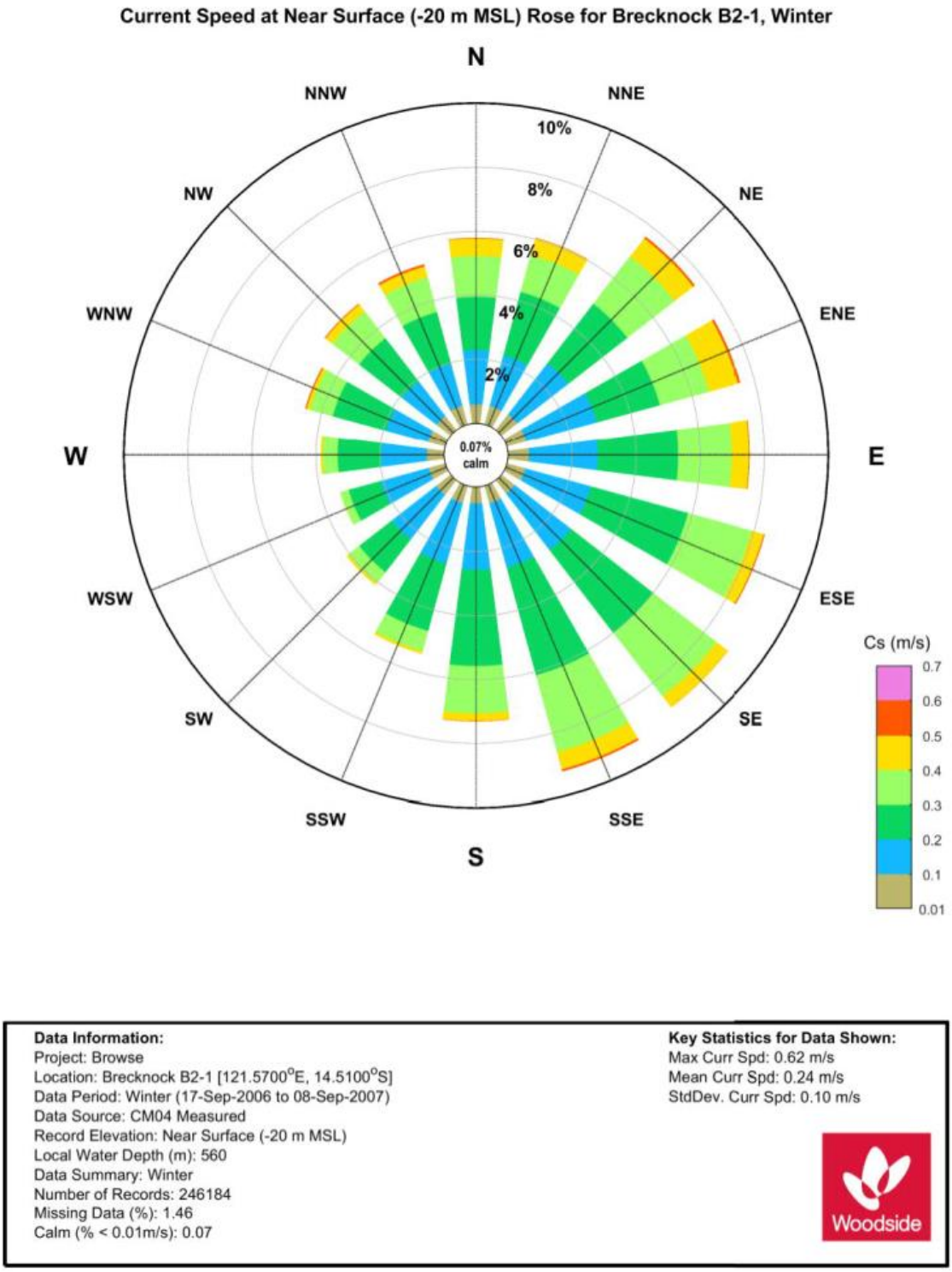

Figure 5. Winter (May-Sep) near surface combined frequency of 1-minute mean current speed and direction (towards) measured at Brecknock B2-1 location (cyclones removed) (RPS Metocean Ltd. 2008).

North west Shelf/Scarborough

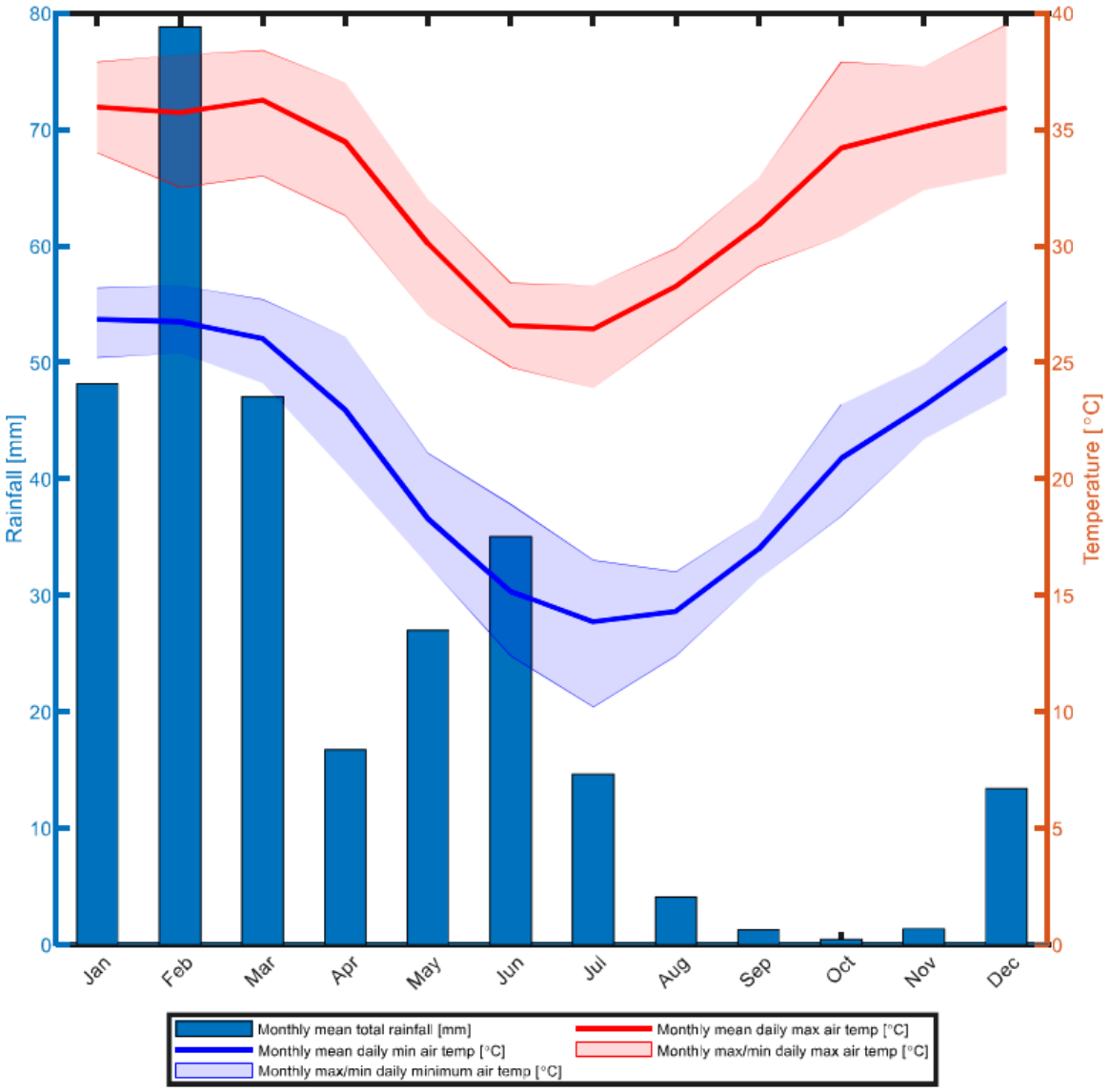

Figure 1. Monthly average total rainfall [mm] and air temperature [°C], calculated based on observations at the Karratha Aero weather station from 1972-2020 and 1993-2020 respectively (Bureau of Meteorology 2020). Bars show the monthly average total rainfall values, and thick blue and red lines denote monthly average daily minimum and maximum air temperatures, respectively. Shaded blue and red areas denote monthly recorded extremes of daily minimum and maximum air temperature, respectively.

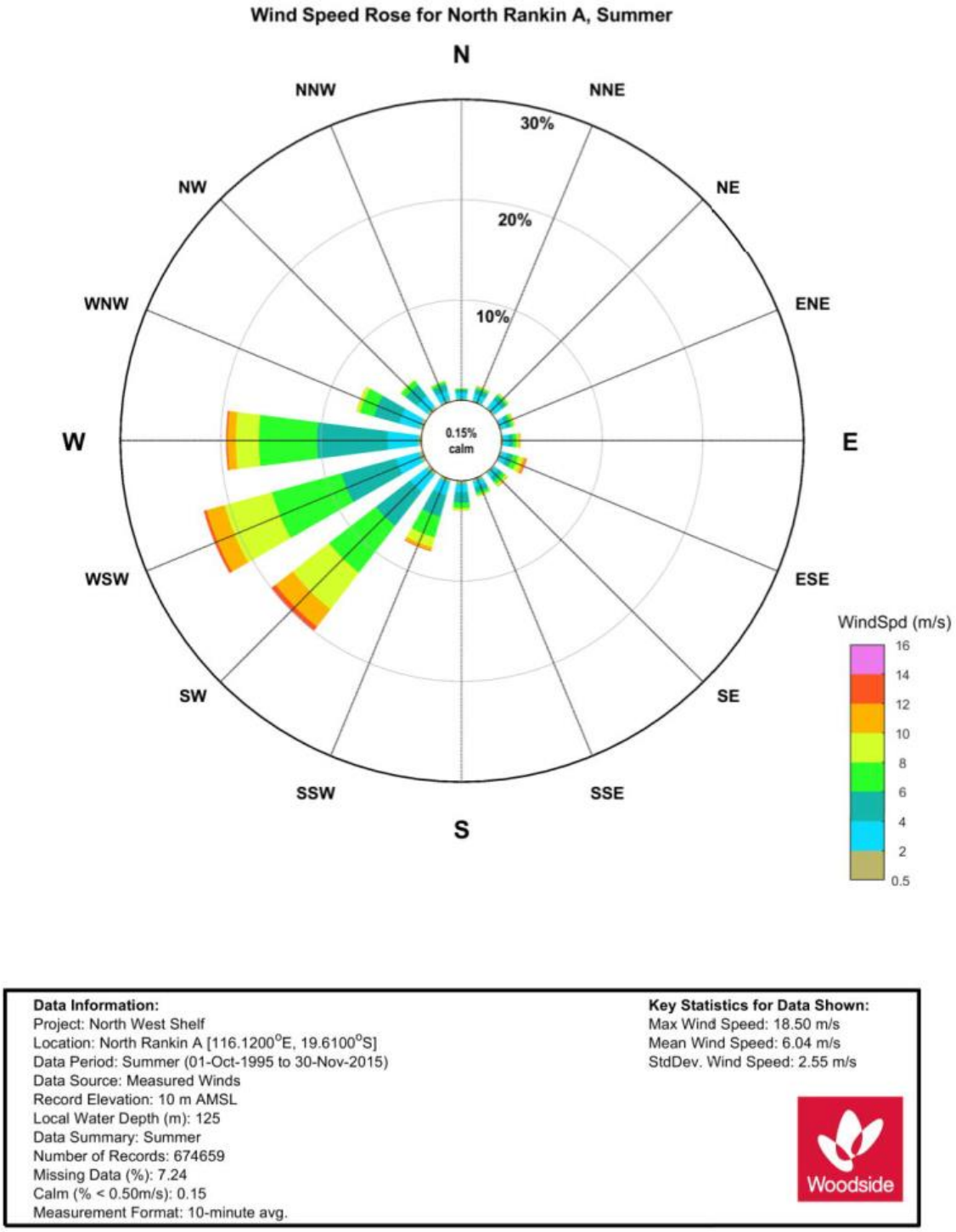

Figure 2. Summer distributions of 10-minute average wind speeds by 22.5° directional sectors at the North Rankin A site (WEL, 2015). Note tropical cyclone events were not included in this distribution. Winds at North Rankin A in summer are characterised by W to SW driven by the North West Monsoon (RPS, 2016).

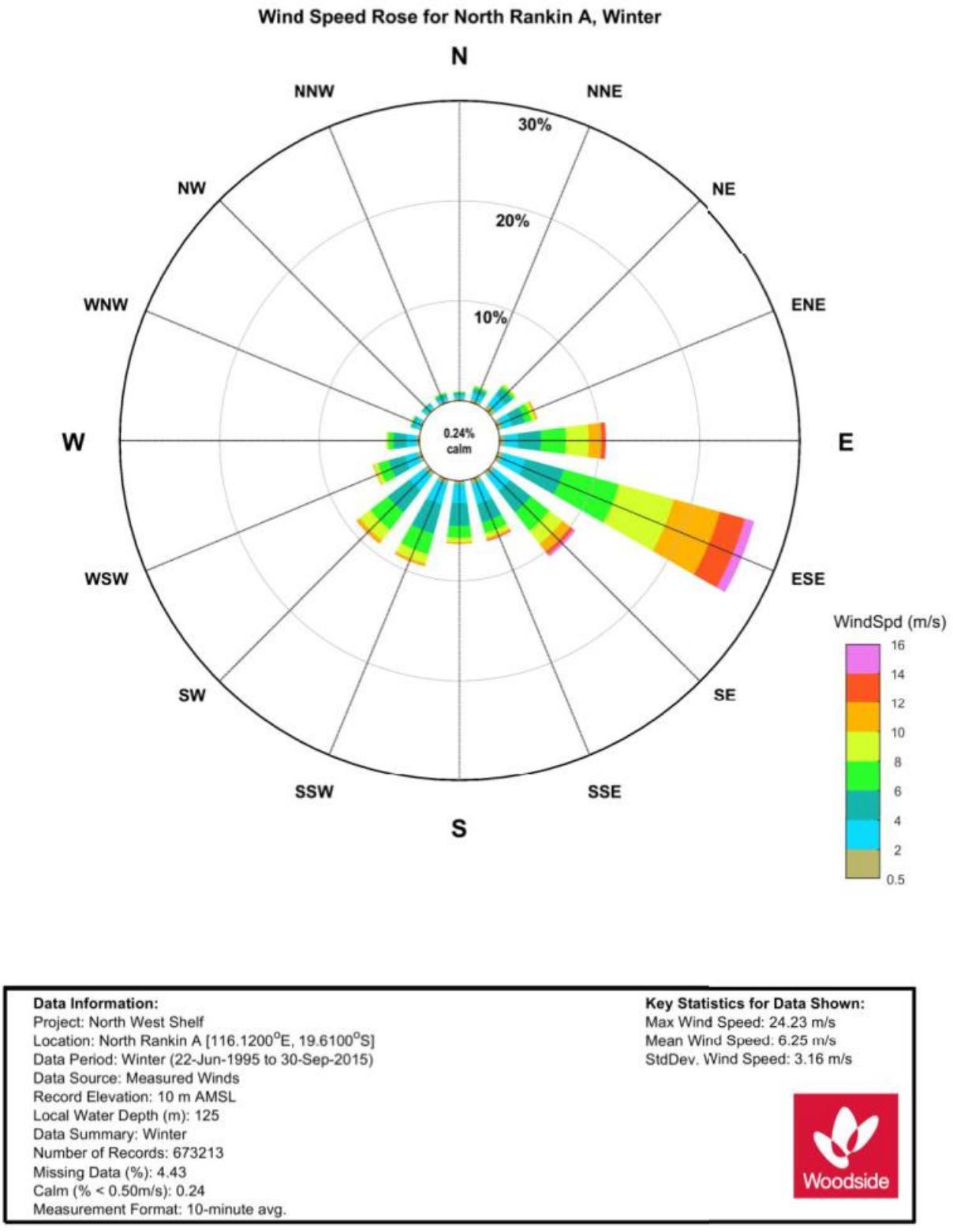

Figure 3. Winter distributions of 10-minute average wind speeds by 22.5° directional sectors at the North Rankin A site (WEL, 2015). Note tropical cyclone events were not included in this distribution. Winds at North Rankin in winter are predominantly influenced by the South East Trade Winds over Australia (RPS, 2016).

Scarborough

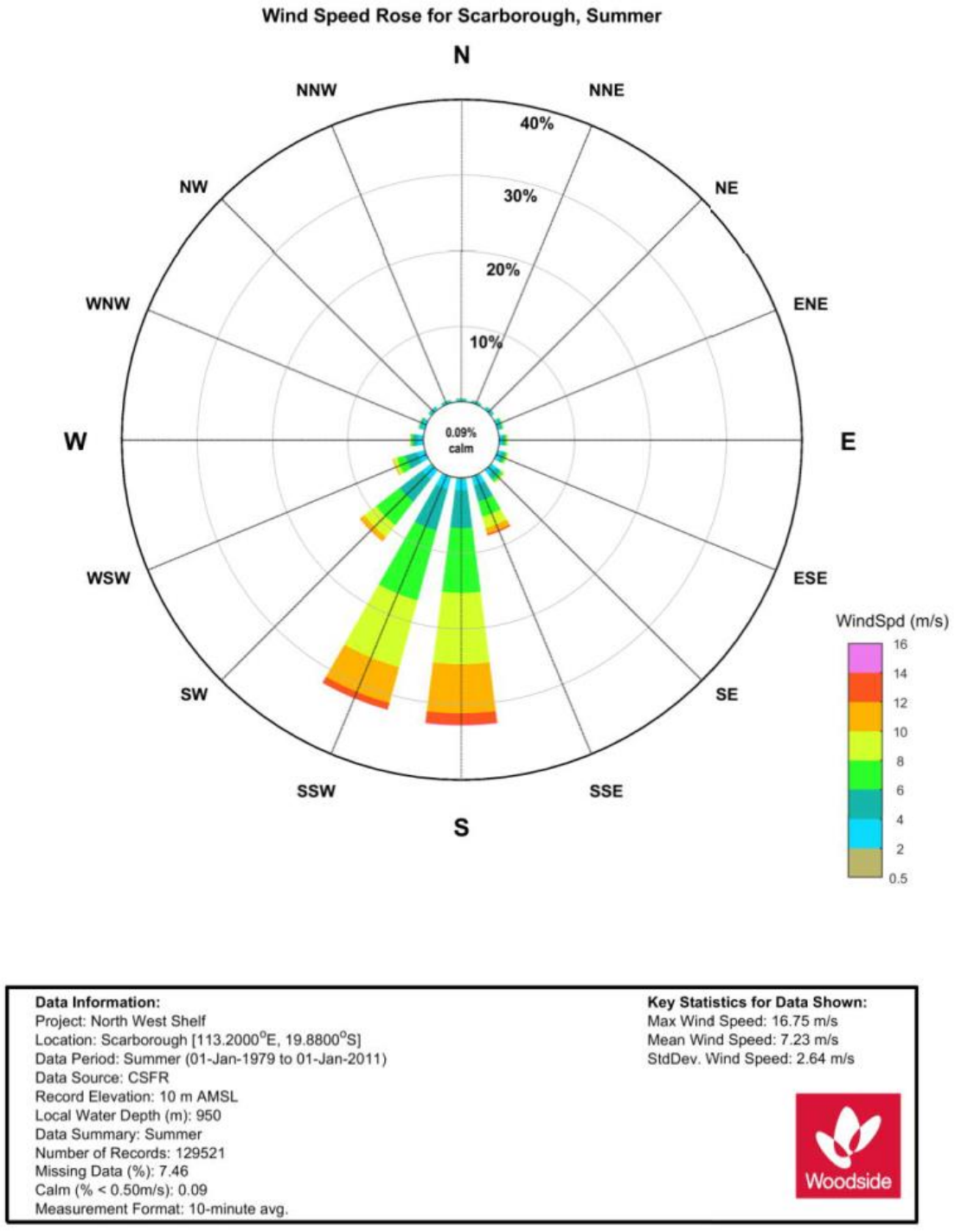

Figure 1. Summer distributions of wind speeds (10-minute at 10m ASL) by 22.5° directional sectors at the Scarborough site (WEL, 2018). Note tropical cyclone events were not included in this distribution. Winds at Scarborough in summer are predominantly from the S to SSW due to a Pilbara Heat Low forming over the northwest coast of Western Australia [R8] SW winds are also experienced at this site due to the monsoon trough.

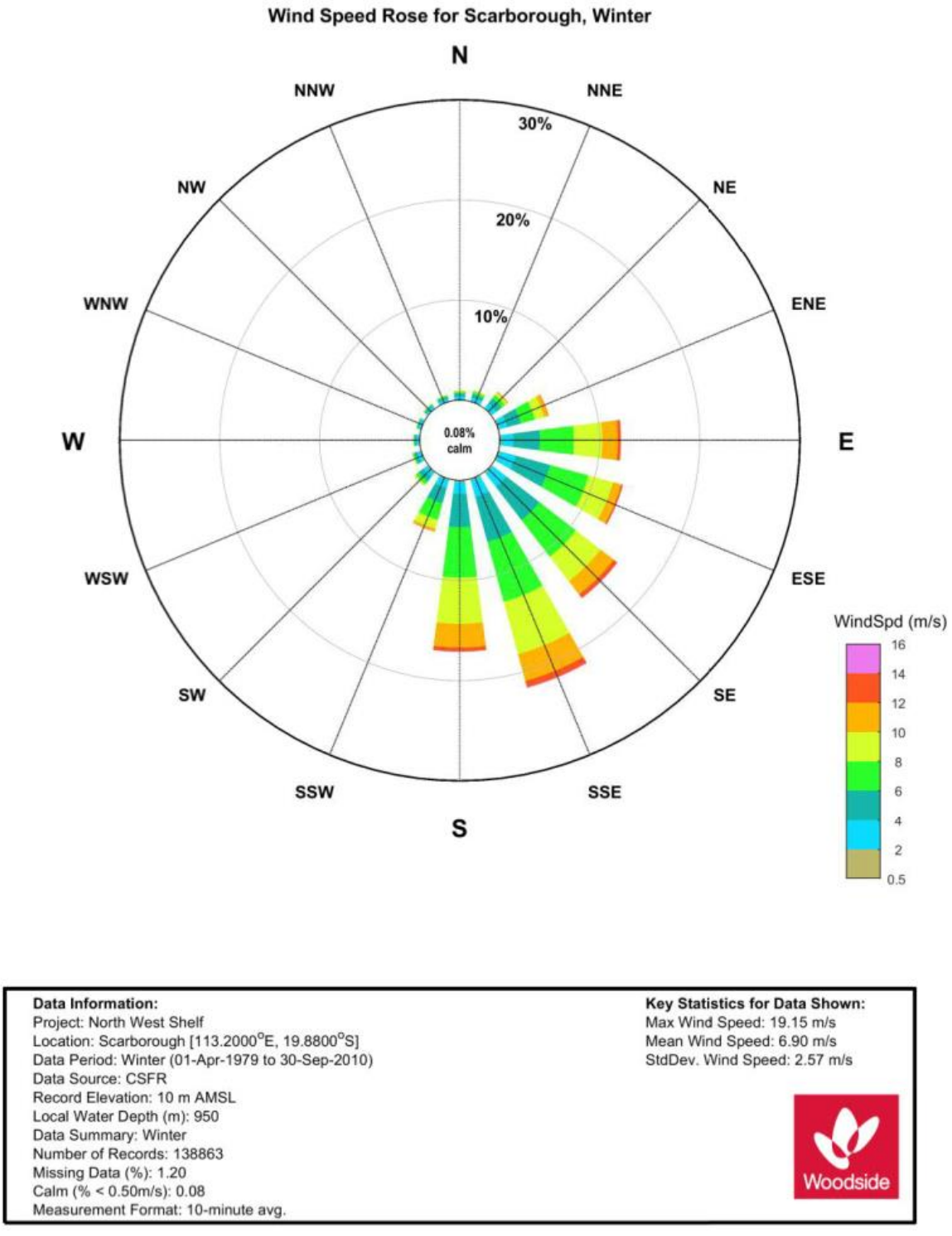

Figure 2. Winter distributions of wind speeds (10-minute at 10 m ASL) by 22.5° directional sectors at the Scarborough site (WEL, 2018). Note tropical cyclone events were not included in this distribution. Winds at Scarborough in winter are predominantly from the S to E driven by the South East Trade Winds over Australia (RPS, 2016)

North-west Shelf

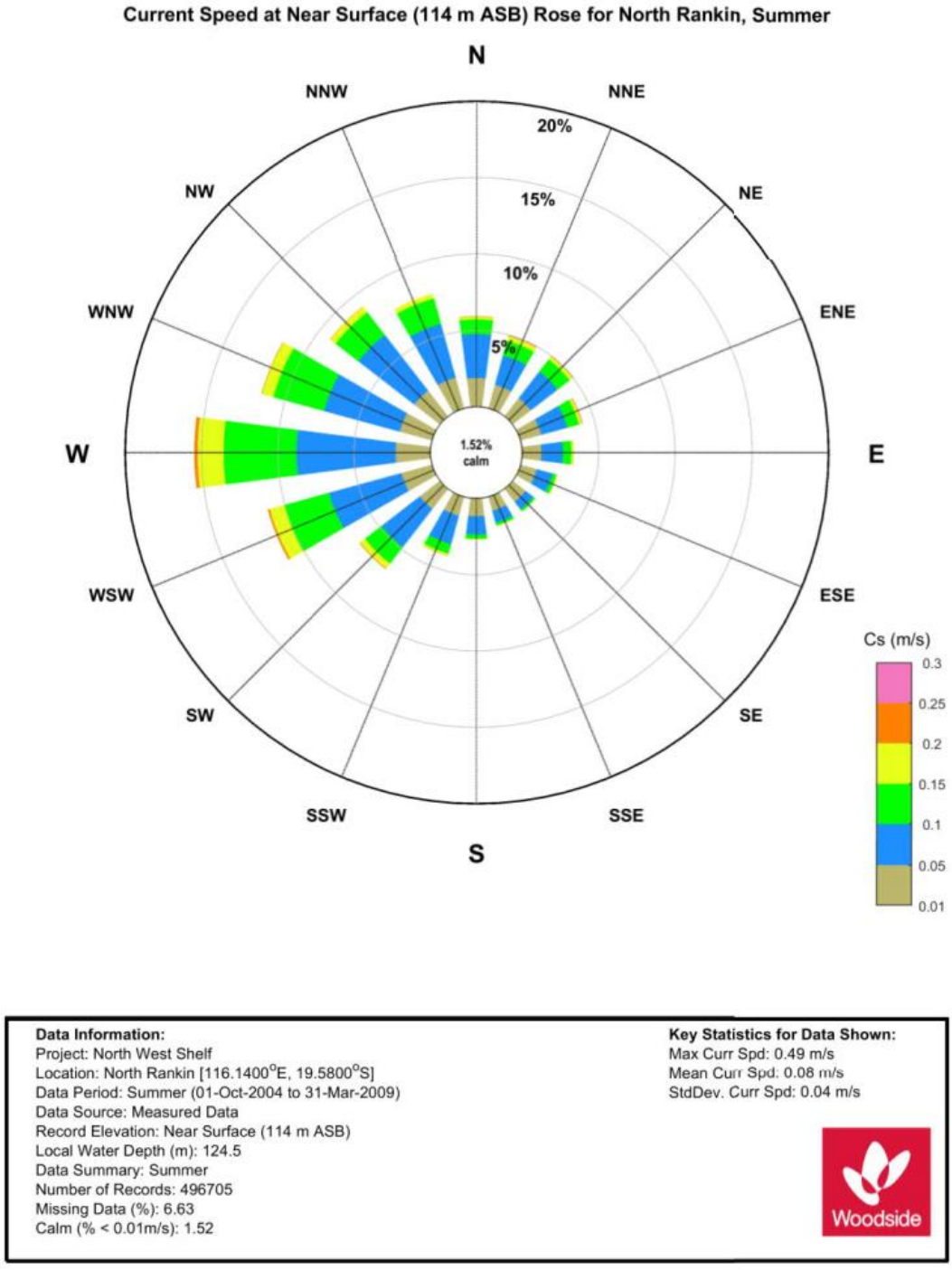

Figure 1. Summer (Nov-Apr) near surface combined frequency of 1-minute mean current speed and direction (towards) measured at the North Rankin location (cyclones removed) (WEL, 2011).

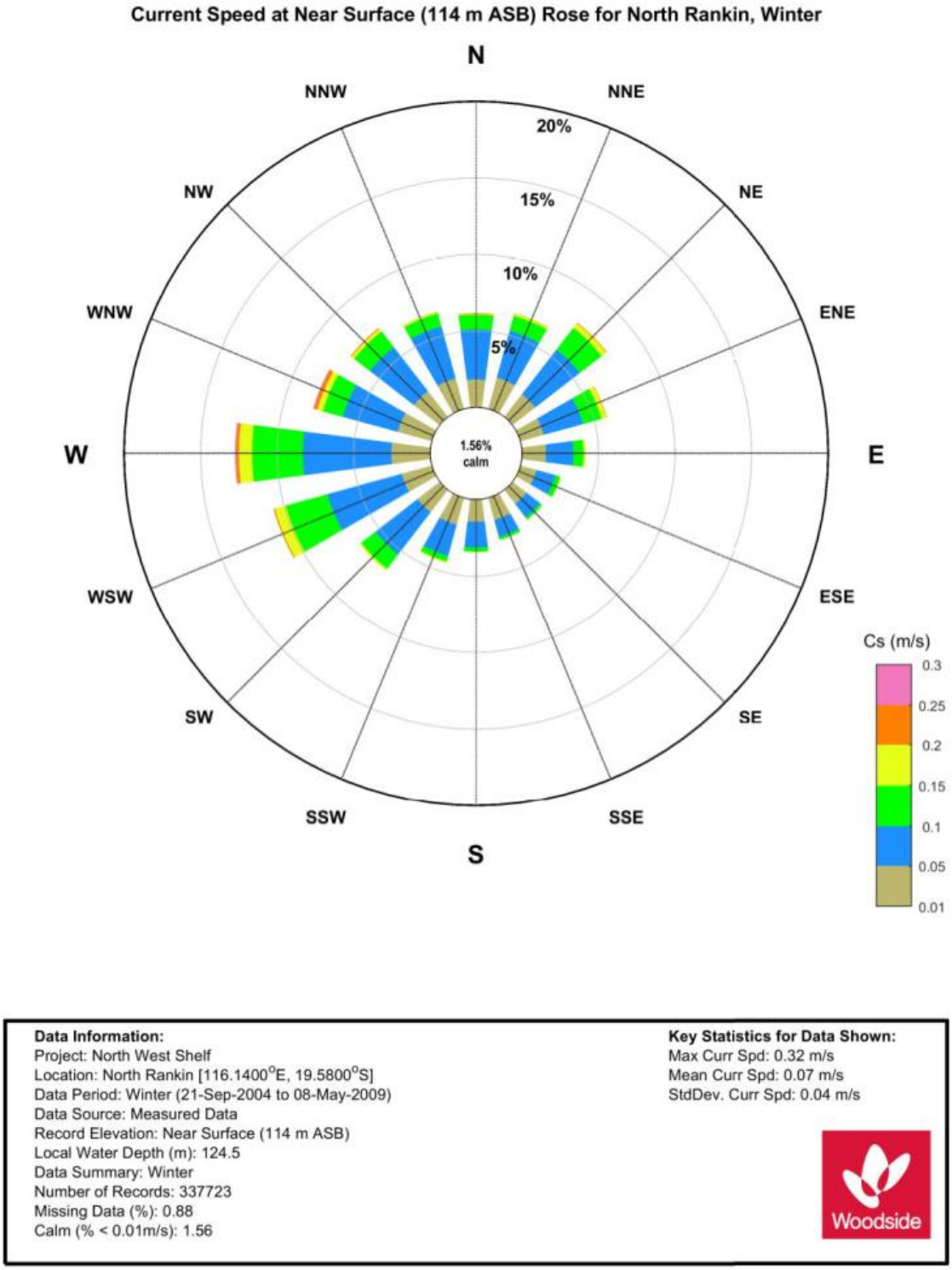

Figure 2. Winter (May-Sep) near surface combined frequency of 1-minute mean current speed and direction (towards) measured at the North Rankin location (cyclones removed) (WEL, 2011).

Scarborough

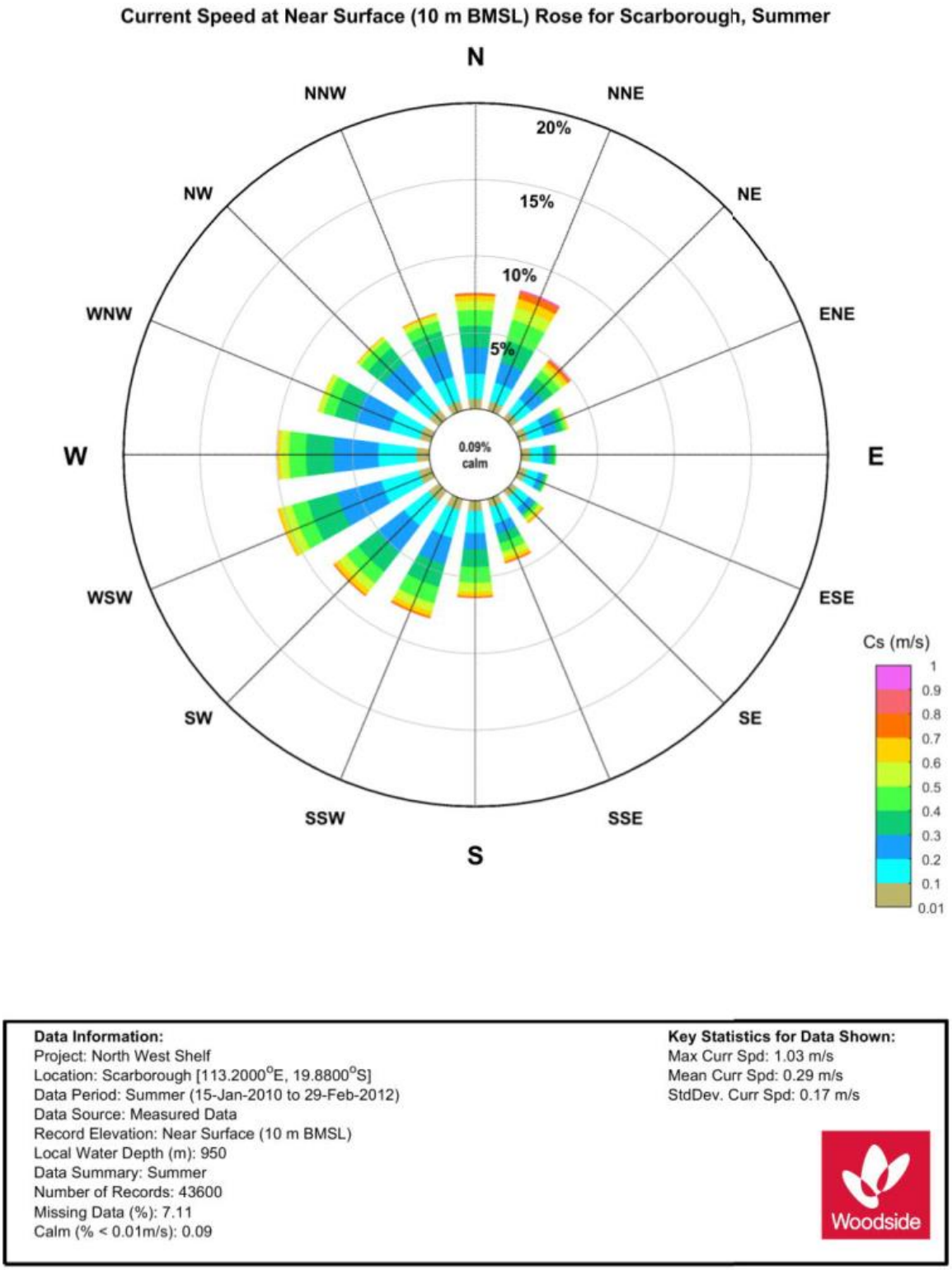

Figure 1. Summer (Nov - April) near surface combined frequency of 1-minute mean current speed and direction (towards) measured at the Scarborough location (cyclones removed) (WEL, 2018).

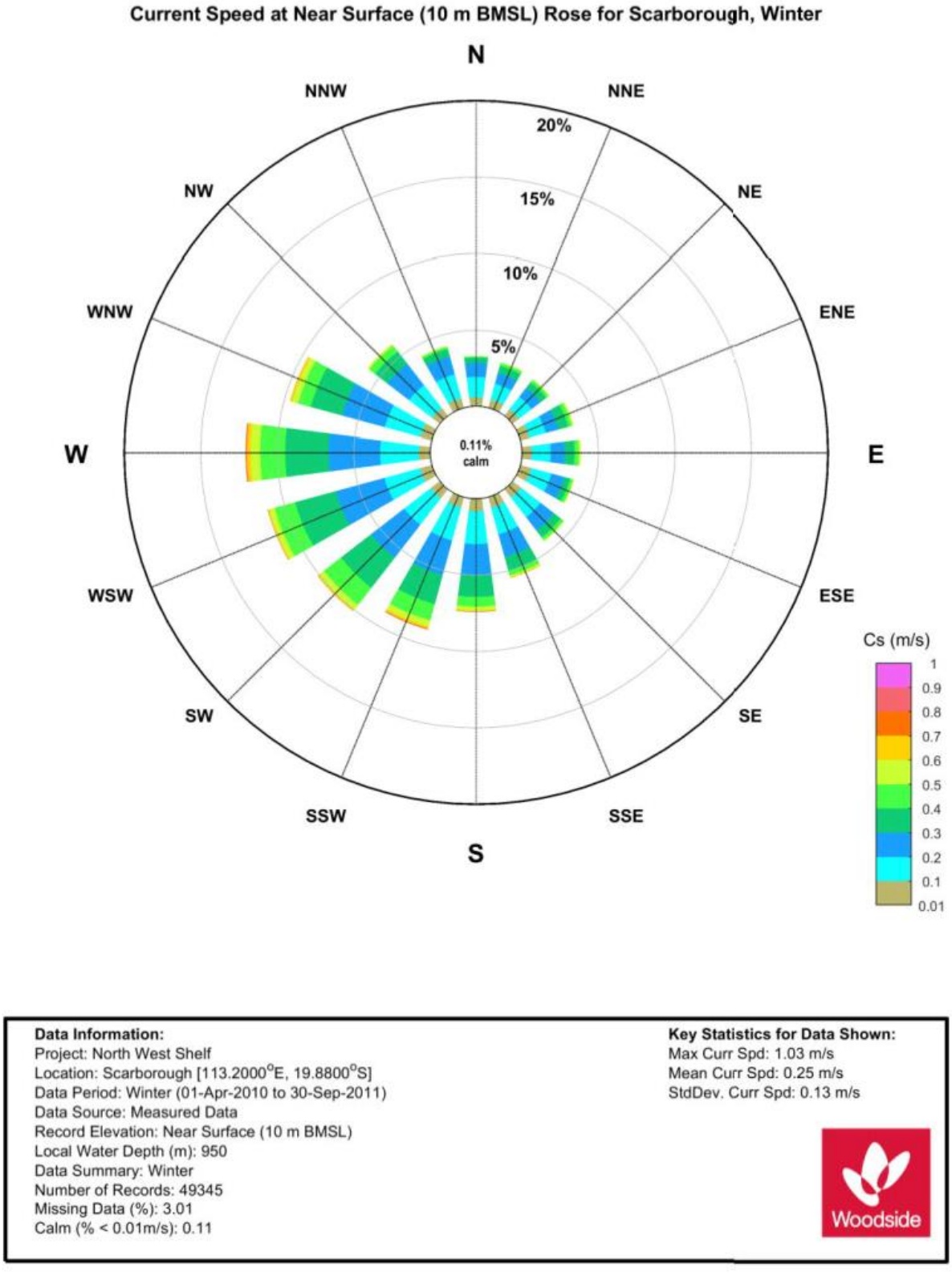

Figure 2. Winter (May-Sep) near surface combined frequency of 1-min mean current speed and direction (towards) measured at the Scarborough location (cyclones removed) (WEL, 2018).

North-west Cape

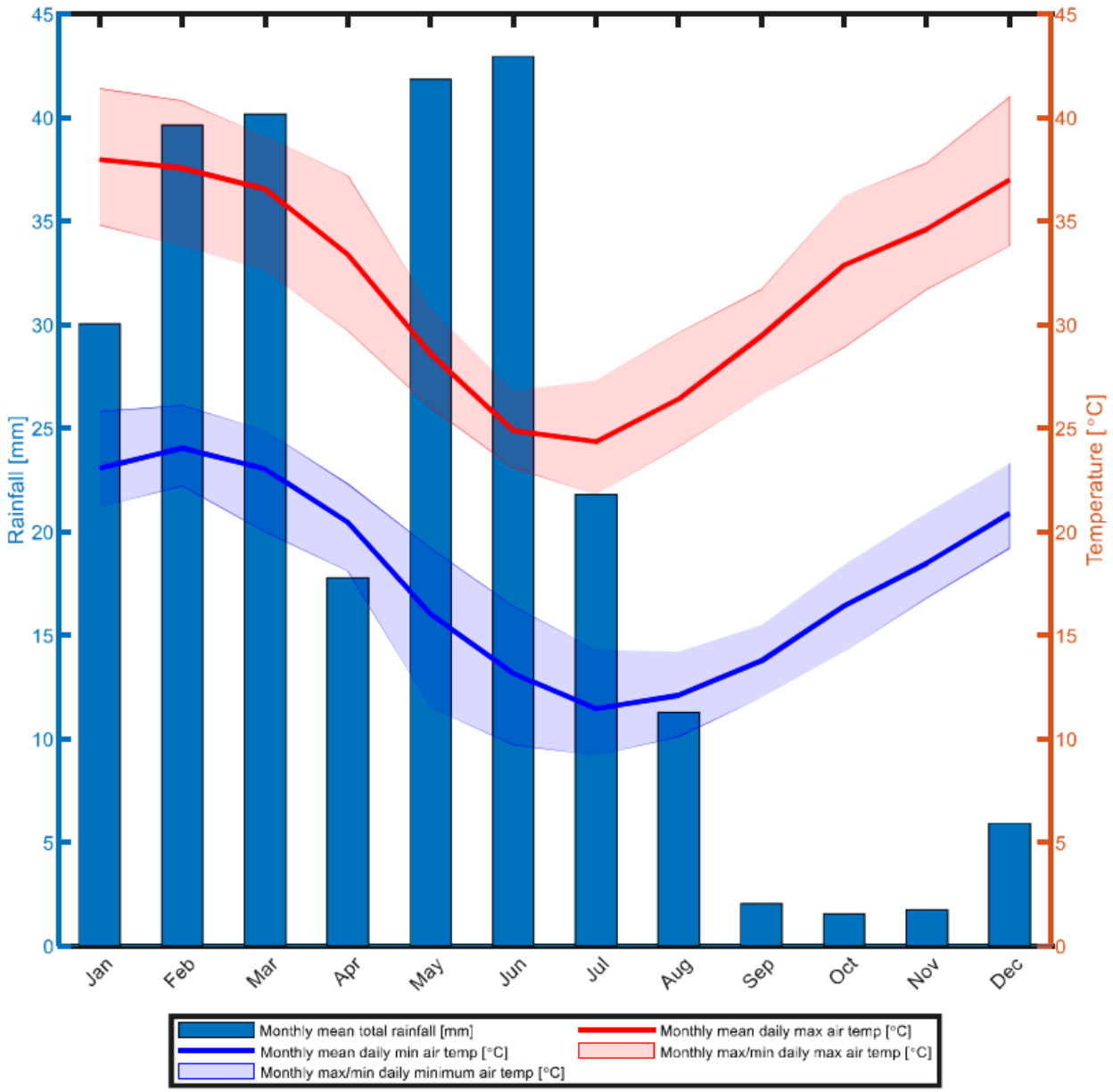

Figure 1. Monthly average total rainfall [mm] and air temperature [°C], calculated based on observations at the Learmonth Airport weather station from 1945-2020 and 1975-2020 respectively (Bureau of Meteorology 2020). Bars show the monthly average total rainfall values, and thick blue and red lines denote monthly average daily minimum and maximum air temperatures, respectively. Shaded blue and red areas denote monthly recorded extremes of daily minimum and maximum air temperature, respectively.

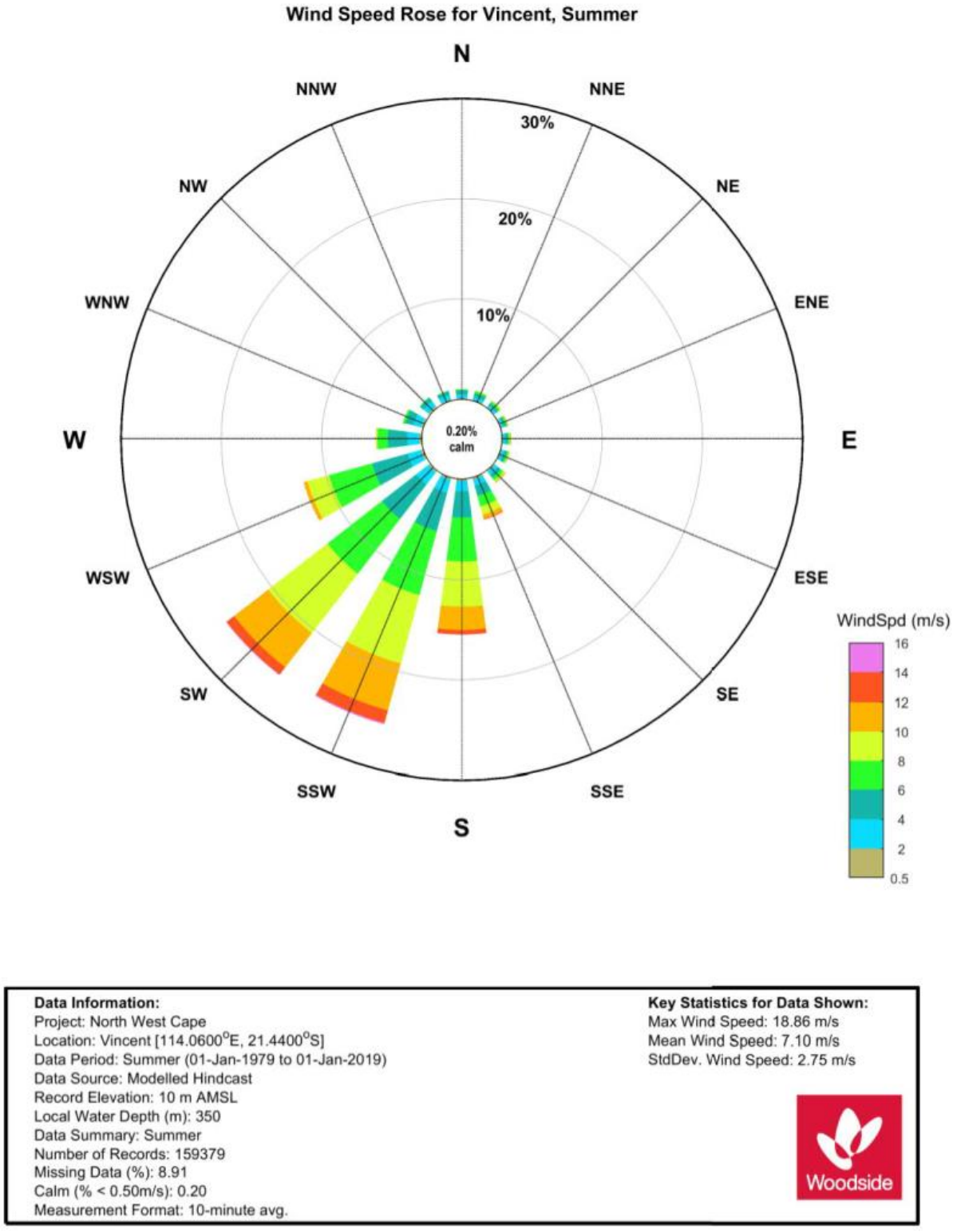

Figure 2. Summer distributions of wind speeds (10-minute at 10 m ASL) by 22.5° directional sectors at the Vincent site (Vincent Metocean). Note tropical cyclone events were not included in this distribution. Winds at Vincent in summer are predominantly from the SW to SSW in summer due to the presence of the Pilbara Heat Low (MetOcean Engineers, 2005).

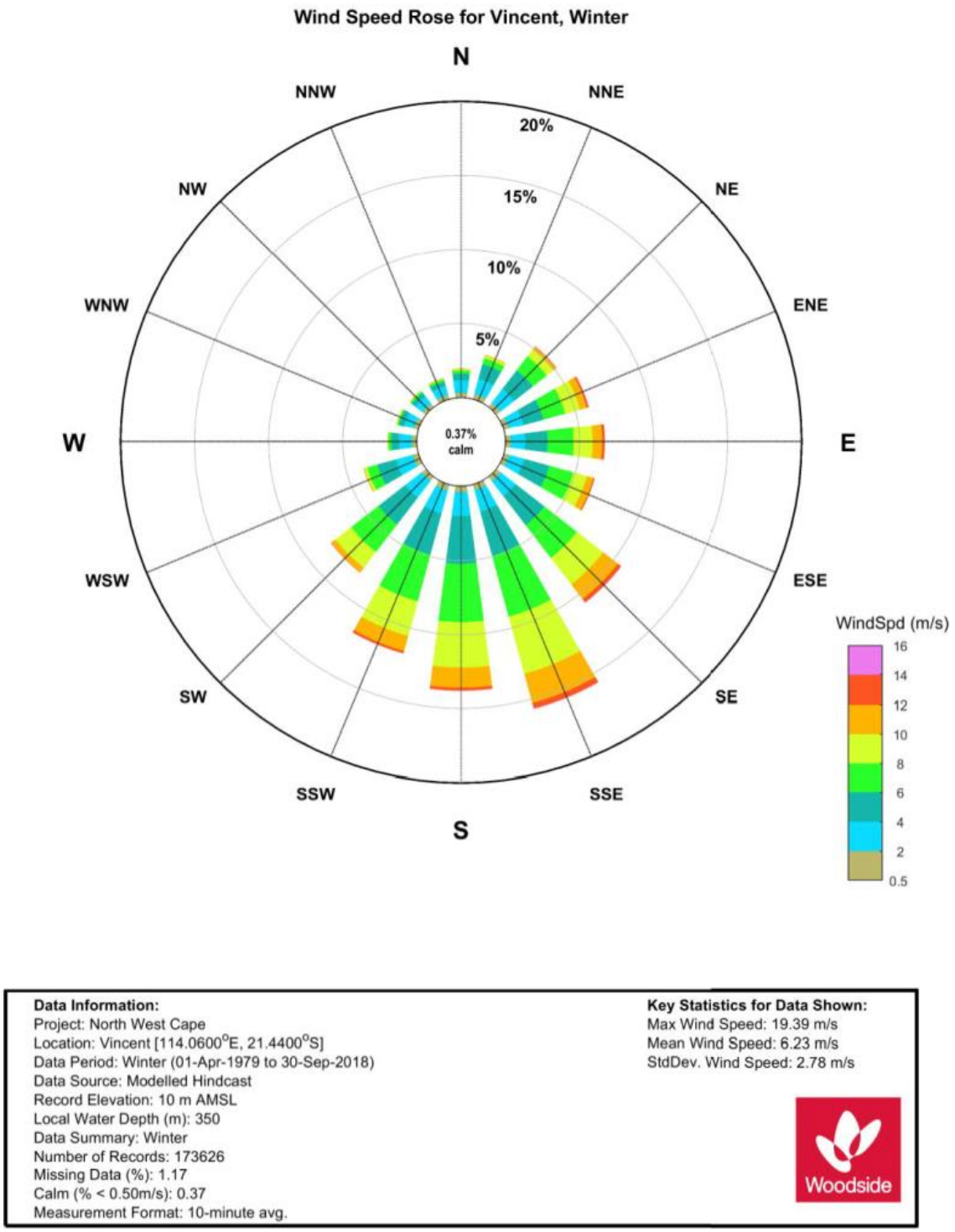

Figure 3. Winter distributions of wind speeds (10-minute at 10 m ASL) 22.5° directional sectors at the Vincent site (Vincent Metocean). Note tropical cyclone events were not included in this distribution. In winter, winds at are predominantly from the S to SE, associated with the South East Trades. Easterly gales are experienced at the Vincent location due to high pressure systems generating from the Great Australian Bight area to the site (MetOcean Engineers, 2005).

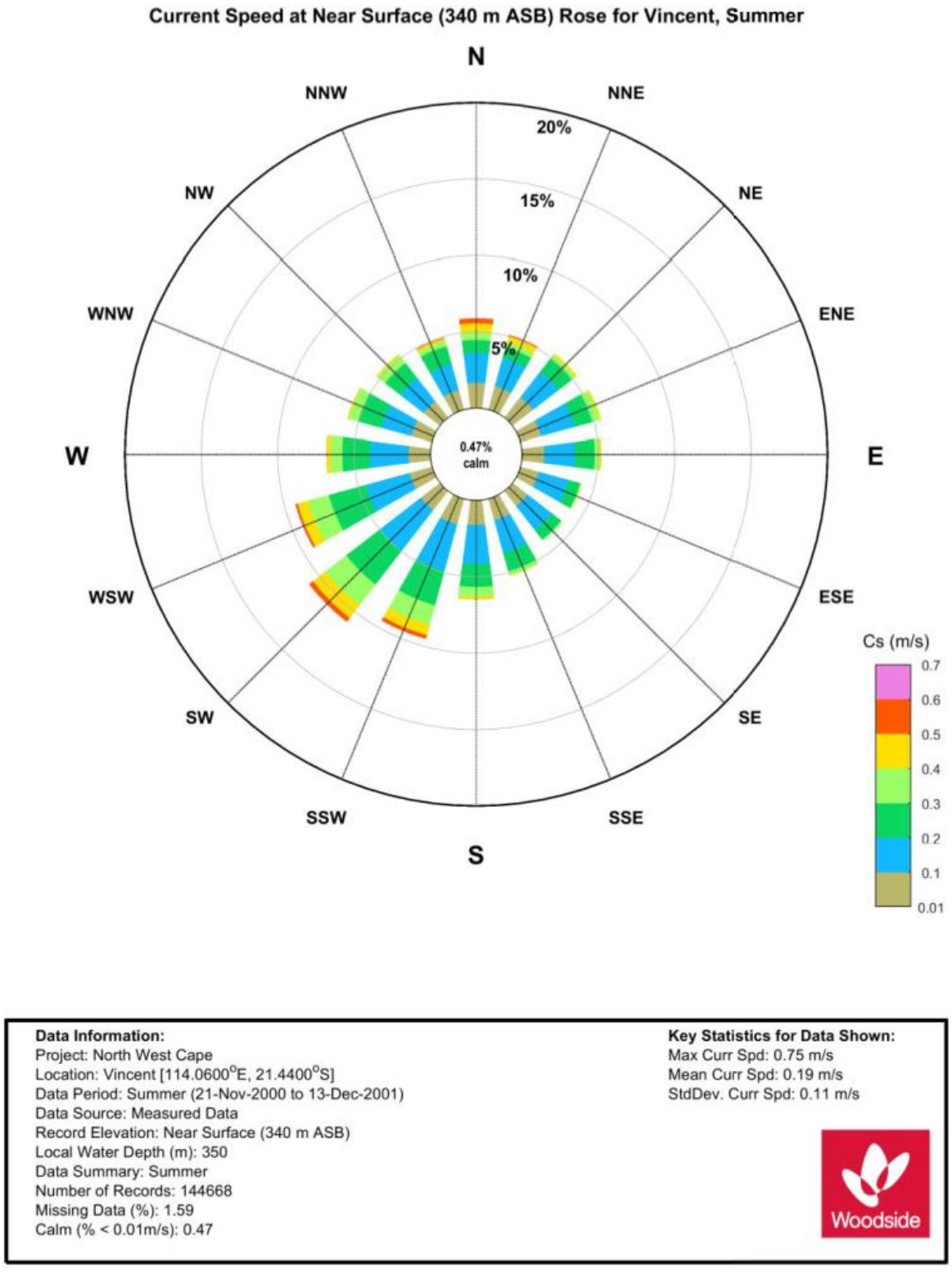

Figure 4. Summer (May - Sep) near surface combined frequency of 1-minute mean current speed and direction (towards) measured at the Vincent location (cyclones removed) (WEL, 2016).

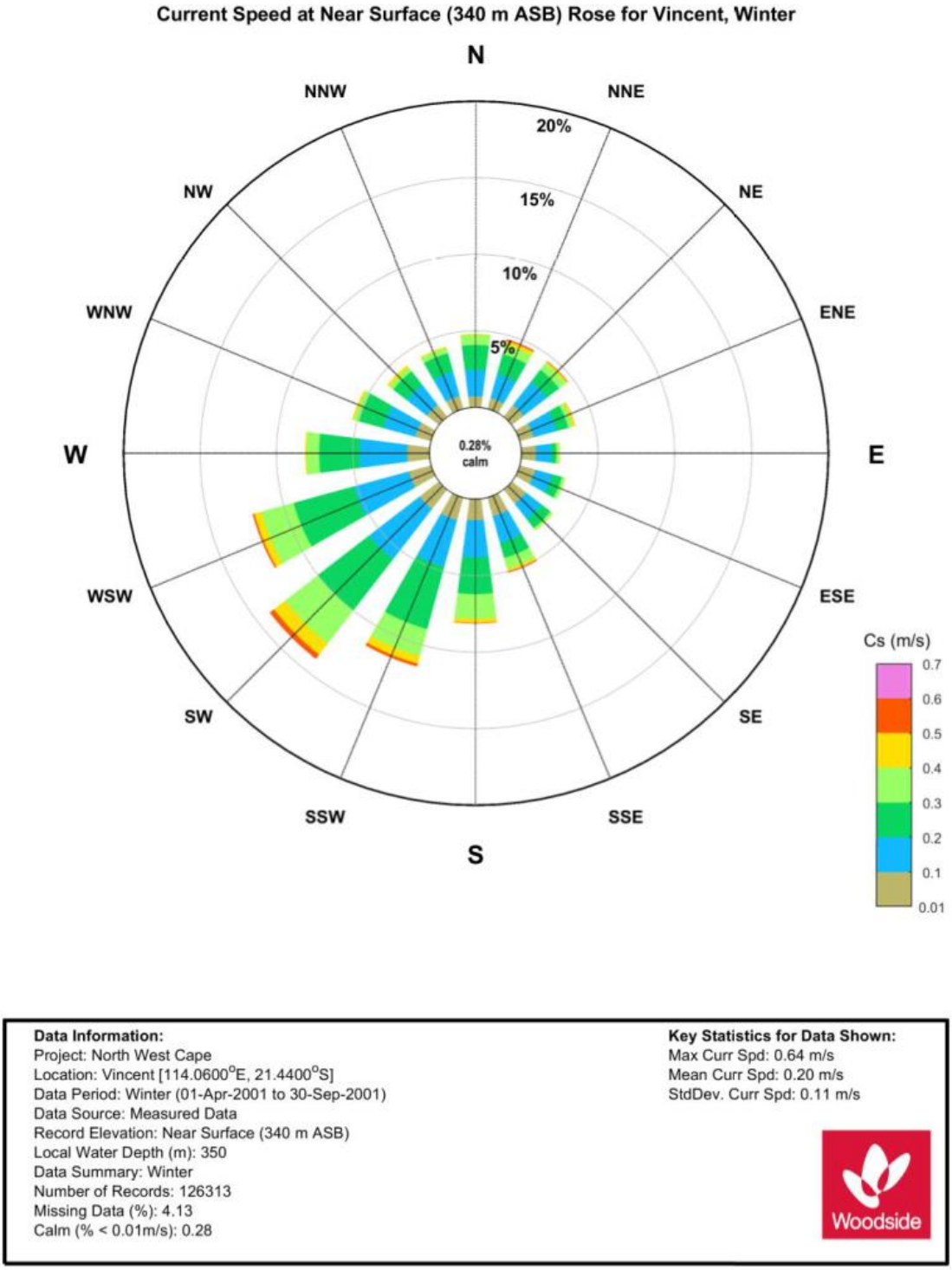

Figure 5. Winter (Nov - Apr) near surface combined frequency of 1-minute mean current speed and direction (towards) measured at the Vincent location (cyclones removed) (WEL, 2016).

REFERENCES

AFMA 2021. Southern Blue Fin Tuna. Accessed 3 June 2021 www.afma.gov.au/fisheries-

management/species/southern-bluefin-tuna

Bureau of Meteorology 2020. Climate Statistics for Australian Locations, Summary Statistics Broome Airport Accessed 1 October 2020 <http://www.bom.gov.au/climate/averages/tables/cw_003003.shtml>.

MetOcean Engineers 2005. Vincent Development Metocean Criteria Report No. R1276.

Metocean Solutions Ltd 2019.West Shelf wave hindcast: Description and validation of SWAN ST6 Wave Model", DRIMS 1401150817.

RPS 2016. Metocean Criteria Guidelines for Modu Mooring on Australia's North West Shelf, DRIMS 1400522719.

RPS Metocean Pty Ltd 2008. "Browse LNG Development – Offshore MetOcean Measurement Programme: September 2006 to February 2008 Final Data Report." JB0020RT0019.

Vincent Metocean 40 Year Non-Cyclonic Metocean Database for Design Studies CRN: VAOOOORT1400067309.

WEL 2011. Greater Western Flank Detailed Metocean Design Criteria, Rev 2. CRN: A3000RG5492827.

WEL 2016. Vincent Basic Design Data Specification sheet Metocean CRN: VA0000RT1400067309.

WEL 2015. Winds Measured at North Rankin A 1995-2015.

WEL 2018. Scarborough Development - Non-Cyclonic and Operational Metocean Design Criteria Spreadsheet, Revision A, CRN: SA0009CT1400722569.

WEL 2019. "Browse Development – Metocean Design Basis" CRN:JJ0013ST1400274448.