Angel Operations Environment Plan

Australian Operations

May 2024

Rev 17

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1 INTRODUCTION

1.1 Overview

Woodside Energy Ltd (Woodside), as Titleholder under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth) (referred to as the Environment Regulations), on behalf of the North West Shelf (NWS) Joint Venture detailed in **Section 1.6**, is operator of the Angel facility. The Angel facility commenced operation in 2008. The facility consists of subsea hydrocarbon gathering systems, a riser platform and an export pipeline. This Environment Plan (EP) is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The activities proposed to occur within Production Licences WA-16-L and WA-3-L and Pipeline Licences WA-31-PL and WA-14-PL are:

- routine production and associated activities
- routine inspection, monitoring, maintenance and repair (IMMR) of the platform and associated subsea infrastructure
- well clean up and commissioning
- drill new well in the Lambert West field
- subsea infrastructure installation
- pre-commissioning and commissioning activities

These activities will hereafter be referred to as the Petroleum Activities Program and form the scope of this EP. A more detailed description of the activities is provided in **Section 3.1**.

This EP has been prepared as part of the requirements under the Environment Regulations, as administered by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA). In accordance with the requirements of regulation 39(1) of the Environment Regulations, Woodside has revised the Angel Operations EP, as a new stage of the activity, to incorporate the tie-back, commissioning and operation of the Lambert West well as a new stage under the Angel Operations EP.

Key components of the Lambert West activity which can be attributed to a new stage of the Angel Operations Environment Plan activity include:

- The activity is a single well therefore the Lambert west well and tie-back are proposed to form part of an existing production system.
- The activity would be conducted within the spatial area described in the existing Angel Operations EP, with a slight temporary expansion to the Operational Area during construction activities.
- The addition of the Lambert West field and associated reserves forms an orderly continuation of the Angel project (EPBC 2004/1805) within existing timeframes specified in EPBC approval.
- The operation of proposed Lambert West wells and subsea infrastructure is consistent with the activities already described within this Angel Operations EP.

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 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 Petroleum Activities Program is carried out in a manner consistent with the principles of ecologically sustainable development (ESD) (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 Petroleum Activities Program 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**. 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 Petroleum Activities Program 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

An EP summary will be prepared based on the material provided in this EP. **Table 1-1** summarises the content that will be provided within the EP summary, as required by regulation 35(7).

Table 1-1: Environment Plan summary

EP summary material requirement	Relevant section of this EP containing EP summary material
The location of the activity	**Section 2.10**
A description of the receiving environment	**Section 4**
A description of the activity	**Section 2.10**
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 7.8**
Response arrangements in the oil pollution emergency plan	**Section 7.12**
Consultation already undertaken and plans for ongoing consultation	**Section 5**
Details of the titleholder's nominated liaison person 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: Environment Plan process phases, applicable Environment Regulations and relevant section of Environment Plan

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 34(c): demonstrates that the environmental impacts and risks of the activity will be of an acceptable level	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(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: systems, practices and procedures performance monitoring Oil Pollution Emergency Plan (OPEP) and scientific monitoring ongoing consultation.	**Section 7** **Appendix D**
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	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), particular relevant values and	No activity, or part of the activity, undertaken in any part of a declared World Heritage property	**Section 2.10** **Section 4** **Section 6**

Criteria for acceptance	Content Requirements/Relevant Regulations	Elements	Section of EP
undertaken in any part of a declared World Heritage property within the meaning of the EPBC Act	sensitivities may include any of the following: (a) the world heritage values of a declared World Heritage property within the meaning of the EPBC 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; (d) 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.		
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 between the titleholder and any relevant person	Consultation in preparation of the EP	**Section 5**
Regulation 34(h): complies with the Act and the regulations	Regulation 23: Details of the Titleholder and nominated liaison 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 7.10**

1.6 Description of the Titleholder

Woodside is the Titleholder for this activity, on behalf of the NWS Joint Venture comprising Woodside Energy Ltd, Woodside Energy (North West Shelf) Pty Ltd, BP Developments Australia Pty Ltd, Chevron Australia Pty Ltd, Japan Australia LNG (MIMI) Pty Ltd, CNOOC NWS Private Ltd and Shell Australia Pty Ltd.

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 http://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 Energy Ltd

11 Mount Street

Perth, Western Australia

T: 08 9348 4000

ACN: 63 005 482 986

1.7.2 Nominated Liaison

Andrew Winter

Corporate Affairs Manager

11 Mount Street

Perth, Western Australia

T: 08 9348 4000

E: feedback@woodside.com.au

1.7.3 Arrangements for Notifying Change

If the titleholder, titleholder's nominated liaison person, or the contact details for the titleholder or the liaison person change, then NOPSEMA will be notified of the change 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**):

- **Compass 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.

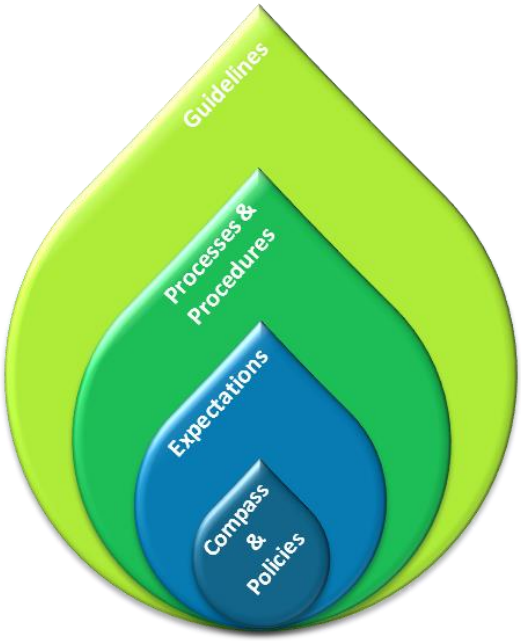


Figure 1-1: The four major elements of the Woodside Management System Seed

The WMS is organised within a Business Process Hierarchy based upon Key Business Activities to ensure 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.

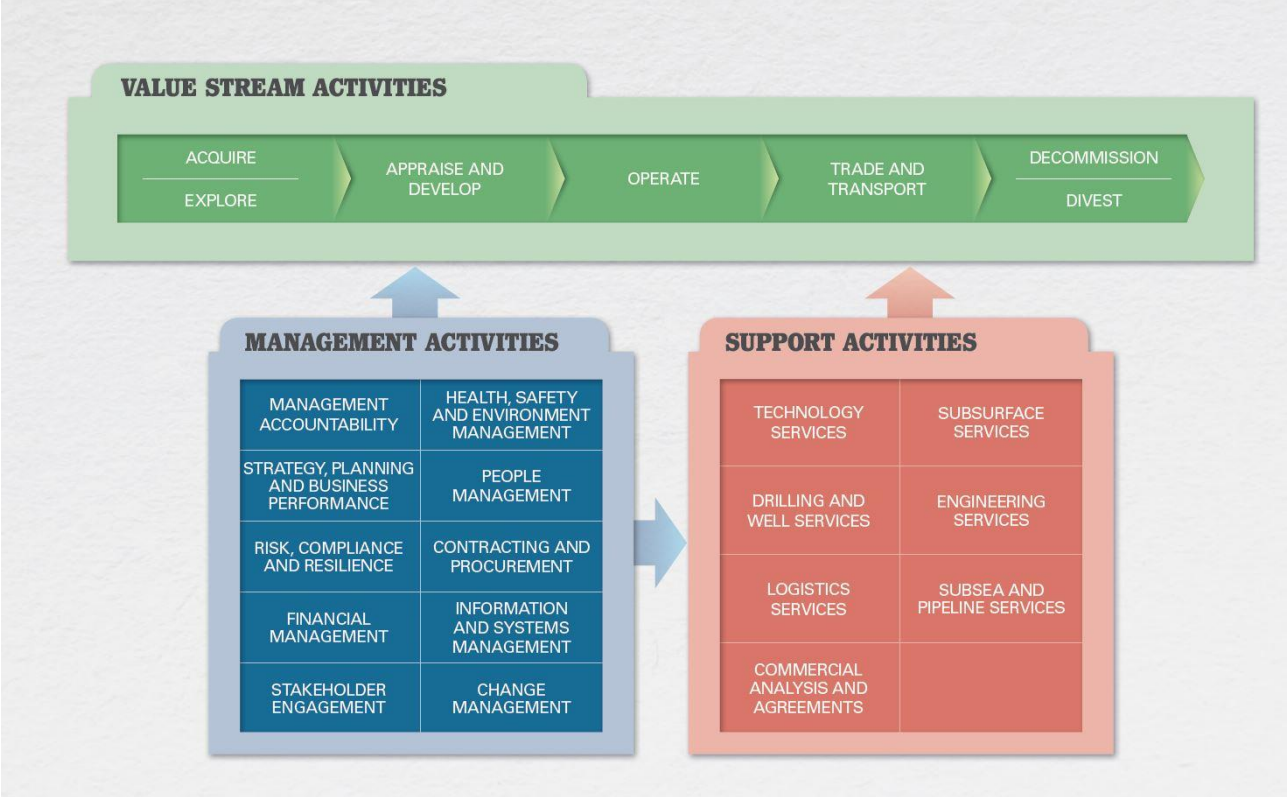


Figure 1-2: The Woodside Management System business process hierarchy

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.

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 risks and impacts of the Petroleum Activities Program 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) controls exploration and production activities 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 of the OPGGS Act are detailed in **Table 1-3**.

Table 1-3: Relevant requirements of Section 572 of the *Offshore Petroleum and Greenhouse Gas Storage Act*

Section number	Relevant Requirement	Relevant section of the EP
Section 270 – Consent to surrender title[1]		
	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		
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 7.3**
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 3.4 and 7.3**
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; and (d) any other law.	**Section 7.3.4.2**

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

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 ESD
- 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.

1.9.2.1.1 Offshore Project Approval

The Angel Gas and Condensate Field was referred for assessment under the EPBC Act and was determined to be a Controlled Action. The level of assessment was set at Preliminary Documentation, and the action was subsequently approved with conditions on 27 June 2005.

Consolidated Approval Notice – Angel Gas and Condensate Field (EPBC 2004/1805) 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 EP related to the action that was submitted to NOPSEMA after 27 February 2014 and is 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 the Angel gas and condensate field (EPBC 2004/1805) relevant to the Petroleum Activities Program

Condition number	Condition	Relevant section of EP
1[1]	The person taking the action must submit, for the Minister's approval, a plan (or plans) for managing the offshore impacts of the action. The plan (or plans) must include measures for the following individual activities: c) Operations: (i) Produced water monitoring, management and verification; (ii) If naturally occurring radioactive materials (NORMs) are found to be present, measures to manage their collection, handling and disposal; and (iii) Interaction procedures for supply vessels and aircraft that are consistent with Part 8 of the Environment Protection and Biodiversity Conservation Regulations 2000 and cetacean reporting.	(i) – **Section 6.6.5** (ii) – **Section 6.8.7** (iii) – **Section 6.7.3**
2	The person taking the action must submit a decommissioning plan (or plans) for approval by the Minister prior to decommissioning of the development. The plan (or plans) must consider the complete removal of all structures and components above the sea floor. The approved plan (or plans) must be implemented.	Planning for decommissioning is outlined in **Section 7.3**
6	If the person taking the action wishes to carry out any activity otherwise than in accordance with the plans referred to in conditions 1 or 2, the person taking the action may submit for the Minister's approval a revised version of any such plan. If the Minister approves a revised plan so submitted, the person taking the action must implement that plan instead of the plan as originally accepted.	This EP

1 Condition 1a) and 1b) (not shown) have been met through previous plans.

Condition number	Condition	Relevant section of EP
8	A plan required by condition 1, 2 or 6 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: (a) Was submitted to NOPSEMA after 27 February 2014; and (b) Either: (i) Is in force under the OPGGS Environment Regulations; or (ii) Has ended in accordance with regulation 46 of the OPGGS Environment Regulations.	The implementation of this EP is considered to meet the requirements of this condition
8A	Where a plan required by condition 1 or 6 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: (a) Was submitted to NOPSEMA after 27 February 2014; and (b) Either: (i) Is in force under the OPGGS Environment Regulations; or (ii) 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
8B	Where an environment plan, which includes measures specified in the conditions referred to in conditions 8 and 8A above, is in force under the OPGGS Environment Regulations that relates to the taking of the action, the person taking the action must comply with those measures as specified in that environment plan.	The implementation of this EP is considered to meet the requirements of this condition

1.9.2.1.2 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 6.9**.

1.9.2.1.3 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 described in **Appendix C**. 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).

1.9.2.1.4 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 1-5**.

Table 1-5: Relevant management principles under Schedule 5 – Australian World Heritage management principles of the *Environment Protection and Biodiversity Conservation 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 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 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.

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. A copy of Woodside's Risk Management Policy is provided in **Appendix A**.

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 (**Section 7.2.4**):

- 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 **Section 2.2** to **Section 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.

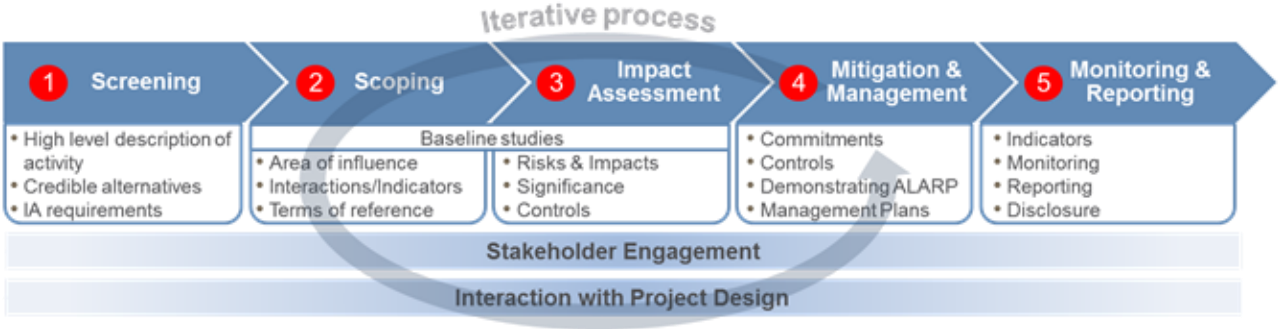


Figure 2-2: Woodside's impact assessment process

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 to ensure 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**.

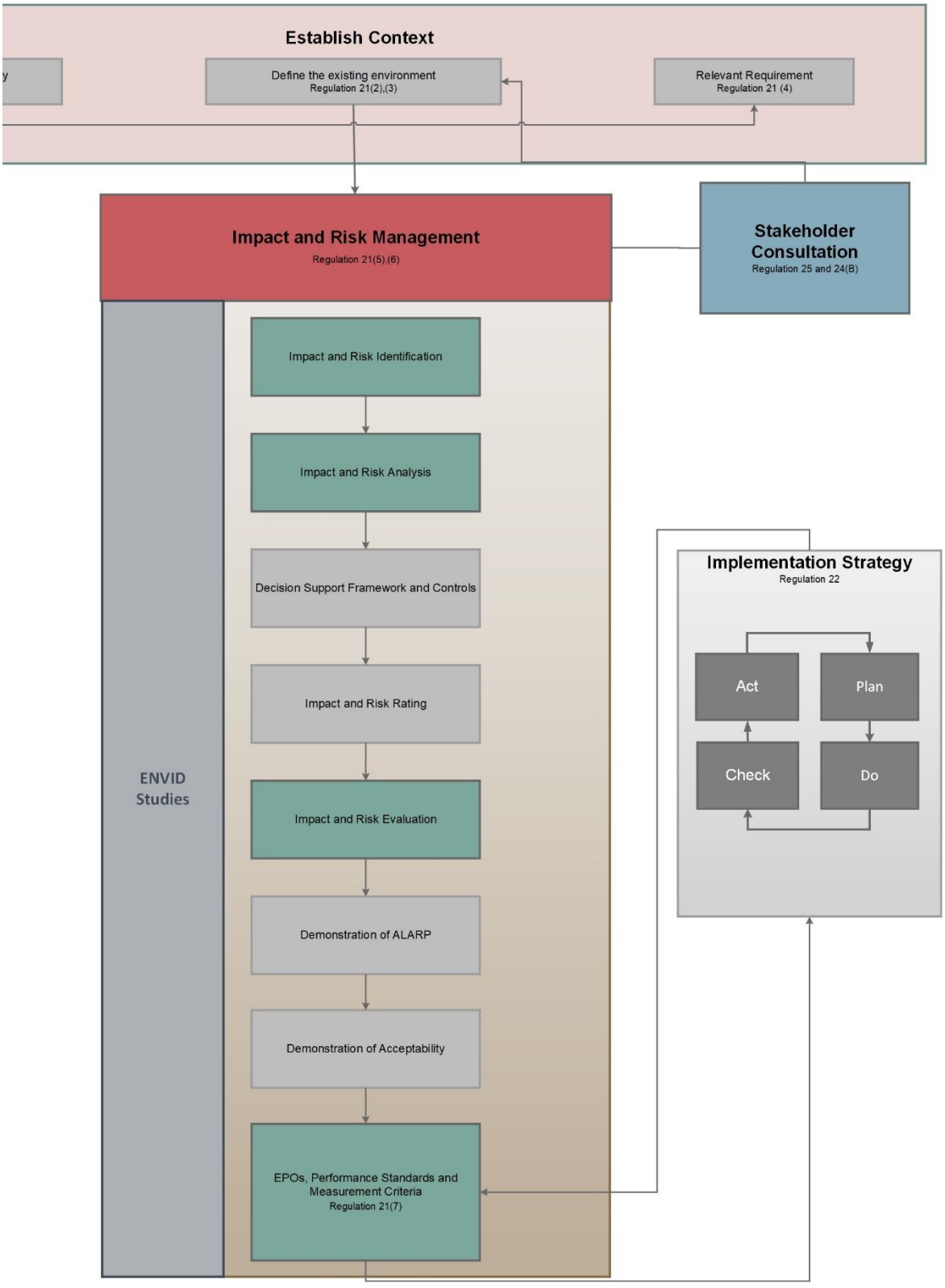


Figure 2-3: Environment Plan development process

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'[2] 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[3] events.

The Existing Environment (**Section 4**) is structured into subsections defining the physical, biological, socio-economic and cultural attributes of the area of interest, 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 Petroleum Activities Program (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 presented in **Section 6.7.2**. MNES, as defined under the EPBC Act, are addressed through Woodside's impact and risk assessment (**Section 6**).
- 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.

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

[3] 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.

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 Petroleum Activities Program are identified and reviewed; and are presented in **Appendix B**.

The Risk Management Climate and Environment and Biodiversity Policies are referenced 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 assessment presented in this EP has been informed by recent and historic hazard and environmental risk identification studies (e.g., HAZID/ENVID), consequence modelling studies for high consequence, low probability environmental risks, bowtie risk assessments for MEEs as required by Woodside's PSRA processes, desktop reviews and studies associated with the Petroleum Activities Program. Impacts, risks and potential consequences were identified based on planned and potential interaction with the activity (based on the description in **Section 3**), the existing environment (**Section 4**) and the outcomes of Woodside's consultation process (**Section 6**). 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**.

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.

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

- 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.

2.6.1.1.1 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 utilise professional judgment.

2.6.1.1.2 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 ensure 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.

2.6.1.1.3 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.

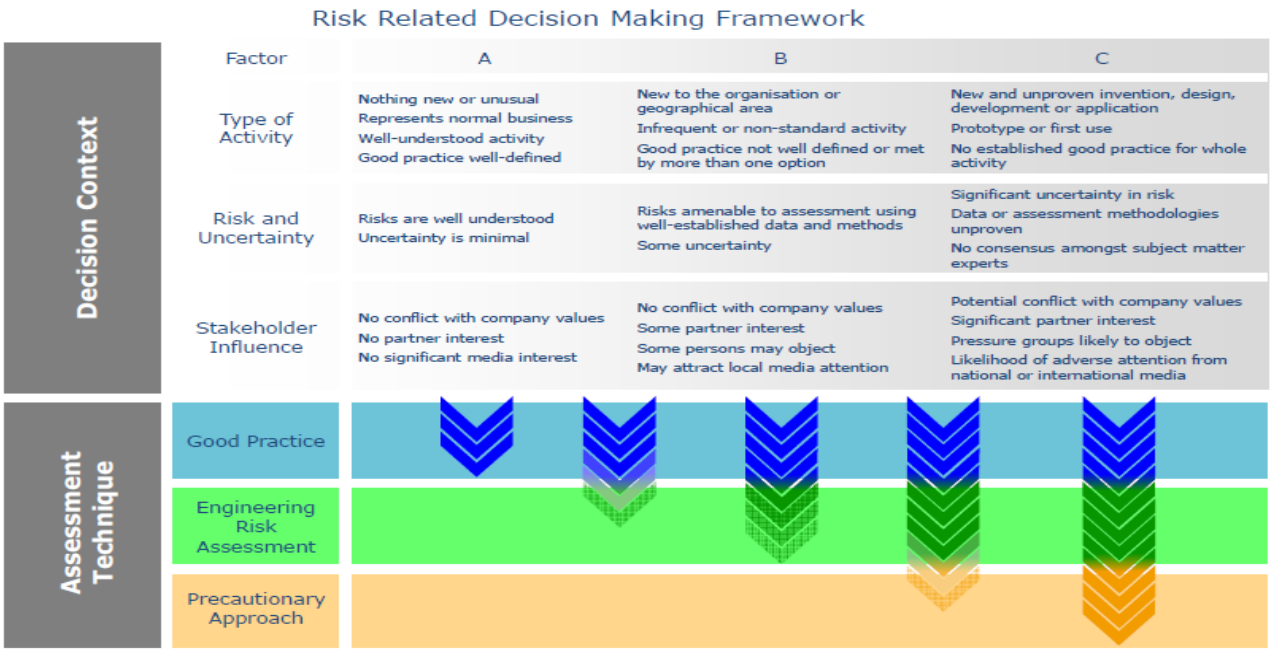


Figure 2-4: Risk-related decision-making framework (Oil and Gas UK, 2014)

2.6.1.1.4 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 the Woodside Compass. 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.

2.6.1.1.5 Decision Calibration

To determine that the alternatives selected, and 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**).

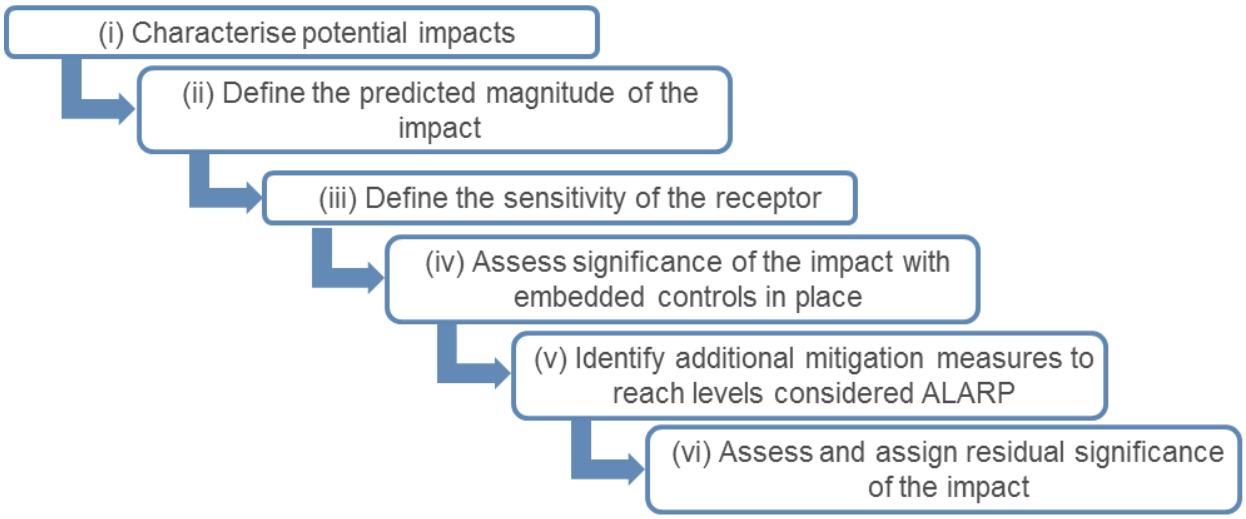


Figure 2-5: Environmental risk and impact analysis

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.

2.6.4.1.1 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.

2.6.4.1.2 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

2.6.4.1.3 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.

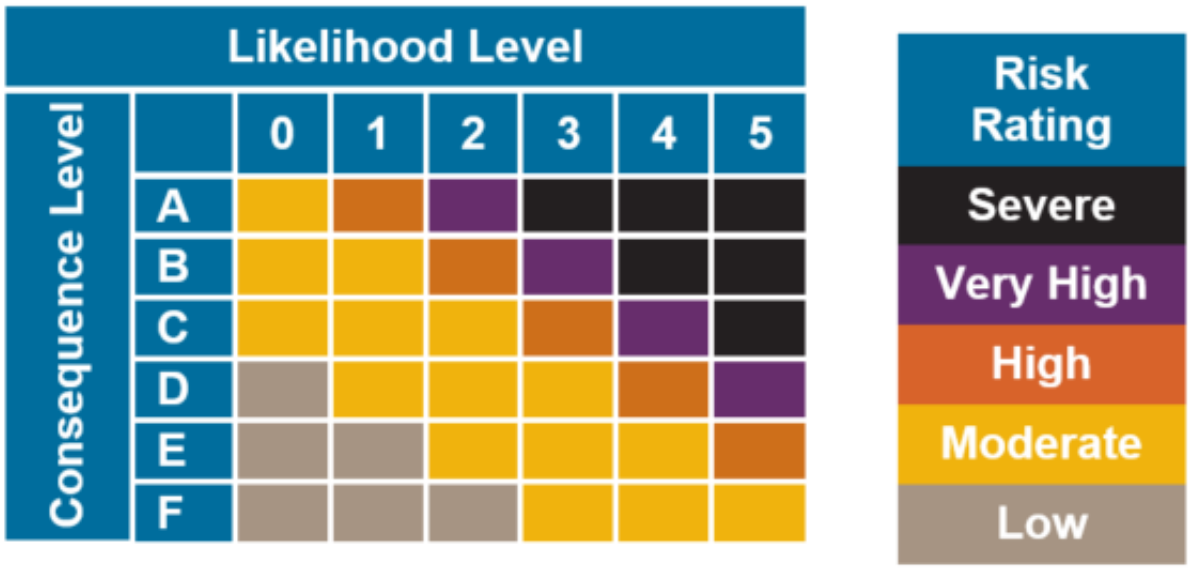


Figure 2-6: Woodside risk matrix – risk level

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 ensure the continual management of risk to ALARP by identifying risk reduction measures and assessing acceptability.

2.7 Classification and Analysis of Major Environment Events

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 to ensure 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 Major Environment Event 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 to ensure 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.

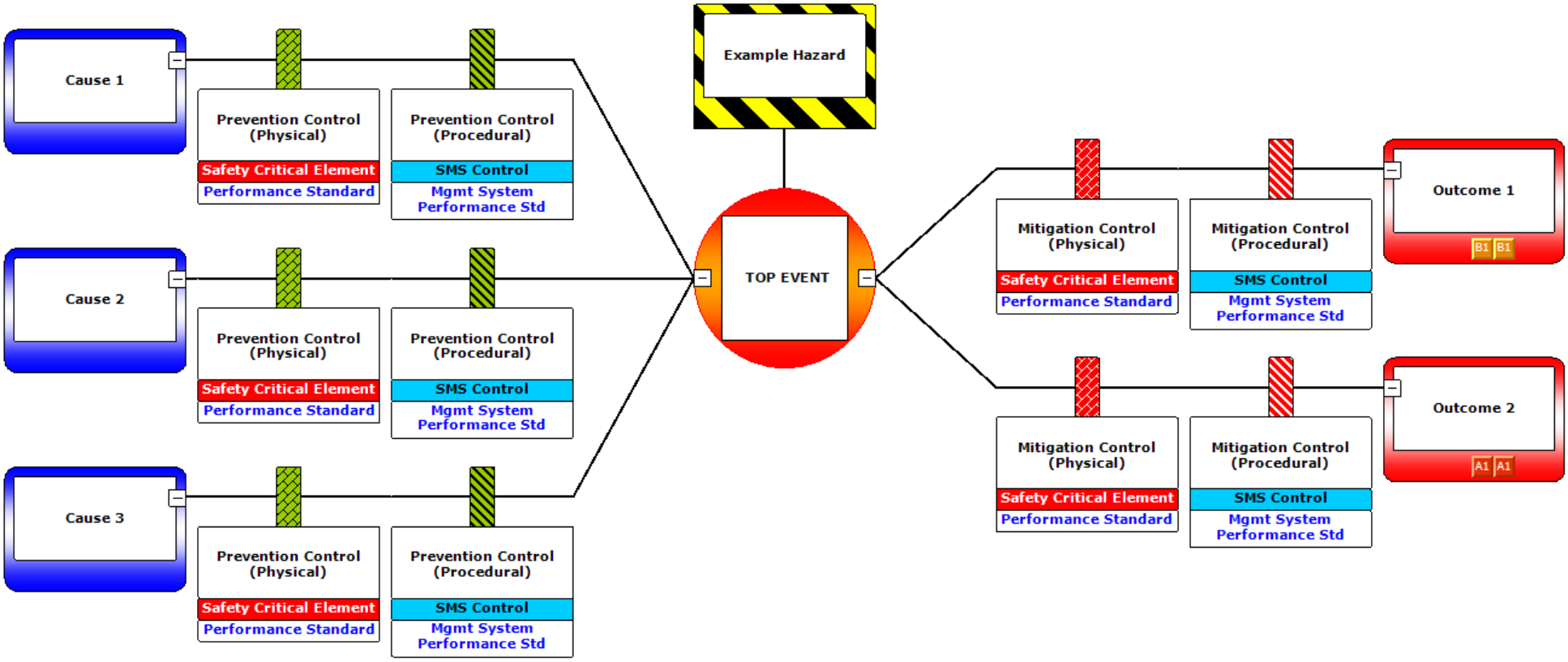


Figure 2-7: Example of bowtie diagram structure

2.7.4 Major Environment Event 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 Procedure 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 ensure 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 ensure 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 7.2.6**). 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, ensure risks are managed 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 Angel operations are presented in **Section 6.7.2** 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 7.2.6**.

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 ESD – 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 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 As Low As Reasonably Practicable

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 demonstrating 'as low as reasonably practicable.

Risk	Impact	Decision Type
Low and Moderate (C, D, E or F level consequence)	***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 (A or B level consequence)	***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 shown good industry practice and RBA have been employed, if legislative requirements are met, societal concerns are accounted for, and 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 ESD 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 advices, conventions and significant impact guidelines (e.g., MNES). 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

To support the demonstration of acceptability, a separate assessment is undertaken to demonstrate that the EP is not inconsistent with any relevant recovery plans or threat abatement plans (refer **Section 6.9**). The steps in this process are:

- Identify relevant listed threatened species and ecological communities (**Section 4.6**).
- Identify relevant recovery plans and threat abatement plans (**Section 6.9**).
- 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 Petroleum Activities Program (**Section 6.9**).
- For those objectives/action areas applicable to the Petroleum Activities Program, 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 6.9**).

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 Petroleum Activities Program 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 Petroleum Activities Program 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 Petroleum Activities Program 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 Petroleum Activities Program under this EP. It includes the location of the activity, general details of the Angel facility and associated infrastructure, the operational details of the activity, and additional information relevant to consideration of environmental risks and impacts.

The Angel facility currently produces gas and condensate from the Lambert Deep field via one well (LDA-01) and associated subsea infrastructure. This EP includes the ongoing operation of the Angel facility (**Section 3.1.1**) and drilling and tie-back activities associated with a new well (LDA-02) in the Lambert West field (**Section 3.1.2**). The LDA-02 well is to be the final well tied back to the Angel facility. An overview of the Petroleum Activities Program, as defined in **Section 1.1** is provided in **Table 3-1**.

3.1.1 Angel Operations Overview

The Angel facility includes a riser platform consisting of a single processing train, which processes the production fluids via cooling, separation and dehydration. The condensate and gas are then comingled for export, and transported along an export pipeline into the first trunkline (1TL) to the Karratha Gas Plant (KGP) for processing (the operation of 1TL is beyond the scope of this EP).

A single well (LDA-01) produces from the Lambert Deep field via the Lambert Deep two-slot production manifold and 10-inch flowline.

There are a further three production wells tied back to the Angel facility via rigid flowlines that are no longer producing from the Angel reservoir due to high water content. These have been shut-in and are scheduled to be permanently plugged for abandonment. Ongoing preservation of the non-producing Angel infrastructure is covered under this EP. Following plug and abandonment (P&A) the associated subsea infrastructure is planned to be decommissioned. P&A and decommissioning activities will be covered under a separate EP. These activities are outlined in **Table 3-1.**

3.1.2 Lambert West Tie-back Overview

The Lambert West tie-back consists of a subsea tie-back to the Angel facility via the existing Lambert Deep subsea infrastructure. The Lambert West Field lies in 130 m water depth and is located approximately 15 km north-west of the Angel Platform (80 m water depth).

The Lambert West tie-back consists of one well, LDA-02, drilled and connected to the Lambert Deep (LD) two-slot production manifold using a flexible jumper, installation of a controls subsea distribution unit and disconnection of the LDA01 electrical and hydraulic flying leads from the Lambert Deep Umbilical Termination Assembly (UTA) and reconnecting them to the subsea distribution unit.

The well will be drilled and completed using a mobile offshore drilling unit (MODU). Typically, two or three support vessels will support the MODU during drilling activities (**Section 3.5**), 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 (**Section 3.5.3**) will be undertaken using an installation vessel. Another installation vessel, similar to vessels used for IMMR, may be used to install the tubing head spool and 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 (see **Section 3.5**) and port, however transit activities are not included in the scope of this EP.

The scope for this EP covers the tie-back of the Lambert West field, 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**.

Table 3-1: Petroleum Activities Program overview

Item	Description
Production Licences	WA-16-L and WA-3-L pipeline licenses WA-14-PL and WA-31-PL.
Pipeline Licences	WA-14-PLand WA-31-PL
Platform Location	North West Shelf
Water depth	70 m to 130 m
Key components of platform facilities	Angel fixed riser platform, processing equipment and utilities
Number of wells	• two production wells (one new) • three shut-in production wells • four abandoned with well heads • exploration temporarily abandoned wells
Subsea infrastructure	**Existing:** • Lambert Deep manifold • LDA01 tree and flexible jumper • Lambert Deep umbilical, UTA and flying leads • Angel platform • Angel export pipeline • Angel umbilicals and flowlines (shut in) **Lambert West Proposed:** • one subsea Xmas tree and wellhead (LDA-02) • an 8” ID jumper approximately 300 to 500 m long between the Lambert Deep manifold and the LDA02 well • two sets of flying leads • one subsea distribution unit
MODU	Moored MODU or hybrid moored/DP MODU
Vessels	• Angel Operations: – platform support vessels, subsea support vessels, heavy lift vessels and others appropriate to nature of petroleum activities • Lambert West Tie-back: – installation vessel for installing the subsea infrastructure – IMMR vessel for Xmas tree installation, isolation testing or contingent activities – support vessels including barge(s), heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) (AHVs) and general supply/support vessels
Key activities	• Angel Operations: – routine production – routine IMMR of the platform and associated subsea infrastructure – well clean-up and commissioning – non-routine and unplanned activities and incidents associated with the above • Lambert West Tie-back: – subsea infrastructure stabilisation – mooring installation for the MODU – development drilling and completions activities via MODU – well intervention, workovers and well kill activities from MODU – site surveys – installation of flowline, flying leads, subsea tree, subsea distribution unit

Item	Description
	– tie-in to existing subsea infrastructure, including disconnecting the LDA-01 well from the Lambert Deep manifold and reconnecting it to the subsea distribution unit – installation of Xmas tree – pre-commissioning of the new subsea infrastructure – cold commissioning of the well and Xmas tree – start-up to the Angel facility including unload of well to host and performance testing – contingent intervention, workover, or re-drill for the existing well (LDA-01) and new well (LDA-02)

3.2 Location

The Angel facility is located in Commonwealth waters on the NWS of Western Australia (WA) and consists of subsea hydrocarbon gathering systems, a riser platform and an export pipeline. The Angel platform is located in Production Licence WA-3-L. Associated subsea production infrastructure is located in Production Licences WA-3-L and WA-16-L, and the Lambert Deep flowline in Pipeline Licence WA-31-PL. The export pipeline, connecting the Angel platform to the North Rankin Complex (NRC), is located in Pipeline Licence WA-14-PL. The LDA-2 well proposed for Lambert West tie-back will be located in Production Licence WA-16-L.

The Angel platform is located approximately 49 km east of the NRC and 123 km north-west of the KGP (**Figure 3-1**). Gas and condensate produced from the Angel facility are exported via the 49 km long export 30-inch pipeline, which ties into the NRC 1TL.

The Angel facility is marked on nautical maps surrounded by a 500 m petroleum safety zone (PSZ). The Angel export pipeline and Lambert Deep flowline are also marked on nautical charts. The coordinates and petroleum titles of the Angel facility infrastructure are presented in **Table 3-2**.

Table 3-2: Approximate location details for the Petroleum Activities Program, including all relevant infrastructure

Structure	Water depth (approx. m LAT)	Latitude	Longitude	Title
Production wells				
LDA-01 well	130	19° 26' 07.220" S	116° 28' 51.314" E	WA-16-L
LDA-02[4] well	130	19º 26’ 11.80” S	116º 28’ 49.04” E	WA-16-L
Production wells (shut-in)				
AP2 well	80	19° 28' 59.7433” S	116° 36' 37.4083” E	WA-3-L
AP3 well	80	19° 30' 38.5126” S	116° 36' 18.5726” E	WA-3-L
AP4 well	80	19° 31' 18.1097” S	116° 35' 13.4346” E	WA-3-L
Exploration wells temporarily abandoned (ETA)				
Angel-3	71	19° 32' 26.031" S	116° 37' 47.254" E	WA-3-L
Abandoned wells with wellhead (AW)				
Angel-1	91	19° 30' 14.901" S	116° 35' 52.545" E	WA-3-L
Angel-2	88	19° 27' 53.638" S	116° 39' 29.501" E	WA-3-L
Lambert-1	127	19° 27' 18.163" S	116° 29' 27.442" E	WA-16-L

[4] Proposed base case LDA-02 (Lambert West) top hole location. The LDA-02 well will be drilled and completed during the LW drilling and tie-back activity, included in the PAP covered by this EP. The exact location is subject to final engineering design and may differ by approximately 200 m. Therefore, the location provided is approximate.

Structure	Water depth (approx. m LAT)	Latitude	Longitude	Title
Production subsea infrastructure				
Angel platform	80	19° 29' 55.144" S	116° 35' 53.066" E	WA-3-L
Angel export pipeline	80 (Angel) 125 (NRC)	19° 29' 54.72169" S (Angel) 19° 35' 11.11086" S (NRC)	116° 35' 52.9073" E (Angel) 116 ° 8 ' 23.9984" E (NRC)	WA-14-PL
LDA manifold	130 m	19° 26' 15.029" S	116° 29' 28.721" E	WA-16-L
LD flowline	80 (platform) 130 (well)	19° 19' 53.70" (platform) 19° 26' 10.95" S (well)	116° 35' 52.21" E (platform) 116° 28' 57.02" E (well)	WA-31-PL
LD umbilical	80 (platform) 129 (well)	19° 29' 53.91" S (platform) 19° 26' 8.84" S (well)	116° 35' 52.29" E (platform) 116° 28' 52.69" E (well)	WA-16-L and WA-3-L
AP2 umbilical	80 (platform) 84 (well)	19° 29' 53.97" S(platform) 19° 28' 59.71" S (well)	116° 35' 52.49" E (platform) 116° 36' 37.38" E (well)	WA-3-L
AP3 umbilical	80 (platform) 78 (well)	19° 29' 53.91" S (platform) 19° 30' 38.96" S (well)	116° 35' 52.68" E (platform) 116° 36' 18.57" E (well)	WA-3-L
AP4 umbilical	80 (platform) 77 (well)	19° 29' 55.46" S (platform) 19° 31'18.56" S (well)	116° 35' 52.17" E (platform) 116° 35' 13.40" E (well)	WA-3-L
Shut-in subsea infrastructure				
AP2 flowline	80 (platform) 84 (well)	19° 29'52.95" S (platform) 19° 28' 59.06" S (well)	116° 35' 51.23" E (platform) 116° 36' 36.67° E (well)	WA-3-L
AP3 flowline	83 (platform) 80 (well)	19° 29' 53.39" S (platform) 19° 30' 37.28" S (well)	116° 35' 54.75" E (platform) 116° 36' 19.43" E (well)	WA-3-L
AP4 flowline	82 (platform) 80 (well)	19° 29' 54.30" S (platform) 19° 31' 17.32" S (well)	116° 35' 50.08" E (platform) 116° 35' 12.78" E (well)	WA-3-L

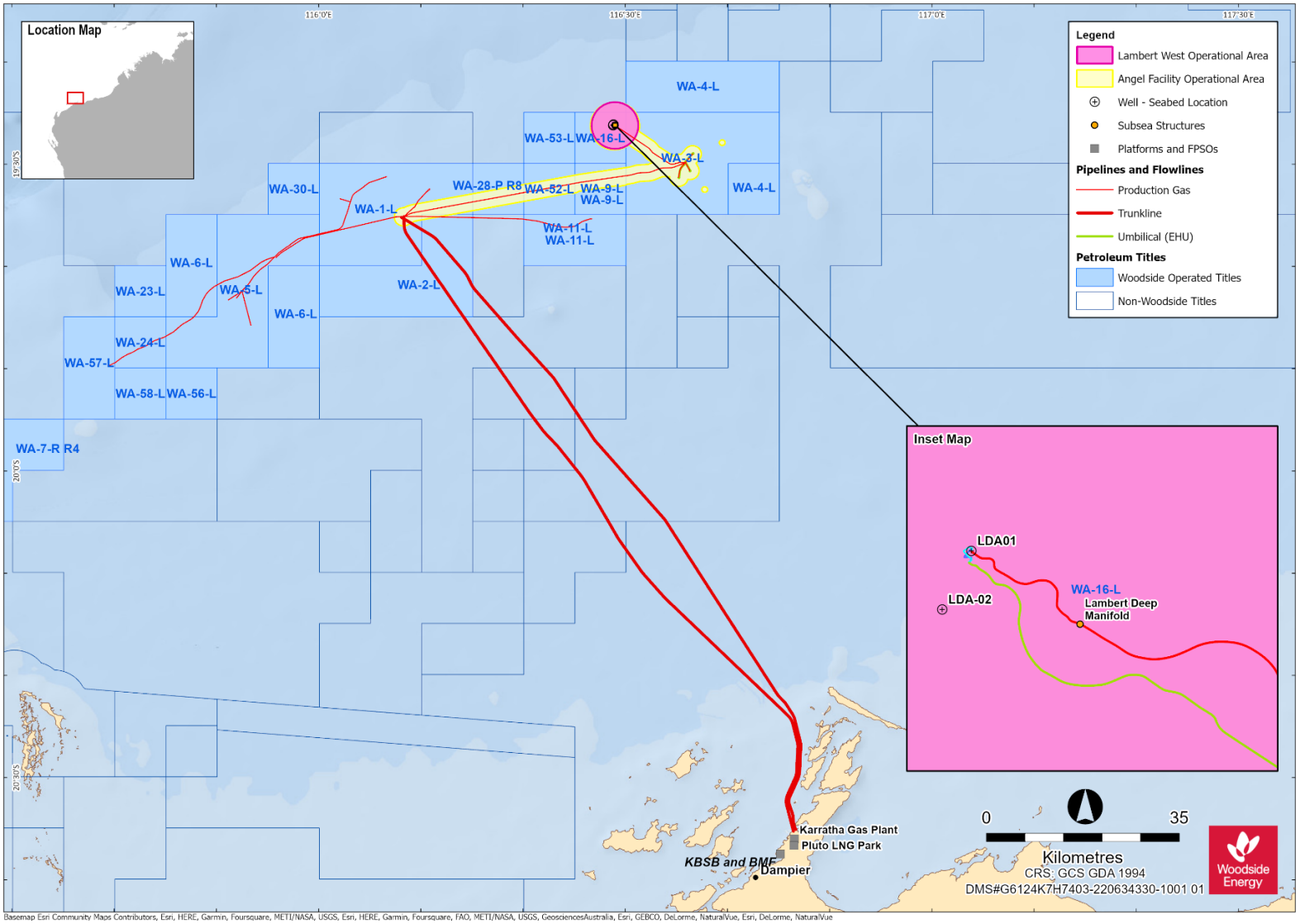


Figure 3-1: Location of the Petroleum Activities Program

3.2.1 Petroleum Activities Area

The spatial boundary of the Petroleum Activities Program (**Figure 3-1)** has been described and assessed using two Operational Areas, the Angel Operational Area and the Lambert West 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.

3.2.1.1.1 Angel Operational Area

The Angel Operational Area includes:

- the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the Angel facility
- the export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure
- Angel subsea hydrocarbon gathering system infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP-4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure
- Lambert Deep and Lambert West subsea hydrocarbon gathering system infrastructure including wells LDA-01 and LDA-02, flowline (Pipeline Licence WA-31-PL), umbilicals and an area within 1500 m around the subsea infrastructure
- ETA and AW wells and an area of 500 m around each wellhead.

The Angel Operational Area will also include the Lambert West subsea hydrocarbon gathering system infrastructure once tie-back is complete, including the LDA-02 well and an area within 1500 m around the subsea infrastructure.

3.2.1.1.2 Lambert West Operational Area

The Lambert West Operational Area has a radius of 4500 m centred on the Lambert Deep Manifold, to allow for MODU mooring operations, drilling of the LDA-02 well, installation of subsea infrastructure (including disconnection of the LDA-01 well EFLs/HFLs and reconnection to the subsea distribution unit), pre-commissioning and related petroleum activities.

The Lambert West 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, operating within the Lambert West Operational Area, will also be surrounded by a 500 m SEZ when on-location, which will be under the control of the vessel master.

3.3 Timing

The Angel facility commenced production in 2008. AP wells were in production up to late 2020 when they were shut-in. Once production from these wells ceased, Angel topsides processing equipment and subsea infrastructure were placed into preservation mode. Angel topsides processing equipment were recommissioned for the Lambert Deep well (LDA-01) tie-back in 2022.

Decommissioning planning for Angel is underway to meet the requirements of Section 572 and Section 270 of the OPGGS Act. Further information on decommissioning is outlined in detail in **Section 7.3.4** and will be subject to future separate EPs:

- Plug and abandonment activities are currently planned to commence by 1 December 2025 subject to approvals and vessel availability. This work will be covered under the North West Shelf Phase 1 Plug and Abandonment EP, which is due to be submitted to NOPSEMA for assessment in January 2025.
- Subsea infrastructure removal activities are currently planned to commence by 1 December 2026 subject to approvals and vessel availability, this work will be covered under the Angel Flowline and Umbilical Removal EP, due to be submitted to NOPSEMA for assessment in March 2025. Angel Operations.

The Angel facility is designed to operate 24 hours per day, 365 days per year. This EP is intended to remain in force in accordance with Regulation 36 of the Environment Regulations.

3.3.1 Lambert West Tie-back

Lambert West tie-back activities are planned to commence in Q3 2024 with the drilling of the Lambert West (LDA-02) well and related subsea installation is planned to commence from Q4 2024 (**Table 3-3**). Lambert Deep and Lambert West reservoir end of field life (EoFL) is anticipated in 2027 subject to reservoir performance.

Drilling operations for the LDA-02 production well are expected to take about 50 to 60 days to complete, including mobilisation, demobilisation and contingency. Installation of subsea infrastructure and pre-commissioning is anticipated to commence following drilling and is expected to have a cumulative duration of about four weeks (including mobilisation, demobilisation and contingency). Drilling and installation of subsea infrastructure may be performed over multiple campaigns.

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 LDA-02 well including 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	2024 (7 to 10 days per activity)
Drilling and completions	2024 (50 to 60 days) 2025 (contingency)
Subsea installation and pre-commissioning/cold commissioning	2024 (~4 weeks) 2025 (contingency)
Well start-up and performance testing	2024 (~3 weeks) 2025 (contingency)

3.4 Angel Operations

3.4.1 Overview

This section provides a description of the Angel facility and the activities that are undertaken during operations.

The Angel facility includes a single processing train on the riser platform, which processes the production fluids via cooling, separation and dehydration. The condensate and gas are then comingled for export and transported along an export pipeline to the NRC.

IMMR activities, and the ongoing preservation of non-producing Angel infrastructure are also covered under this EP.

3.4.2 Angel Facility Layout and Description

This section provides an overview of the Angel facility, including existing and proposed infrastructure, as relevant to consideration of the environmental risks and impacts of the Petroleum Activities Program.

3.4.2.1 Angel Topsides

The Angel platform topside comprises of two decks. The main deck is plated and the cellar deck north of the blast wall is grated. Two grated mezzanine decks are provided in the process area north of the blast wall, and a single plated mezzanine deck is provided south of the blast wall. A pedestal crane is located on the east side of the deck and a boom-rest on the west. A subcellar deck is provided under the northern end of the cellar deck to accommodate the Emergency Shutdown valves and drains tanks. The Angel export riser is located at the base of the riser platform. A flare boom projects northward from the north face of the topside. The helideck is above the south-west corner.

Although the riser platform is not normally crewed (NNC), accommodation facilities are installed on the southern end of the topside for personnel required for campaign maintenance, commissioning, and shutdown activities. **Figure 3-2** shows the layout of the topsides on the Angel facility.

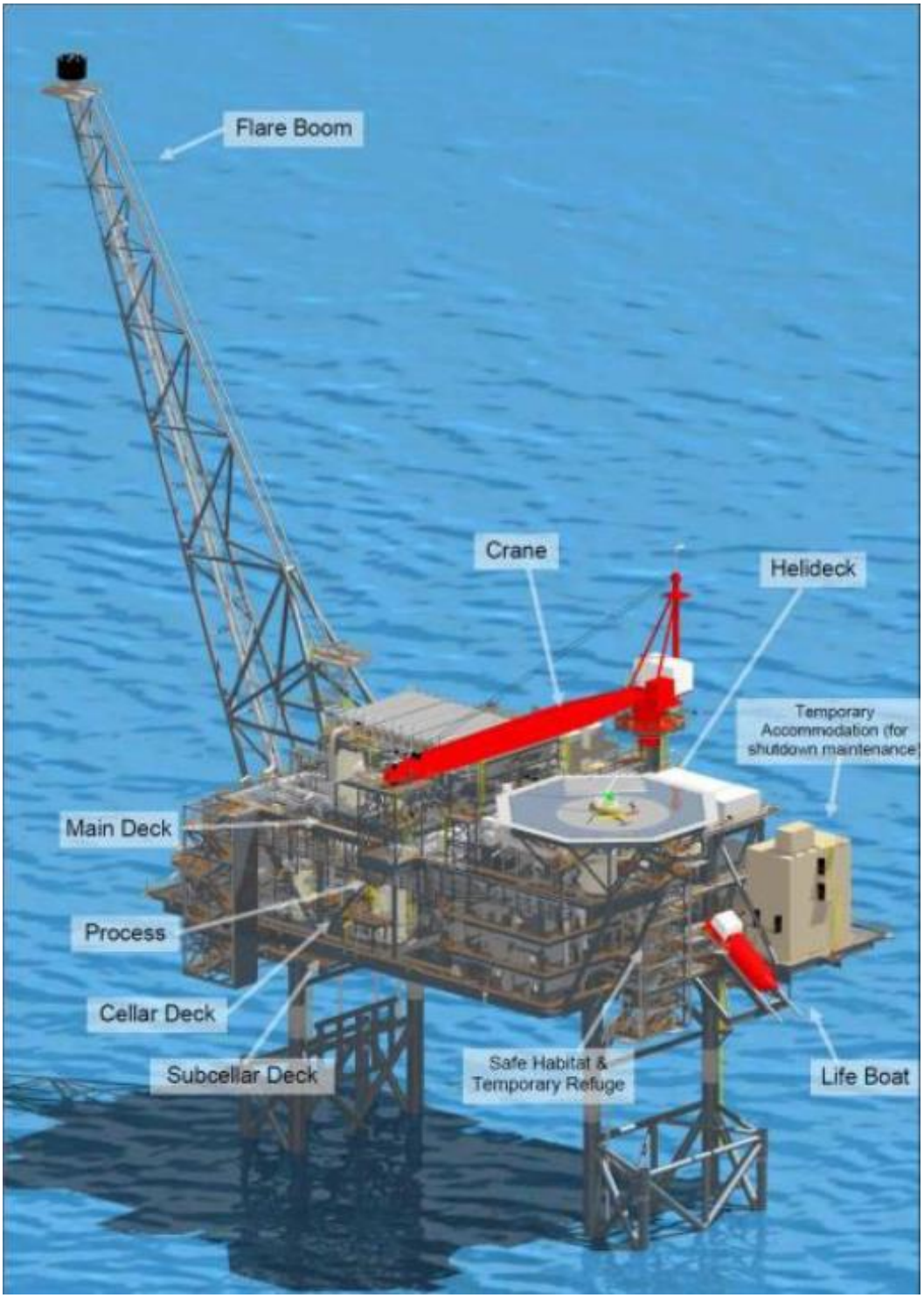


Figure 3-2: Angel facility platform layout

3.4.3 Wells and Reservoirs

The Angel and Lambert Deep wells are managed in accordance with the North Rankin Hub Well Operations Management Plan (WOMP), which provides for current and future wells tied back to the Angel platform, and the associated temporary abandonment of the Angel-3 exploration and appraisal well. The WOMP describes control measures in place to ensure the risks to the well integrity are reduced to ALARP, including during periods of non-operation, before permanent abandonment.

A new well construction WOMP will cover the drilling and management of the new Lambert West well (LDA-02) tie-back.

3.4.3.1 Lambert Deep

LDA-01 is a dual zone open hole gravel pack well that accesses the Lambert Deep reservoir. The well is designed to limit production and isolate unwanted fluids (water) through water shut-off capability. The reservoir upper zone initially flows comingled with the reservoir lower zone. Water shut-off capability will be enabled to isolate the lower zone from the above reservoir intervals once water break through occurs.

3.4.3.2 Lambert West

LDA-02 is a single zone open hole gravel pack well that accesses the Lambert West reservoir. The well is designed to manage gas production and unwanted fluids (water). The various reservoir will be produced as comingled flow.

3.4.3.3 Angel

There are three subsea satellite variant slick big bore wells that access the Angel reservoir currently tied back to the riser platform. Surface controlled sub-surface safety valves (SCSSV) are installed on each well as the primary down hole safety system. The three wells are currently shut in and not producing due to high water content.

Planning for permanent plug and abandonment and decommissioning of the Angel wells is underway and will be covered under a separate EP. See **Section 7.3** for decommissioning planning activities.

3.4.3.4 Exploration Wells with Wellheads

There are ETA and AW wells with wellheads identified in **Table 3-2** that are not tied back to the Angel facility and have no associated infrastructure (i.e., no Xmas tree). The ETA well is managed under an accepted WOMP. Wellheads are being inspected in accordance with WOMPs based on the assessed risk for each well.

In line with the WOMP commitment relating to the ETA well, Woodside continues to undertake detailed subsurface/technical assessments. This is to ensure that the well is abandoned to the relevant regulatory requirements, including permanent downhole barriers. WOMPs to enable final NOPSEMA assessment and subsequent abandonment applications are being continually progressed, with some wells having been accepted as permanently abandoned and have been removed from their respective WOMPs (AW wells).

Decommissioning of the wellheads will progress once the wells have been accepted as permanently abandoned. However, planning for ETA and AW wellhead decommissioning is premised upon the plan for removal as the base case, with consideration of the principles of ALARP and acceptability. Once the wells have been accepted as permanently abandoned and the decommissioning activity is defined, an EP will be submitted for the wellhead decommissioning activity. Decommissioning planning is further described in **Section 7.3.3**). These wells with wellheads continue to be maintained until decommissioned.

3.4.4 Subsea Infrastructure Operations

3.4.4.1 Existing Subsea Infrastructure

The subsea system for both Angel and Lambert Deep is typically controlled from NRC via an integrated power and control cable through:

- umbilicals, which provide hydraulic and electric power, communications and chemical supplies between the platform and Angel and Lambert Deep subsea components through a number of cables and tubes; umbilicals run between the platform and UTA

- well control for the LDA-01 well via a dedicated umbilical from Angel platform, bypassing Lambert Deep manifold and connecting to a subsea distribution unit (SDU) near LDA-01 enhanced horizontal Xmas tree; from the UTA, electrical and hydraulic flying leads carry controls directly to LDA-01 Xmas tree
- for the LDA-01 well, power and communication routers (PCR-X and PCR-D), hydraulic control router (HCR), which are sealed and pressure compensated units linking subsea and surface controls
- valves, which control subsea operations and processes
- chokes, which control pressure and flow rates of hydrocarbons
- a number of subsea valves that may be overridden manually from either a remote operated vehicle (ROV) or by divers on both the Lambert Deep and Angel wells
- a 10” jumper that runs between the LDA-01 Xmas tree and Lambert Deep manifold (~0.34 km), and a 10” jumper (~14.5 km) between Lambert Deep manifold to Angel subcellar deck via existing spare 30” J-tube (no SSIV)
- the 14” diameter corrosion-resistant alloy (CRA) lined, carbon steel rigid flowlines that are 2.04 km (AP2), 1.53 km (AP3) and 2.81 km (AP4) in length that run between the Angel Xmas trees to Angel subcellar deck via individual 14” risers (no SSIVs)
- all flowlines connecting back to Angel Platform being connected to riser emergency shut down valves (RESDVs).

The layout of the Angel and Lambert Deep subsea infrastructure is shown in **Figure 3-3**.

3.4.4.2 Lambert West Subsea Infrastructure

The Lambert West tie-back is primarily supported by the Lambert Deep subsea infrastructure with the following additions:

- From the existing Lambert Deep UTA, EFLs and HFLS will carry controls to the new SDU, then split out via EFLs and HFLs through to both LDA-01 and LDA-02 wells.
- A new 8 to 10” flexible jumper will run between LDA-02 Xmas tree and the existing Lambert Deep manifold (~500 m).
- The layout of the additional Lambert West subsea infrastructure is shown in **Figure 3-3**.

3.4.4.3 Angel Topsides Substructure

The jacket is supported on four pile groups. Each group comprises eight primary and eight insert piles which were drilled and grouted over two stages. The weight of the Angel jacket and piles are 7685 tonnes and 4766 tonnes respectively.

3.4.4.4 Angel Subsea System (Non-producing)

The three Angel wells have subsea control modules (SCM), which are sealed and pressure compensated electro-hydraulic units (typically found on Xmas trees) and link the surface and subsea controls.

Hydrocarbons in the Angel subsea system are depressurised to just above seabed ambient pressure and monitored accordingly. The Angel subsea flowline system commenced operation in 2008 and has a design life of 20 years. The subsea system has been inspected regularly, based on the risk-based inspection (RBI) procedure developed specifically for the Angel facility. The flowlines consist of a 40 mm thick concrete weight coating, protecting and weighting the pipeline down to prevent movement on the seabed. Additional external corrosion protection in the form of anodes placed at regular intervals along each of the flowlines, ensures the flowlines continue to be protected

from corrosion. An in-water inspection undertaken in 2019 of the corrosion protection systems demonstrates that the three flowlines have sufficient integrity forecast until between 2030–2119:

- AP2 flowline – all visible anodes appeared secure with slight depletion, and the field gradient report estimated that the remaining anode lifetimes are 60 years.
- AP3 flowline – all visible anodes appeared secure with slight depletion, and the field gradient report estimated that the remaining anode lifetimes are between 11 years and more than 100 years.
- AP4 flowline – all visible anodes appeared secure with slight depletion and the field gradient report estimated that the remaining anode lifetimes are between 19 years and more than 100 years.

Estimated volumes of hydrocarbons remaining in the AP2, AP3 and AP4 flowlines are presented in **Table 3-4**. Pressure monitoring of the flowlines continues and if the flowlines repressurise via passing subsea valves, the option exists to blowdown the flowlines to seabed ambient pressure again via the flare. Spectacle blinds have been swung closed on the respective RESDVs to provide positive isolation from process equipment and remain in the closed position. IMMR process activities associated with subsea systems are maintained using a RBI methodology and associated plans until they are decommissioned (**Section 3.4.15.1**).

Table 3-4: Estimated hydrocarbon volumes remaining in the AP2, AP3 and AP4 flowlines

Estimated hydrocarbon volumes remaining in Angel flowlines			
Flowlines	AP2	AP3	AP4
Liquid hydrocarbon at seabed Ambient pressure (Am^3)	12	8	15
Gas hydrocarbon at surface pressure (Sm^3)	1520	1230	2220

Section 3.4.15.8 describes subsea flushing operations.

Planning for decommissioning the Angel subsea infrastructure is described in **Section 7.3**.

3.4.4.5 Angel Export Pipeline

Dehydrated export gas and condensate is metered at the outlet of the production train on the riser platform, prior to recombination and subsequent export via the export pipeline. The pipeline route commences at the flange connecting the riser to the riser platform and runs 49 km westwards to the NRC facility. The pipeline ties in to 1TL at the downstream flange of the tie-in assembly to 1TL.

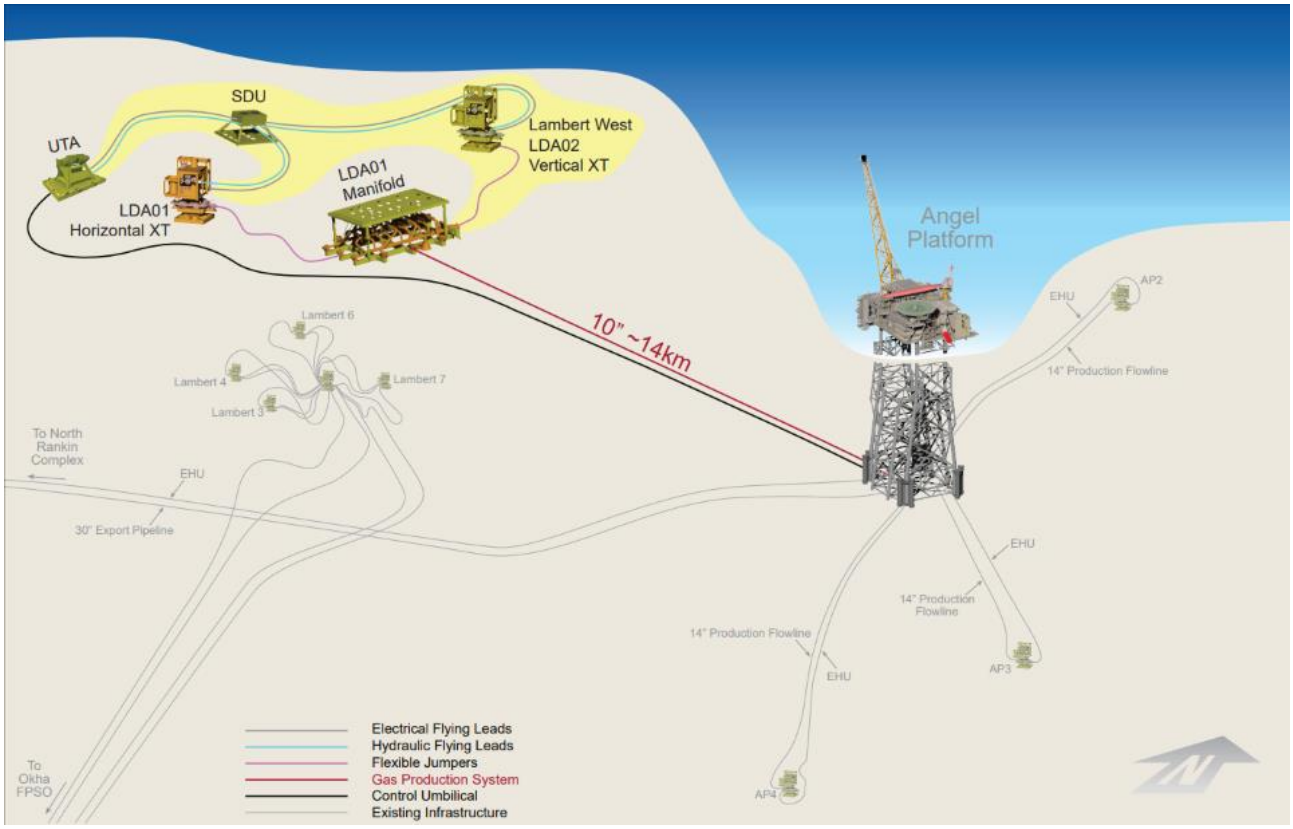


Figure 3-3: Angel facility subsea system layout

3.4.5 Operational Details

3.4.5.1 Staffing and Modes of Operations

The Angel facility is designed to operate without on-platform operator intervention, as a NNC installation. The permanently installed accommodation on the Angel facility can cater for up to 24 personnel on board (POB). Activities which require POB may include:

- projects
- campaign maintenance
- unplanned corrective (breakdown) maintenance
- inspections/audits
- planned facility shutdowns
- well start-up/commissioning.

During routine operations, planned maintenance visits are typically undertaken five times a year, each lasting nominally 14 days, with teams of up to 24 POB. Unplanned maintenance generally requires teams of up to 10, and shutdown maintenance teams including Lambert West initial commissioning activities of up to 24 POB.

The modes Operations fall under are any one of:

- production remote operations
- major projects
- maintenance, including subsea IMMR and removal activities
- well maintenance

- well start-up and commissioning
- suspension
- flowline flushing prior to well plug and abandonment.

When the Angel facility is staffed, primary control is retained by NRC, with personnel on Angel communicating with NRC via the radio communication links. Operational control of equipment is handed to 'local control' on the Angel facility on an as-required basis.

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

3.4.5.2 Production Remote Operations

The Angel facility is a NNC facility and, therefore, is normally operated, monitored, controlled, restarted and diagnosed from the riser platform or remotely via fibre optic cable from NRC. In the event that NRC personnel are demobilised (e.g., for a cyclone), Angel can be remotely operated from KGP or Perth. The Process Control System (PCS) for the Angel facility provides the monitoring and control functions of:

- basic monitoring of all key performance indicators
- adjustment of devices on the Angel facility, such as control valves, pumps and variable speed drives, to maintain process variables within design limits
- alarm signals to the Human–Machine Interface located on the NRC
- automatically managing duty/standby and lead/lag equipment.

3.4.5.3 Major Projects

Major projects involve refurbishment, modification or major maintenance on the Angel facility. Potential environmental impacts related to projects are managed through the process outlined in **Section 7.2.4.3**. During execution of major projects, such as commissioning of Lambert West, the Angel platform is permanently staffed until the Angel facility is ready to be returned back to remote operations.

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

IMMR including those undertaken subsea, are undertaken to maintain production within the platform and subsea infrastructure design constraints. Maintenance teams routinely visit the Angel facility for:

- a nominal 14-day duration with typically five campaigns per year, with teams of up to 24 POB
- unplanned corrective (breakdown) maintenance and restart, executed by a smaller team as required
- shutdown maintenance and restart conducted by a team of up to 24 personnel.

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

3.4.5.5 Suspension

Suspension may be implemented for reservoir management purposes. In suspension mode, the Angel facility's process systems are maintained at a positive pressure, flaring is maintained at purge rates and the PW overboard isolated. Implementation for suspension requires minimal intervention,

as it is predominantly achieved through the existing control systems and valves. Implementation activities are summarised as follows:

- shut in the well and open the choke intermittently to ensure the HP and LP flare system remains operational. Close the RESDV on the non-flowing flowline
- minimise topsides liquid inventories, as required
- segregate systems through existing valves
- place non-critical equipment (e.g., fans, coolers, motors) offline
- keep control, Safety Instrumented System and fire and gas live and reconfigured to fit the system requirements.

Facility operations during suspension (post implementation) are as follows:

- facility operations and associated activities as described in this EP are retained
- manual operation of the well production system ensures the HP and LP flares remain operational
- life support, lifesaving equipment, temporary refuge and Safety Instrumented System remain operational and available.

3.4.6 Process Description

3.4.6.1 Production Process

The Angel facility receives well fluids (gas, condensate and associated PW) from the production wells for topside processing via cooling, separation and dehydration prior to export. There is no gas compression.

The Angel facility has a single processing train with an operating capacity of 21.5 kt dry gas per day (kt/day) plus associated condensate.

3.4.7 Flare Systems

The riser platform has two flare systems, the HP flare and the LP flare. The main purpose of the flare systems is to safely discharge gas streams during emergency depressurisation. However, there are also a number of process streams which continuously pass gas to the flare, such as gas flashed from the PW, and stripping gas used in the glycol regeneration process. Other streams intermittently flow to the flare, such as during maintenance activities and when vessels are depressurised and purged.

In line with the Angel facility NNC design philosophy, flare gas recovery is not provided and the system is designed for minimum maintenance. There is no planned venting of hydrocarbons from the Angel facility during normal operations. The flare is monitored via CCTV from NRC CCR. As a contingency, the flare can be manually ignited (in the event the pilots are extinguished) to minimise cold venting.

The amount of gas that may be flared on an annual basis is dependent on continuous and intermittent process sources, planned activities requiring flaring, and unplanned process upsets.

3.4.7.1 High Pressure Flare System

The HP flare system collects vented hydrocarbons from process and utility systems, with design capacity of 2000 kPa or greater. The main HP flare header is routed to the HP flare drum, which is designed to separate liquid droplets by gravity. Liquids collected in the drum are pumped to the oily water treatment system. Vapours from the flare drum are disposed at the flare tip (at the top of the 80 m tower).

3.4.7.2 Low Pressure Flare System

The LP flare system collects vented hydrocarbons from process and utility equipment with design pressures of between 345 kPa and 2000 kPa. There are two separate LP headers, one to accommodate low temperature relief streams and the other to accommodate venting at ambient or higher temperatures. The two LP headers are routed to the LP flare drum, which separates out liquid droplets by gravity. Liquids collecting in the drum (usually condensed water from the glycol regeneration system) are recycled back to the process.

3.4.7.3 Flaring – 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 which are not recovered to the process. There is no planned venting of hydrocarbons from the Angel facility during normal operations. The continuous flows to the LP flare are:

- flare pilot
- LP flare header and storage tank purges
- glycol regeneration process, including still column overheads and flash drum
- flash gas from PW degasser
- gas used to blanket the MEG storage vessel
- flash gas from scrubber vessels, and the glycol contactor integral suction scrubbers (under on/off level control).

The continuous flows to the HP flare are:

- flare pilot
- HP flare header purges
- leakage past flare header valves such as pressure safety valves (PSVs) and blowdown valves (BDVs).

3.4.7.4 Flaring – Intermittent Process Upsets and Activities

During process upsets, the process control valves on the main process equipment open to relieve excess pressure to the HP flare. The following sources make up intermittent flaring:

Emergency

The topsides equipment and piping are divided into isolatable sections, each with a dedicated BDV. During an emergency shutdown, each section is separately depressurised to the HP flare. Each section contains a fail-open actuated BDV which allows blowdown of the entire riser platform inventory. Approximately 55 t is flared during each emergency shutdown.

Manual Depressurisation

Typically triggered by routine equipment maintenance, planned emergency shutdown testing and/or depressurisation of equipment and piping to remove the equipment from service. Equipment must be depressurised prior to draining, as the closed drains system is not intended for high pressure service.

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 riser platform flare to allow pressure in the flowlines to be reduced, typically for the reasons of:

- production flowline maintenance and critical leak-off testing
- to facilitate remediation in the event of an unplanned hydrate blockage in the subsea flowlines
- to prevent hydrate formation in the flowlines as the fluids cool after the wells are shut-in
- over-pressurisation of flowlines above integrity limit
- suspension of redundant pipelines/flowlines.

3.4.8 Greenhouse Gas Emissions

The main sources of greenhouse gas (GHG) emissions associated with Angel production are shown in **Table 3-5**. GHG sources that are not part of the Angel facility (e.g., from energy supplied by NRC and onshore processing emissions) are included for completeness. In the context of this EP, the emissions are classified as direct and indirect emissions.

Table 3-5: Direct and indirect emissions greenhouse gas sources from the Angel facility and supply chain

Emission type	Emissions source	Location	Jurisdiction	Process
Direct	Angel facility process	Offshore	Commonwealth	GHG emissions from diesel crane (**Section 3.4.12.7**), flares, fugitives and process vents
Indirect	North Rankin Complex	Offshore	Commonwealth	GHG emissions from gas/diesel turbines generating power for the Angel facility, supplied via subsea cable (**Section 3.4.12.3**)
	Support vessels (on charter)	Offshore	Commonwealth	GHG emissions from engines and fugitives on vessels
	Onshore processing*	Onshore	State	GHG emissions from venting reservoir CO2, combustion of gas as fuel, flares and fugitives associated with processing gas to LNG, LPG, condensate and domestic gas
	Transport	Transit	Subject to consumer location	GHG emissions from transport of products to market, including regasification and distribution of LNG in customer markets
	Regassification, distribution and combustion by third-party user	Market	Subject to consumer location	GHG emissions from combustion of products as part of power generation and other energy solutions within the final market

**ISO 19694:2021 defines indirect GHG emissions as GHG emission that is a consequence of an organisation'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 "organisation" is the Angel facility and therefore NRC power generation, onshore processing and support vessel operations are considered indirect emissions sources.*

3.4.9 Produced Water System

PW is brought to the surface from the reservoirs and separated from the hydrocarbon components during the production process, then discharged to the marine environment. PW can consist of produced formation water (a water reservoir below the hydrocarbon formation), condensed water

(water vapour present within gas/condensate which condenses when brought to the surface), or a combination of both. The PW system is designed to process a maximum of 4,800 m^3/day; however, discharge rates are significantly lower. In 2022, PW discharge ranged from 0 to 123 m^3/day from the Lambert Deep reservoir. Overall PW rates are expected to increase as the fields age but due to low volumes PW is currently being batch discharged and this expected to continue until wells cut water. Current reservoir modelling predicts Lambert Deep may cut water in 2025 and Lambert West is not expected to cut water during field life.

During well clean up and commissioning, drilling and completion fluids may be present in the PW stream. Well clean up and commissioning discharges are described in **Section 3.5.4**.

3.4.9.1 Produced Water System Description

The PW stream is primarily made up of water recovered from the condensate stream by the primary water/condensate separators (PWCS) a lesser quantity of water removed downstream by the condensate coalescers. PW flows under level control from the PWCS and the online condensate coalescer to PW degasser. The PW degasser operates at the LP flare header pressure where liberated flash gas (acid gas, hydrocarbon and nitrogen) is disposed of. Any residual condensate is skimmed to the LP flare knock-out/closed drains drum from the PW degasser. PW from the degasser is discharged overboard above the water line at +8m LAT (**Figure 3-4**).

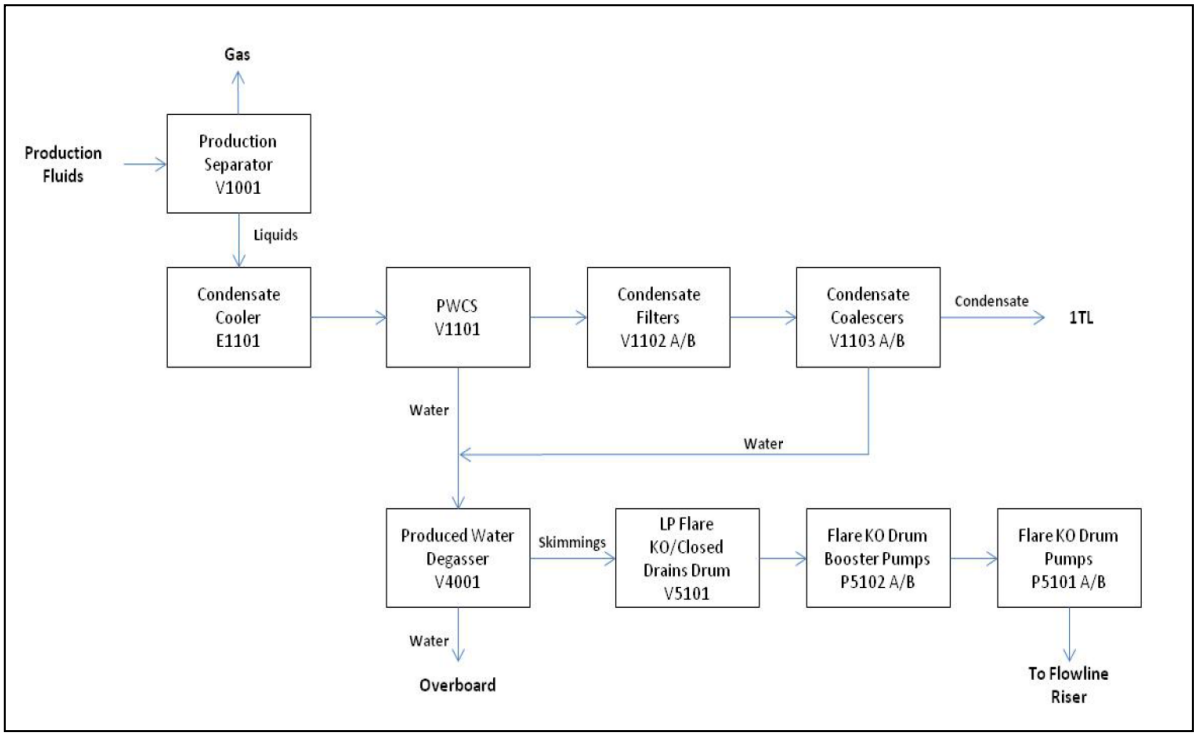


Figure 3-4: Produced water system configuration

3.4.9.2 Produced Water Oil in Water Discharge Monitoring

The measurement of oil in water (OIW) in the PW stream is undertaken prior to discharge to the ocean. OIW is measured using an online OIW analyser. The analyser is designed specifically for offshore operations and measures fluorescence this is calibrated to provide total petroleum hydrocarbon (TPH) in water. Two analysers are currently installed on the facility, with a single analyser on-line at any one time. The analysers can be controlled locally or remotely from the NRC central control room (CCR).

3.4.10 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 segregated from drains from non-hazardous areas to prevent ingress of gases into a non-hazardous area via the drains system.

3.4.11 Closed Drains

The process closed drains system is used for draining liquids process equipment for maintenance purposes. The drained liquids are routed to the LP flare knock-out/closed drains drum, and from there the recovered liquids are recycled back to the process.

3.4.11.1 Hazardous Open Drains

Operational process and non-process discharges, discharges from some maintenance activities and potential spills are contained within the hazardous open drain system. The drains collect spillage, process drainage and washdown water from equipment/flooring, and rain/deluge water from areas designated as hazardous. Drainage into the system is directed to the collection header which discharges into a horizontal three-phase separator (gas/liquid/liquid).

A 4 m^3 diesel storage tank is always available on the platform so diesel is available during unplanned maintenance visits. The tank is located in a bunded area which drains to the hazardous open drains.

Recovered hydrocarbons/glycol from the open drains separator is skimmed and transferred to waste oil ISO tanks for onshore disposal. The separated water is discharged directly overboard at +22 m LAT from the water disposal compartment of the open drains separator.

During normal operation, there is little flow of liquids through the drains system, with the only continual flow into the hazardous open drains system being the discharge of the sample water from the PW OIW analyser.

3.4.11.2 Glycol Hazardous Open Drains

The Angel facility has a dedicated hazardous open drain system for collecting and containing the glycol and chemical injection areas. The drain is designed to prevent these liquids from being discharged to sea or entering the condensate/water separation process where it may adversely affect the process. The glycol hazardous open drain system also collects triethylene glycol (TEG) and monoethylene glycol (MEG) to prevent recycling into the process via the closed drains system or into the TEG regeneration system (where it may cause corrosive organic acids to form).

The transportable MEG and corrosion inhibitor 4 m^3 ISO tanks are located in common bunded areas on the main deck. The connection provided on the outlet of the bund is normally closed and can be drained to the glycol hazardous open drain system in case of a spill. Drainage into the system is directed to waste oil storage tanks (4 m^3) for onshore disposal.

3.4.11.3 Non-hazardous Open Drains

The non-hazardous open drains system is ‘open’ to the atmosphere and collects, contains and disposes rain, wash water and waste liquids from non-hazardous areas of the decks and from the helideck. The drainage from this system is routed directly overboard. The heating, ventilation and air conditioning (HVAC) condensed water drains also tie into the service water tank overflow in the non-hazardous area of the Angel facility.

3.4.12 Utility Systems

3.4.12.1 Platform Lighting

The riser platform has appropriate lighting to ensure a safe working environment during 24-hour operations. Lighting is split between emergency and normal lighting. Approximately 30% of the

platform lighting is powered from the emergency generator supply. The remainder is fed from the normal supply from NRC. Lighting on the Angel facility may be controlled directly on the facility or remotely from NRC.

The emergency light fittings are located to illuminate the designated escape routes on the Angel 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 re-fuelling and lifting operations), lighting on the riser platform is directed to the work area, which limits light spill to the marine environment.

3.4.12.2 Heating, Ventilation and Air Conditioning System

The HVAC system comprises HVAC equipment, ductwork and associated pipework. It provides independent and interdependent subsystems with pressurised, conditioned, purge and exhaust air services to various areas including accommodation and various modules, which can be operated on an as-required or continuous basis. Ozone-depleting substances are not used on Angel and refrigerants associated with the HVAC system are managed by a licenced refrigerant authority.

3.4.12.3 Power Generation

Power for the Angel facility is supplied from NRC at the 33 kV voltage level via a single submarine cable from the 6.6 kV switchboard. The submarine cable is of a composite type, with power cores as well as fibre optic cores for instrumentation, telecommunication, and electrical interlocking and relaying signals.

The uninterruptible power supply (UPS) is provided by a dual redundant AC and DC battery power system to ensure continuous power to the critical control and safeguarding equipment, even if one UPS or battery in the AC or DC system is shut down for maintenance. On loss of main power supply from NRC, the power control system disconnects and switches to the battery system.

3.4.12.4 Utility Gas System

As the Angel facility does not use gas as a combustion fuel for power generation, utility gas generated from the process system is provided on the facility for:

- stripping gas to the glycol stripping column
- purge gas to the flare headers, glycol storage vessel, MEG storage tank and glycol surge drum
- pilot gas to the flare ignition package
- start-up blanket gas to the glycol flash drum.

3.4.12.5 Sewage and Putrescible Wastes

Sewage from the ablutions is disposed to ocean via the sewage caisson. Putrescible waste (principally food scraps) is either ground to less than 25 mm diameter and disposed overboard, or bagged and transported to shore for disposal as domestic waste.

3.4.12.6 Sand Management

LDA-01 and LDA-02 wells are equipped with sand screens and open hole gravel pack completions and acoustic sand detectors on its subsea Xmas tree. The Angel facility basis of design assumes there is a low probability of sand production from both wells and alarms from the acoustic sand detectors alert operators to any minor sand production. In the event of minor sand/fines production, sand is deposited in the PW system degasser. The piping, layout and valve materials are designed to prevent, handle or easily remove any accumulation of sand as required. In the event of major sand production (i.e., a well completion failure), the well will automatically shut in via the acoustic sand detector signal.

3.4.12.7 Diesel Fuel

Filtered, low sulphur bulk diesel is transported via supply vessels in 4 m^3 ISO tanks. A 4 m^3 diesel ISO tank is provided on the platform so diesel is available during unplanned maintenance visits. The tank is located in a bunded area which drains to the hazardous open drains. Diesel is required for the crane and lifeboat.

3.4.12.8 Routine Lifting from Platform Support Vessels

Routine lifting operations primarily include transferring stores and equipment from a support vessel to the Angel 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 Angel facility are secured inside the skip or container. Containers for supply of chemicals and diesel are routinely lifted. Equipment is appropriately rated for offshore lifting.

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

3.4.12.9 Lifting Around the Angel Facility

A pedestal crane is located on the east side of the riser platform at the main deck.

Once lifted to the lay down area, there may be a need to re-position equipment at various locations throughout the Angel facility for operational purposes. This includes lifting stores or equipment to various landing areas throughout the Angel 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 in a container or an approved lifting frame.

3.4.13 Operational Chemicals and Hydrocarbons

3.4.13.1 Hydrocarbons

The main hydrocarbon inventories associated with major topside process equipment is presented in **Table 3-6**. Non-process inventories of hydrocarbons used on the Angel facility are outlined in **Table 3-7**.

Table 3-6: Hydrocarbons inventories of major topside process equipment

Vessel	Gas or two-phase volume (m^3)	Volume liquid (m^3)
Production separator, inlet coolers	105	20
Condensate cooler, PWCS	N/A	30
Glycol contactor	157	2
Condensate filters, condensate coalescers	N/A	7
Export riser to subsea isolation valve (SSIV)	88	N/A

Table 3-7: Inventories of non-process hydrocarbons

Material	Storage volumes
Diesel	Two 4 m^3 ISO tanks
Lube Oil/Hydraulic Fluid	Various sized containers based on type and use 10 m^3 and 205 L drums

3.4.13.2 Chemicals

Chemicals are used on the Angel facility for a variety of purposes and can be divided into two broad categories (operational and non-operational) as described below.

Operational Process Chemicals

A 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 Angel facility.

Operational Non-process Chemicals

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 and dyes.

Non-operational Chemicals

Non-operational chemicals include chemicals which are required for general maintenance or 'housekeeping' activities and are critical for overall maintenance of the Angel facility 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).

Indicative Chemical Inventories

An indicative list of bulk chemicals commonly used on the Angel facility, and estimated storage quantities, is summarised in **Table 3-8**. In addition to the chemicals listed, the Angel facility may also maintain small volumes of various operational chemicals and facility maintenance chemicals as previously described.

Table 3-8: Indicative bulk inventories of chemicals

Material	Storage means	Storage capacity
Corrosion Inhibitor	Corrosion inhibitor tank	30 m^3 storage vessel (21 m^3 working volume)
TEG	Glycol storage tank	40 m^3 storage vessel 100 m^3 regeneration system
MEG	MEG storage tank	25 m^3 storage vessel
Subsea control fluid	Production hydraulic power unit (HPU) tank	10 m^3 storage vessel

3.4.14 Vessel-based Activities

During planned operations, vessel-based activities will involve the Platform Support Vessel and support vessels during field work such as subsea inspection, maintenance and repair activities.

3.4.14.1 Platform Support Vessel

Platform support vessels are used to transport personnel, material and equipment to and from the Angel facility when staffed. The specifications of the Siem Thiima (**Figure 3-5**) are presented in **Table 3-9** as an example, and represent the typical specifications of a support vessel. Vessels supporting the Angel facility vary depending on vessel schedules and availability. While in the field, the vessel also backloads materials and segregated waste for transport back to the King Bay Supply

Facility (KBSF) in Karratha, as well as carrying out standby duties including during working over the side activities while in the field.

Figure 3-5: Indicative support vessel (Siem Thiima)

Table 3-9: Siem Thiima vessel specifications

Attribute	Details
Type	Facility support vessel
Length overall	89.2 m
Breadth	19.0 m
Draft	7.6 m
Dead weight tonnage	5,500 t
Accommodation	Berthing for 25 personnel
Dynamic positioning system	DP2
Fuel capacity	152 m^3 – largest isolatable tank

3.4.14.2 Support and Other Vessels

Support or project vessels (crewed or remotely operated) are used for field work such as subsea inspection, maintenance and repair activities. Vessels supporting the activities may vary depending on operational requirements, vessel schedules, capability and availability.

Typical support vessels use a DP system to allow manoeuvrability and avoid anchoring when undertaking works, due to the proximity of subsea infrastructure. However, vessels are equipped with anchors which may be deployed in an emergency. Support vessels do not anchor within the PAA during the activities due to water depth.

3.4.15 Inspection, Monitoring, Maintenance and Repair

Subsea infrastructure 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. 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 or repair.

The IMMR process for subsea infrastructure, including any redundant equipment (**Section 3.4.15.4**), 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 ROV with transponders to inspect equipment.

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 m^2. This equipment is removed from field via recovery to the support vessels at the completion of IMMR activities.

Typical IMMR activities are described below.

3.4.15.1 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 frequencies are provided in **Table 3-10**. Actual scope and frequency of subsea equipment (operational or redundant) and pipeline inspections are determined using an RBI methodology and associated plans. While the inspection frequency of ETA, AW and non-producing wellheads are determined by the WOMP.

RBI is commonly used within the industry as a method for determining inspection frequencies (Energy Institute, 2009; DNV, 2019). RBI for pipeline systems that have reached cessation of production inherently pose less risk to the environment and may drive a less frequent inspection frequency.

Table 3-10: Typical subsea inspection/surveys and frequencies

Type of inspection/ survey	Subsea infrastructure	Purpose	Approximate frequency
General visual inspection	Structure, wellheads, spools, flowlines, risers and pipelines	Check general infrastructure integrity.	Varied – every 1 to 8 years
Close visual inspections	All subsea infrastructure	Investigate certain subsea infrastructure components.	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).	Typical: Once every 25 years Worst case: Once every 5 years
Acoustic survey (e.g., multibeam echo sounder (MBES), sidescan sonar (SSS), sub bottom profiling (SBP))	Pipelines	Identify buckling, movement, scour and seabed features. Low frequency/ intensity signals undertaken on the flowlines.	Varied – every 1 to 6 years

Type of inspection/ survey	Subsea infrastructure	Purpose	Approximate frequency
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 Worst Case: 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
Pigging	Export pipeline, flowline	Inspection, maintenance, repair or to facilitate modifications.	Typical – Once every 12 years Worst case – every 5 years

3.4.15.2 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, to determine if and when damage may occur, and (where relevant) predict the rate or extent of that damage. Monitoring activities may include process parameters and composition testing, acoustic sand detectors, erosion probes, metocean and geological seismic monitoring, and cathodic protection testing.

3.4.15.3 Maintenance

Planned maintenance activities on subsea infrastructure are undertaken to prevent deterioration or integrity failure of infrastructure. Typical maintenance activities are described in **Table 3-11**.

Table 3-11: Typical subsea maintenance activities

Type of maintenance	Subsea infrastructure	Purpose	Approximate frequency
Cycling of valves via control system	Well	Test functionality of technical integrity valves	Every 6 months
Marine growth removal	Production and cross over manifolds and retrieval components (e.g., chokes)	Reduce weight or gain visual access	Based on outcomes from visual inspections (**Table 3-10**) 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

3.4.15.4 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. 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 3-10** and **Table 3-11**. Typical subsea repair activities include:

- subsea choke replacement
- chemical injection metering valve insert replacement
- PCR, HCR, SCM, SDU or control distribution unit (CDU) replacement
- hydraulic flying lead (HFL) replacement and/or relocation
- electrical flying lead (EFL) replacement and/or relocation
- tree cap changeout
- logic plate/cap changeout
- pipeline or spool support with grout bag or mattress
- spool disconnection and/or replacement
- flowline/pipeline replacement
- scour prevention installation
- cathodic protection system replenishment/repair
- acoustic sand detector replacement.

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 input into a database for the inventory associated with each title (refer **Section 6.6.2**). The inventory is used to track equipment on the seabed to enable planning for future removal.

3.4.15.5 Subsea Chemical Use

Planned chemical discharges may occur during a range of subsea system operation and IMMR activities. However, these are either small volumes, or discharged intermittently. Operational chemicals to be used in the subsea infrastructure are selected and assessed using Woodside's chemical selection and assessment guideline, as detailed in **Section 3.8**. Typical chemicals used in the subsea infrastructure may be released during IMMR activities. These include:

- control fluid – the subsea control fluid presently used in the subsea systems is Oceanic HW443ND (no dye included), which is a water-based product, with the major component ethylene glycol; HW443ND is dosed with dye to support integrity monitoring, when required
- hydrate control – MEG and TEG are used for hydrate control
- corrosion inhibitor is used to manage and prevent corrosion within pipelines and flowlines
- biocide are used to prevent the bacterial growth in pipelines that may cause corrosion
- acid – where removal of calcium deposits is required, Woodside typically uses sulphamic (or equivalent) acid. Alternatives such as citric acid or calcium wash may be used
- oxygen scavenger is used to reduce/de-oxygenate the pipeline and prevent corrosion and aerobic bacterial growth
- surfactants are formulated to remove water and organic deposits from pipelines
- grout – material used in grout, mattresses and rock is typically concrete-based
- staurolite products – used for abrasive/sand blasting to clean and remove marine growth, the main component is staurolite, which is a naturally forming mineral.

3.4.15.6 Typical Discharges During Inspection, Monitoring, Maintenance and Repair Activities

There are planned environmental discharges during subsea IMMR activities, for example during pressure/leak testing or flushing. Where possible, flushing is performed prior to disconnection of a subsea component to reduce residual hydrocarbon or chemical releases to the subsea environment upon disconnection. The flushing chemicals used for this activity may be supplied from either the Angel facility or a chemical package via a downline from a support vessel. Where possible, flushed fluids are returned to the platform and be processed and treated through the production system. **Table 3-12** shows typical discharge volumes during different IMMR activities.

Table 3-12: Typical discharge volumes during different inspection, monitoring, maintenance and repair activities

Activity	Description
Pressure/leak testing	Chemical dye estimated <10 L
Flushing	Residual hydrocarbon or chemical release volume is dependent upon injection port size, component geometry and pumping rates
Hot stab changeout	Hydrocarbons or control fluid estimated <10 L
Subsea control module changeout	A typical release of diluted acid is estimated to be 400 L and of control fluid is estimated to be 10 L
Jumper and umbilical replacement	Typical releases of hydraulic fluid, MEG and corrosion inhibitor are estimated to be <10 L each, typical acid release of <80 L
Choke changeout	Release of hydrocarbons <10 L and a typical release of MEG is estimated to be 280 L, typical acid release of <80 L
Tree cap changeout	Release of hydrocarbons estimated <50 L and a typical release of MEG is estimated to be <50 L
Logic plate changeout	Release of hydrocarbons estimated <20 L and a typical release of MEG is estimated to be <20 L
Spools repair, replacement and recovery	Typical releases of hydrocarbons, MEG and corrosion inhibitor are estimated to be <10 L each

3.4.15.7 Marine Growth Removal Methods

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 an ROV or a diver. The different techniques are described in **Table 3-13**.

Table 3-13: Typical marine growth removal methods

Activity/equipment	Description
Water jetting	Uses high pressure water to remove marine growth
Brush systems	Uses brushes attached to a ROV to physically remove marine growth
Acid (typically sulphamic acid)	Chemically dissolves calcium deposits
Sand/abrasive blasting	Additional cleaning to allow close visual inspections

3.4.15.8 Flushing and Pigging Operations

During pipeline or flowline lifecycle, there may be a need to conduct flushing and/or pigging for a variety of reasons (e.g., inspection, maintenance, repair, facilitate modifications or to remove hydrocarbon in preparation for decommissioning). Where required, subsea isolation valve operations are carried out from a ROV via a support vessel.

Should pigging of the flowlines and/or export pipeline be required, provision has been made for the installation/recovery of temporary subsea/topsides pig launcher and receivers. The entire flowline and pipeline pigging system, including the launcher, receiver and the respective flowlines and pipeline, is designed for maximum operation pressure of the production system.

Flushing of the Angel subsea flowlines is planned for approximately six months prior to Angel well plug and abandonment to maintain ability:

- for ongoing monitoring and management of subsea wells including ability to carry out leak-off testing (LOT) of valves on Xmas trees prior to plug and abandonment
- to manage any passing hydrocarbon fluids from the shut in Xmas tree valves.

Flushing of the Angel flowlines is from topsides into the wells to achieve an ALARP OIW content. The flowlines are flushed using treated seawater, and once flushed are preserved with treated seawater to prevent corrosion, containing a combination of oxygen scavenger, corrosion inhibitor, and biocide. If required a scale dissolver may also be used to strip and clean any scale build-up. The well integrity barriers on the wells will then be closed, tested and verified, in accordance with the WOMP. The flowlines may then be cut and plugs installed in either end of the cut section. This would result in a release of a quantity of preservation fluids (approximately 100 to 150 L). The plugs installed on the Xmas tree will provide additional isolation and hence minimise the requirement for subsea system inspection frequency in the suspended phase.

As part of a pigging activity for the Angel Export Pipeline, there may be a requirement to flush the subsea pig launch receiver (PLR) after use. Prior to lifting the PLR to the deck of the vessel, flushing to a subsea location may be required to avoid deck risks to the vessel and/or reduce health and safety risks to personnel. Indicative discharge volumes associated with pigging the Angel export pipeline (considered worst case) are provided for in **Table 3-14**. Corrosion product solids are not expected from pigging, based on previous pigging activities, but those generated from the pigging activities would be pushed in front of the pig(s) and into the connecting trunkline (or in the case of the Angel subsea flowlines, into the wells). Remaining solids in the pig receiver will be disposed of onshore. The SSIV may be temporarily locked open for pigging activities.

Table 3-14: Typical subsea discharge volumes associated with pigging for the Angel export pipeline

	Cumulative volume released (by number of receiver recoveries)		
Number of runs	1 (most likely scenario)	2	3
Condensate volume (m^3)	2.9	5.7	8.6
Treated seawater discharge (m^3)	28	57	85
TEG volume (m^3)	4	8	12

3.5 Lambert West Drilling and Tie-back

3.5.1 Overview

This section provides a description of the Lambert West drilling and tie-back activities. The Lambert West tie-back consists of a single well, LDA-02, drilled and connected to the Lambert Deep production manifold, installation of a controls subsea distribution unit, and disconnection of the LDA01 electrical and hydraulic flying leads from the Lambert Deep UTA and reconnecting them to the subsea distribution unit.

The well will be drilled and completed using a MODU. Typically, two or three support vessels will support the MODU during drilling activities (**Section 3.5**), 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 (**Section 3.5.3**) will be undertaken using an installation vessel. Another installation vessel, similar to vessels used for IMMR, may be used to install the tubing head spool and Xmas tree and for cold commissioning the wells and during start-up (if required).

3.5.2 Drilling Activities

This EP includes drilling activities for the LDA-02 well in the Lambert West Operational Area and tie-back to the Angel facility. Well construction activities are conducted in a number of stages, as described below. Well design will be optimised for ultimate recovery.

Detailed well design for the LDA-02 well will be submitted to the Well Integrity department of NOPSEMA as part of the Approval to Drill and the accepted WOMP, as required under the Offshore Petroleum and Greenhouse Gas Storage (Resource Management and Administration) Regulations 2011.

3.5.2.1 Cement Unit Test

Upon arrival on location at the PAA, 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 which 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, and occurs as a cement slurry. The slurry is usually a mix of cement and water; however, it may sometimes contain stabilisers or additives.

3.5.2.2 Top Hole Section Drilling

The Petroleum Activities Program drilling commences with the top hole section as follows:

- The MODU arrives and establishes position over the well site.
- A pilot hole or holes may be drilled close to the intended well location. Pilot holes are used when geology and shallow hazards need to be confirmed or further understanding of the structural integrity of the rock is required. Pilot holes are drilled riserless, as described below, and result in additional cuttings, sweeps and potentially mud deposition to seabed.
- 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; these are deposited to the seabed.
- 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 conductor/surface/intermediate casing, and secured in place by pumping cement into the annular space back to about 300 m above the casing shoe or to surface (seabed), which involves discharging excess cement at the seabed.

3.5.2.3 Blowout Preventer and Marine Riser Installation

After setting the surface or intermediate casing, a blowout preventer (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 with open hydraulic systems, using water-based BOP control fluids. Each time the BOP is operated (including pressure testing approximately every 21 days and a function test about every seven days, excluding the week a pressure test is conducted), the volume of BOP control fluid released to the marine environment is up to about 3620 L per full BOP test.

Hydraulic fluid used for operating the BOP rams is subject to the chemical assessment process outlined in **Section 3.8**.

3.5.2.4 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 preference is for bottom hole sections to be drilled using water-based mud (WBM) drilling fluids; however, non-water-based mud (NWBM) may be used (**Section 3.5.5.4**).

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 take place, with the riser in place to circulate drill cuttings and drilling fluids back to the MODU.

Cementing operations are also 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. Excess or contaminated liquid cement that cannot be used down hole and cannot be returned to shore for disposal, as it may solidify in storage tanks, will require discharge. Cement will be mixed and pumped as required from a small mixing tank on the cement unit. This limits the volume of excess or contaminated cement that could potentially require discharge into the ocean. As to excess cement in the form of dry bulk, refer to **Section 3.5.2.11.4**.Cuttings in drilling fluids circulated back to the MODU are separated from the drilling fluids by the solids control equipment (SCoE). The SCoE comprises shale shakers to remove coarse cuttings from the drilling fluid. After processing by the shale shakers, the recovered fluids from the cuttings may be directed to centrifuges, which are used to remove the finer solids (4.5 to 6 µm). Water-based drill cuttings are usually discharged below the water line and the fluids are recirculated into the fluid system.

3.5.2.5 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 once TD is reached. Formation evaluation while drilling (FEWD) is formation evaluation conducted via tools in the drilling bottom hole assembly. It may include extracting small cores, full diameter cores and other down-hole technologies, as required. FEWD tools are incorporated into the drill string during development drilling and may include gamma ray, directional deep resistivity, callipers, density-neutron, sonic, and tools which can measure formation pressures and take formation fluid samples. 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.

3.5.2.6 Wellbore Cleanout

During construction, wells are often displaced from one fluid system to another. Various types of ‘displacement pills’ and ‘cleanout trains’ may be circulated between the two fluid systems to facilitate efficient displacement and/or cleaning of the well. Displacement and cleanout pills will typically be discharged after use. If there is potential for oil within any fluid, it will be captured, tested and discharged only if oil concentration is <1% by volume. It will be returned to shore if discharge requirements cannot be met. Displacement pills and clean out trains are typically between 5 m^3 and 100 m^3, depending on application.

3.5.2.7 Tubing Head Spool Installation (Required for Vertical Xmas Tree Installation)

Before the upper completion is installed into the well, the tubing head spool is installed from an installation vessel (IMMR type), or directly from the MODU. Due to the subsea well layout, if installation was to occur from the installation vessel, the MODU will be required to kedge off or reposition away from the drill centre to allow the installation vessel to install the tubing head spool. Once the tubing head spool has been installed, it is pressure-tested to confirm integrity when the MODU BOP is reconnected to continue with drilling and completions activities.

The tubing head spool is installed with a preservation mixture.

3.5.2.8 Xmas Tree Installation

Following installation of the upper completion, isolations in the upper completion will be tested, and the well suspended. At this point, the vertical Xmas tree may be installed directly from the MODU, or installed from an installation vessel (IMMR Type), immediately, or at a later point in time. Once the Xmas tree has been installed, it is pressure-tested to confirm integrity. A workover control package may be used post Xmas tree installation to facilitate re-opening of tubing isolation valves, which will result in small, localised discharges (<10 L) of MEG/HW443 during downline installation and recover operations. If required, a well control system will be deployed to recover suspension plugs.

An alternate horizontal Xmas tree (HXT) may be utilised which will be installed on the wellhead in place of the tubing head spool (**Section 3.5.2.7**) prior to upper completion deployment. The HXT will be suspended by the rig prior to subsea flowline and control system installation.

The Xmas tree is installed with a preservation mixture in the production and annulus bores.

3.5.2.9 Completions Activities

Once the well has been drilled, completion activities are undertaken including installation of the lower completion, intermediate completion, production tubing, and subsea tree. Throughout construction any safety critical element is tested for integrity. Following construction and completion, the well is suspended with a gas column and tested dual barriers in the subsea tree.

3.5.2.10 Well Unload

3.5.2.10.1 General Description

During well unloading activities, all completion and reservoir fluids will be directed to the Angel facility and be handled by the systems onboard the platform, in accordance with **Sections 3.4.7** and **3.4.9**.

In the event fluids from well unloading cannot be directed to the Angel 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 Angel facility is Woodside's preferred option, which could eliminate or reduce well unloading to the MODU.

3.5.2.10.2 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.

3.5.2.10.3 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.

3.5.2.11 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 to ensure potential impacts are acceptable, ALARP and meet Woodside's expectation for environmental performance.

3.5.2.11.1 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.

3.5.2.11.2 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.

3.5.2.11.3 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 Petroleum Activities Program are presented in **Section 6.6.8**.

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 NWBMs are needed to drill a well section (refer to **Section 3.5.5.4**), 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.

3.5.2.11.4 Dry Bulk Management

Bulk dry products including cement, barite and bentonite is transported to the drill rig via supply vessels and pneumatically transferred to dry bulk storage tanks using compressed air. During the transfer process, the holding tanks are vented to atmosphere to release pressure build up, resulting in small amounts of dry powder being discharged from venting pipes located under the MODU.

Bulk product inventory is managed to minimise excess quantities remaining at the end of the campaign, whilst ensuring adequate stock is available for well integrity and safe operations.

For this activity, it is planned that unused excess dry bulk product at the end of the campaign will be retained for subsequent activities.

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.

3.5.3 Subsea Installation and Pre-commissioning Activities

The subsea installation scope of work will include installing and pre-commissioning the infrastructure summarised in **Table 3-15**. The Petroleum Activities Program 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 3-15: Subsea installation component summary

Description	Detail	Dimensions (approx.)
Well (LDA-02)	One wellhead and Xmas tree system	6.0 m (L) × 4.0 m (W) × 6.0 m (H) (typical)
Subsea flowline	8” ID jumper between LDA manifold and the Lambert West well Xmas tree	300-500 m
Subsea control	Two sets of flying leads (1 HFL, 2 EFL per set)	1 set ~70 m 1 set ~300 m
Subsea structures	One subsea distribution unit	5.0 m (L) × 3.5 m (W) × 2.5 m (H) (typical)

3.5.3.1 Underwater Acoustic Positioning

Long base line (LBL) transponders and/or ultrashort 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.

3.5.3.2 Installation of Structures

Subsea structures (i.e., subsea distribution unit, mudmats) are lowered to the seabed using the installation vessel's main crane to a pre-determined depth before engaging the 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.

3.5.3.3 Flexible Jumper Initiation/Initiation Anchor Deployment

Commencement of the jumper installation may require using an initiation anchor to pull against in order to provide the required tension to the flexible jumper 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.

3.5.3.4 General Flexible Jumper and Flying Leads Installation

The installation contractor will mobilise an installation vessel to the field to install the flexible jumper 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 jumper is as follows:

- The flexible jumper is reeled onto either horizontal or vertical reels.
- VLS are installed on the vessel to lay the flexible jumper.
- 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 jumper is as follows:

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

The flexible jumper 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. From the existing Lambert Deep UTA, EFLs and HFLS will carry controls to the new SDU, then split out via EFLs and HFLs through to both LDA-01 and LDA-02 wells.

Connection to the existing Lambert Deep manifold may require marine growth removal prior to removing or connecting components. Marine growth removal is described in **Section 3.4.15**.

3.5.3.5 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 jumper 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 at the Lambert West UTA 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 jumper. 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.

3.5.3.6 Pre-commissioning of the Flexible Jumper

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 Lambert West 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 break-outs 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 make up of the connection. All chemicals used in pre-commissioning activities will be subject to the chemical selection assessment process described in **Section 3.8**.

3.5.3.6.1 Flooding

The flexible jumper will be installed filled with chemically treated ~55 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.

3.5.3.6.2 Leak Testing

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

3.5.3.7 Tie-in of Flowlines at Lambert Deep Manifold

Prior to tie-in of the LDA-02 jumper to the Lambert Deep 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 predominantly 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.

3.5.3.8 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 HFLs and 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.

3.5.3.9 Wet Storage of Equipment

Wet storage of infrastructure may be required intermittently throughout the duration of subsea installation activities (-60 days) as part of the Petroleum Activities Program. There are three categories of equipment that may require wet storage as part of the Petroleum Activities Program, as summarised in **Table 3-16**.

Table 3-16: Wet storage that may be required as part of tie-back activities

Wet storage category	Reason for wet storage	Typical equipment	Retrieval method
Installation aids	To facilitate safe installation of infrastructure	Predominantly installation aids (subsea/ROV baskets, clump weights, etc)	Retrieval will be undertaken using project vessels (**Section 3.5**) 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 jumper, 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
Mooring	Mooring chains and anchor may be wet stored for ~ 60 days post MODU disconnection	Mooring chains and anchors	Retrieval will be undertaken using project vessels (**Section 3.5**) and associated equipment such as cranes, ROV, etc

3.5.3.10 Maintenance of Subsea Infrastructure

All subsea structures installed during the Petroleum Activities Program have been designed for full removal. As per **Table 3-16**, wet 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.

3.5.3.11 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 jumper 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 jumper 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 put down on, 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 to ensure 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 6.8.8**) will be added to the inventory for the title.

3.5.4 Lambert West Commissioning (Initial Start-up) Activities

The commissioning (initial start-up) activities of the LDA-02 well and associated subsea infrastructure are planned to commence in 2024. All activities may be subject to rescheduling, including delay, based on operational requirements of the Angel platform or other production scheduling reasons as well as project schedule changes.

Topsides modifications on the Angel facility for Lambert West are limited to controls updates and installation of temporary equipment for Start-up. This equipment includes a temporary laboratory for manual OIW sampling of the produced water and for analysis of reservoir fluids. A temporary produced water polishing skid is also proposed for start-up.

Once hydrocarbons have been introduced into the system, preservation fluids are displaced to the Angel platform, where they are processed and wells are cleaned-up to maximum rates. Performance testing may be undertaken such as multi-rate testing, simulated emergency shutdown of LW well only, then pressure build-up testing. MEG of up to 100%, or a combination of MEG/treated water initially in the LDA-02 jumper 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.

3.5.5 Contingent Activities

The following sections present contingencies that may be required, if operational or technical issues occur during the PAA. 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 and may add to the duration of the Petroleum Activities Program.

3.5.5.1 Respud

A respud may be required for a number of reasons, such as if the conductor or wellhead slumps or fails installation criteria (typically during top hole drilling). Re-spudding involves moving the MODU to a suitably close location (e.g., approximately 50 m from the original location, entirely within the Lambert West Operational Area) to recommence drilling. A respud activity would result in repeating top hole drilling (**Section 3.5.6.7**).

The environmental aspects of re-spudding are the same as those for drilling and are considered to be adequately addressed by this EP (**Sections 6.6.8** and **6.6.9**), 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 6.6.8**) and discharged at the seabed, from the repeat drilling of the top hole section, plus an increase in the quantity of cement discharged at seabed from cementing the conductor and surface casing strings along with potential increase in the use of drilling fluids and the additional emissions (atmospheric and waste) associated with an extended drilling program.

3.5.5.2 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 (**Sections 6.6.8** and **6.6.9**), 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 6.6.8**), potential increase in the use of drilling fluids and the additional emissions (atmospheric and waste) associated with an extended drilling program.

3.5.5.3 Workover

The existing production well (LDA-01) and proposed development well (LDA-02) may be worked over. 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.

3.5.5.4 Non-water-based Mud System

The LDA-02 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 the 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 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 being 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 3.4.13.2**).

3.5.5.5 Well Suspension

During drilling activities, the 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 the 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.

3.5.5.6 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.

3.5.5.7 Well Intervention

An intervention may be performed on the LDA-01 or LDA-02 wells. Interventions may be performed due to down-hole equipment failure or to address underperformance of a well. Key well intervention methods include wire-line 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.

3.5.5.8 Well Abandonment

The Petroleum Activities Program covers the drilling and intervention of production wells, which are not envisaged to be abandoned until the end of the production field life. For technical reasons, the lower section of the LDA-02 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 may 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, the well will be abandoned with abandonment cement plugs, including verification of the uppermost cement plug through a prescribed program (e.g., directly by tagging and/or pressure testing or indirectly through assessment). A lower section of the 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 (either immediately with the rig or later on a vessel). Conventional wellheads are removed by deploying a cutting device on drill pipe which then cuts through the 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.

3.5.5.9 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 3.5.5.8** 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 6.6.2**), 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.

3.5.5.10 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.

3.5.5.11 Venting

During drilling of the LDA-02 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’.

3.5.5.12 Emergency Disconnect Sequence

An emergency disconnect sequence (EDS) may be implemented if the MODU is required to rapidly disengage from the LDA-02 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.

3.5.6 Vessel-based Activities

During Lambert West tie-back, vessel-based activities will involve the MODU, subsea installation vessels and support vessels.

3.5.6.1 Mobile Offshore Drilling Unit

Tie-back activities will be drilled by a moored or hybrid (DP/moored) MODU. Typical specifications for moored MODU types are provided in **Table 3-17**. These are collectively referred to as the 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 3-17: Typical mobile offshore drilling unit specification ranges

Component	Specification Range
Rig type/design/class	Semi-submersible MODU
Accommodation	120 to 200 personnel (maximum persons on board)
Station keeping	Minimum eight-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

3.5.6.2 Installation Vessels

The tie-back subsea installation scopes of work may require various installation vessels, with sufficient capacity to accommodate hardware and equipment such as flexible jumpers, SDU and flying leads.

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 3-18**. Another installation vessel, similar to vessels used for inspection, monitoring, maintenance and repair (IMMR), may be used to install the tubing head spool and Xmas tree.

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 pre-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 3-18: Typical DP2 Class subsea installation vessel

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 m^2
Deck strength	Approximately 15 T/m^2
Accommodation	Approximately 120 people
Fuel oil	Approximately 2200 m^3
Potable water	Approximately 800 m^3

3.5.6.3 Support and Other Vessels

The MODU and installation vessels will be supported by other vessels, such as general support vessel(s), cargo vessel(s), anchor handling vessel(s), barges, multiservice construction and HLVs. During the installation campaign, there may potentially be two HLVs and two platform supply vessels for field support and floating storage facilities.

Support vessels are used to transport equipment and materials between the MODU/installation vessel and port (e.g., Dampier, Onslow, Exmouth). If required, one of the vessels may be at the MODU to perform standby duties, and others will make regular trips between the Lambert West Operational Area and port for routine, non-routine and emergency operations.

3.5.6.4 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 Petroleum Activities Program. 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. 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 consist of 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 utilised 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 anchor handling vessel.

3.5.6.5 Holding Station: Dynamic Positioning Mobile Offshore Drilling Unit

DP uses satellite navigation and radio transponders in conjunction with thrusters to maintain the position of the MODU at the required location. Information about the position of the MODU is provided via a number of seabed transponders, which emit signals that are detected by receivers on the MODU and used to calculate position. The transponders are typically deployed in an array on the seabed, using clump weights comprising concrete, for the duration of the drilling, and are recovered at the end, generally by ROV.

Mooring lines may also be deployed in conjunction with the DP system, acting as a hybrid system, to reduce the loads acting on and improve the reliability of the overall mooring system.

3.5.6.6 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 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 to 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 (inc. 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 utilising a ROV.

3.5.6.7 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 undertaken 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 the cooling of machinery engines and high temperature drilling fluid on the MODU. It is subsequently discharged from the MODU to the sea surface at potentially a higher temperature. Alternatively, MODUs may utilise closed-loop cooling systems.

Potable water, primarily for accommodation and associated domestic areas, may be generated on vessels using a reverse osmosis (RO) 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 Petroleum Activities Program are disposed of onshore by support vessels.

3.5.6.8 Subsea Installation and Support Vessel Activities

The installation vessels may be used for various activities such as pre and post installation survey, installation of subsea structures, installation of subsea infrastructure (e.g., subsea distribution unit), installation of flexible jumper and flying leads, reconfiguration and tie-in to existing infrastructure, pre-commissioning, and cold-commissioning activities.

3.5.6.9 Refuelling

The MODU may be refuelled via support vessels approximately once a month, or as required. This activity will take place within the Lambert West Operational Area and has been included in the risk assessment for this EP. Other fuel transfers that may occur on board the MODU include refuelling of cranes, helicopters or other equipment as required.

The installation vessel is expected to be in the field for relatively short durations and therefore may not require refuelling while in the field. However, this activity has been included in the risk assessment for this EP.

3.6 Vessels

Several vessel types will be required to complete the activities associated with the Petroleum Activities Program. These may include:

- platform support vessel
- a MODU during tie-back (options include a semi-submersible moored MODU or a hybrid MODU with both moorings and DP systems, depending on availability and suitability for the well location (e.g., water depth)
- installation vessels during tie-back
- support vessels, including:
  - AHVs required to set anchors and support the MODU during operations
  - HLVs for providing floating storage facilities to the installation vessel
  - activity support vessels for transportation of hardware from port/staging area to the PAA and installation vessels, and for general re-supply and support for the MODU and the installation vessels.

Typical support vessels use a DP system to allow manoeuvrability and avoid anchoring when undertaking works, due to the proximity of subsea infrastructure. However, vessels are equipped with anchors which may be deployed in an emergency. Support vessels do not anchor within the PAA during the activities due to water depth.

Vessel activities associated with Angel operations and Lambert West tie-back are described in **Section 3.4.14 and Section 3.5.6** respectively.

Description and assessment of project vessel environmental impacts and risks, credible spill scenarios and environmental sensitivities for the activities within the scope of this EP are included in **Section 6**. For power generation, vessels may use diesel-powered generators and/or LNG.

3.6.1 Vessel Mobilisation

Vessels may mobilise from the nearest Australian port or directly from international waters to the PAA, in accordance with biosecurity and marine assurance requirements. Vessel activities while in transit to the PAA are not included in the scope of this EP.

3.6.2 Remotely Operated Vehicles

The MODU and project 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. This is discussed further in **Appendix A**.

3.7 Helicopter Operations

Helicopters are the primary means of transporting passengers and/or urgent freight to/from the Angel 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 (frequency described in **Section 3.4.5.4**) or from the NRC for breakdown maintenance.

During Lambert West tie-back activities, crew changes may be performed using helicopters. This activity will take place within the Lambert West Operational Area and has been included in the risk assessment for this EP.

3.8 Chemical Selection, Assessment and Approval

Operational chemicals required by the Petroleum Activities Program are selected and approved in accordance with Woodside's process for selecting and assessing chemicals. This process is used to demonstrate that the potential impacts of the chemicals selected are acceptable and ALARP, and that they meet Woodside's corporate requirements, 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 Chemical Selection and Assessment Environment Guideline is outlined below.

3.8.1.1 Environmental Selection Criteria

Woodside's process for selecting and assessing chemicals follows the principles outlined in the Offshore Chemical Notification Scheme (OCNS), which manages chemical use and discharge in the United Kingdom (UK) and the Netherlands (background on the OCNS scheme is provided below).

Operational chemicals are selected/assessed in compliance with the Woodside's process for selecting and assessing chemicals, 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, 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 is 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 is provided and no further assessment is required.

- If there is planned discharge of the operational chemical to the marine environment, a further assessment and ALARP justification is conducted.

The ALARP assessment considers chemical toxicity and biodegradation and bioaccumulation potential, using industry standard classification criteria (Centre for Environment, Fisheries and Aquaculture Science scheme criteria).

If a product has no specific ecotoxicity, biodegradation, or bioaccumulation data available:

- environmental data for analogous products can be referred to where chemical ingredients and composition are largely identical
- 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 are investigated, with preference for options with a hazard quotient (HQ) band of Gold or Silver, or in 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) are considered for the specific context and implemented where relevant to ensure the risk is ALARP and acceptable.

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

3.8.1.2 Background Overview of Offshore Chemical Notification Scheme

The OCNS applies the requirements of the Oslo–Paris 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 list of registered products have an assigned ranking based on toxicity and other relevant parameters (e.g., biodegradation, bioaccumulation), in accordance one of two schemes (as shown in **Figure 3-6**):

- **Hazard Quotient (HQ) 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.

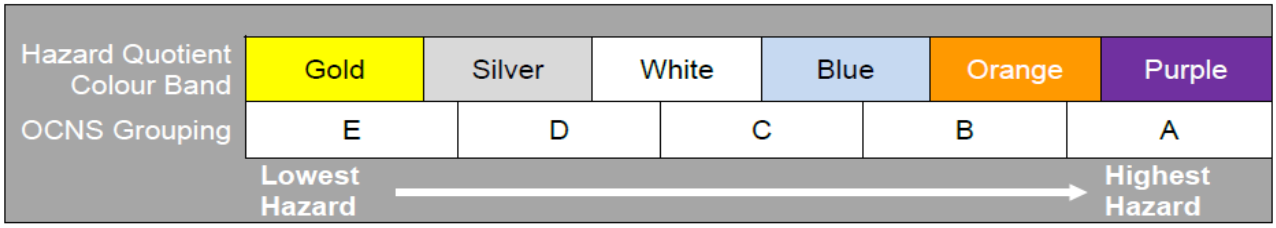


Figure 3-6: Offshore Chemical Notification Scheme ranking

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 (EMBA) by the activity (planned and unplanned, as described in **Section 2.10**), 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, in the event of the worst-case credible spill. The ecological impact thresholds used to delineate the EMBA are defined in **Section 6.7.2**. The worst-case credible spill scenario for this EP is a loss of well integrity. 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 6.7.2**. 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 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 environment that may be affected for surface and in-water hydrocarbons

Hydrocarbon type	EMBA[1]	Socio-cultural EMBA[1]	Planning area for scientific monitoring
Surface	10 g/m^2 This represents the minimum oil thickness (0.01 mm) at which ecological impacts (e.g., to birds and marine mammals) are expected to occur.	1 g/m^2 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).	
Dissolved	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.		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 further in **Appendix D** and **Figure 4-1**. In the event of a spill, DNP will be notified of AMPs which may be contacted by hydrocarbons at this threshold.
Entrained	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.		
Shoreline	100 g/m^2 This represents the threshold that could impact the survival and reproductive capacity of benthic epifaunal invertebrates living in intertidal habitat.	10 g/m^2 This represents the volume where hydrocarbons may be visible on the shoreline but is below concentrations at which ecological impacts are expected to occur.	N/A.

[1] *Further details including the source of the thresholds used to define the EMBA in this table are provided in* ***Section 6.7.2****.*

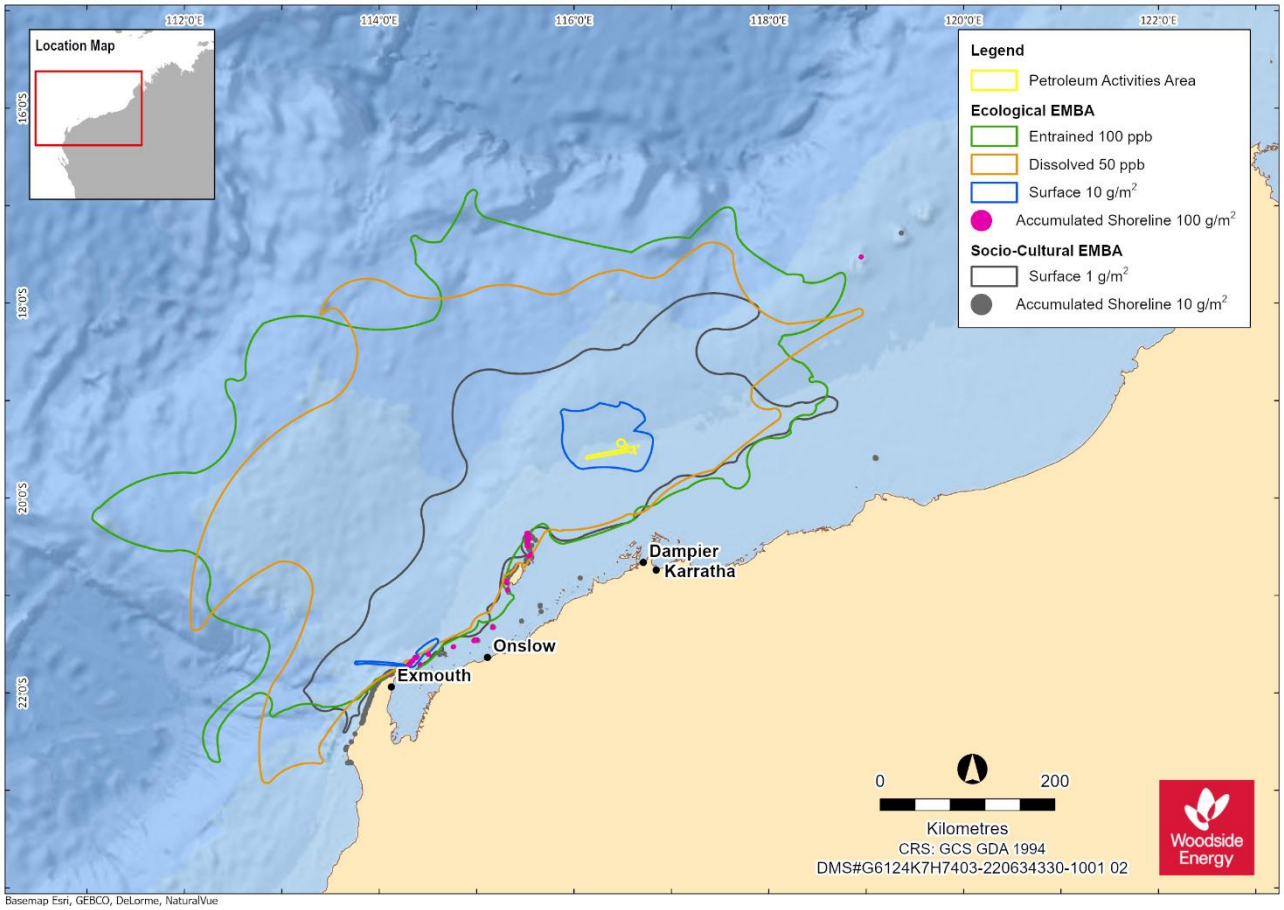


Figure 4-1: Environment that may be affected by the Petroleum Activities Program

4.2 Regional Context

The Petroleum Activities Area (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 PAA lies within the Northwest Shelf Province (**Figure 4-2**). Woodside's Description of Existing Environment (**Appendix C-1** and **Section 3**) summarises the characteristics for the relevant marine bioregions.

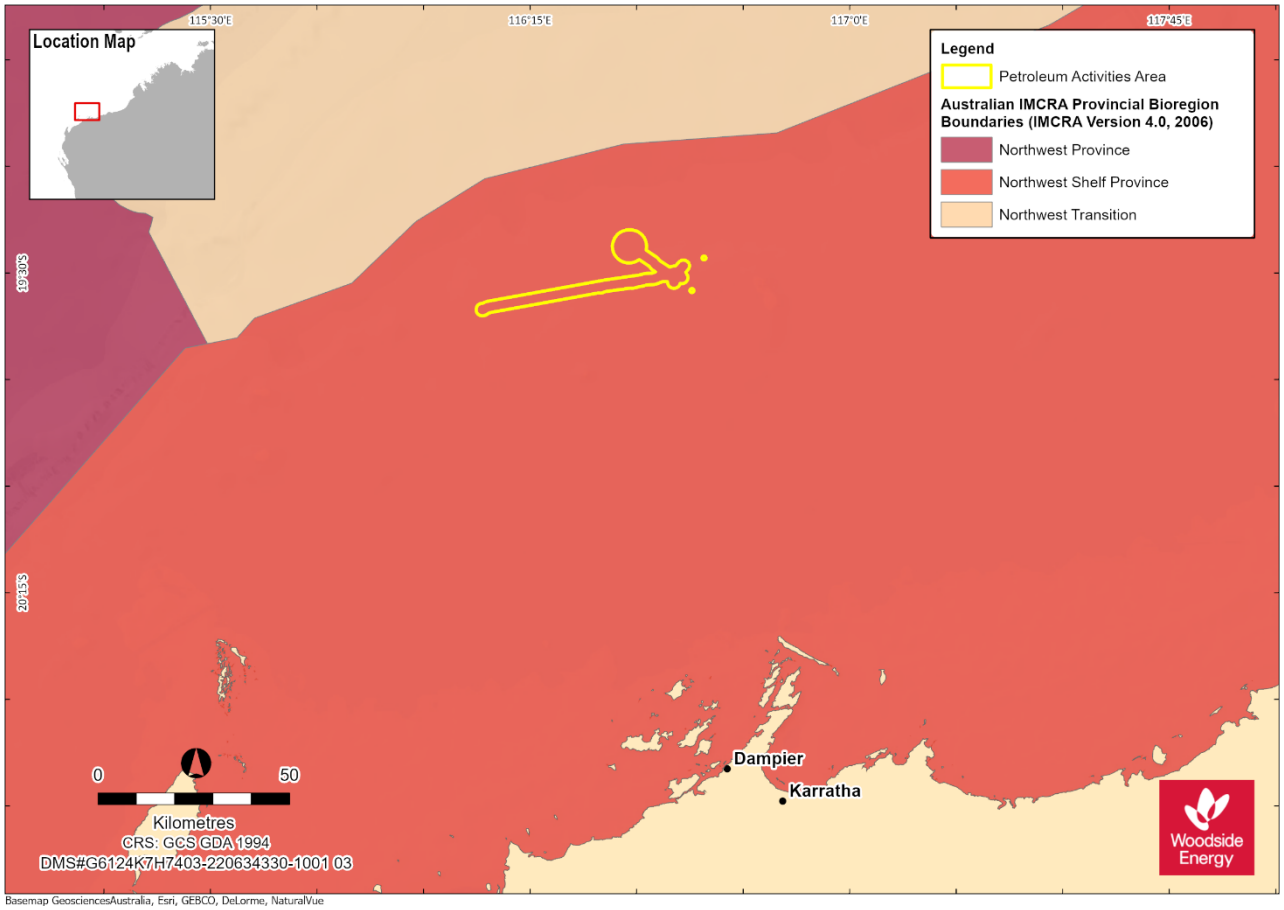


Figure 4-2: Location of the Petroleum Activities Area and relevant marine bioregions

4.3 Matters of National Environmental Significance (Environment Protection and Biodiversity Conservation Act)

Table 4-2 and **Table 4-3** summarise the MNES overlapping the PAA and EMBA, respectively, according to Protected Matters Search Tool (PMST) results (**Appendix C-2**). 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.

Additional information on these MNES is provided in subsequent sections of this chapter and described in detail in **Appendix C** and **Section 3**.

Table 4-2: Summary of matters of national environmental significance identified by the *Environment Protection and Biodiversity Conservation Act* Protected Matters Search Tool as potentially occurring within the Petroleum Activities Area

MNES	Number	Relevant section
World Heritage Properties	0	**Section 4.9**
National Heritage Places	0	**Section 4.9**
Wetlands of International Importance (Ramsar)	0	N/A
Commonwealth Marine Area	1	N/A
Listed Threatened Ecological Communities	0	N/A
Listed Threatened Species	32	**Section 4.6**
Listed Migratory Species	55	**Section 4.6**

Table 4-3: Summary of matters of national environmental significance identified by the *Environment Protection and Biodiversity Conservation Act* Protected Matters Search Tool as potentially occurring within the environment that may be affected

MNES	Number	Relevant section
World Heritage Properties	1	**Section 4.9**
National Heritage Places	1	**Section 4.9**
Wetlands of International Importance (Ramsar)	0	N/A
Commonwealth Marine Area	1	N/A
Listed Threatened Ecological Communities	0	N/A
Listed Threatened Species	48	**Section 4.6**
Listed Migratory Species	65	**Section 4.6**

4.4 Physical Environment

The PAA lies in waters approximately 70 m to 130 m deep on the continental shelf (**Figure 4-3**). The bathymetry within the PAA is generally flat, which is consistent with the broader NWS Province shelf region (Baker et al., 2008). The seabed has a gentle (0.05°) seaward gradient, extending to a relatively steep outer slope approximately 200 to 300 km offshore in water depths of around 200 m (Dix et al., 2005). The continental slope then descends more rapidly from the shelf edge to depths greater than 1000 m to the north-west (James et al., 2004).

Appendix C and **Section 2** provide a summary of the physical characteristics of the environment within the EMBA and broader NWMR.

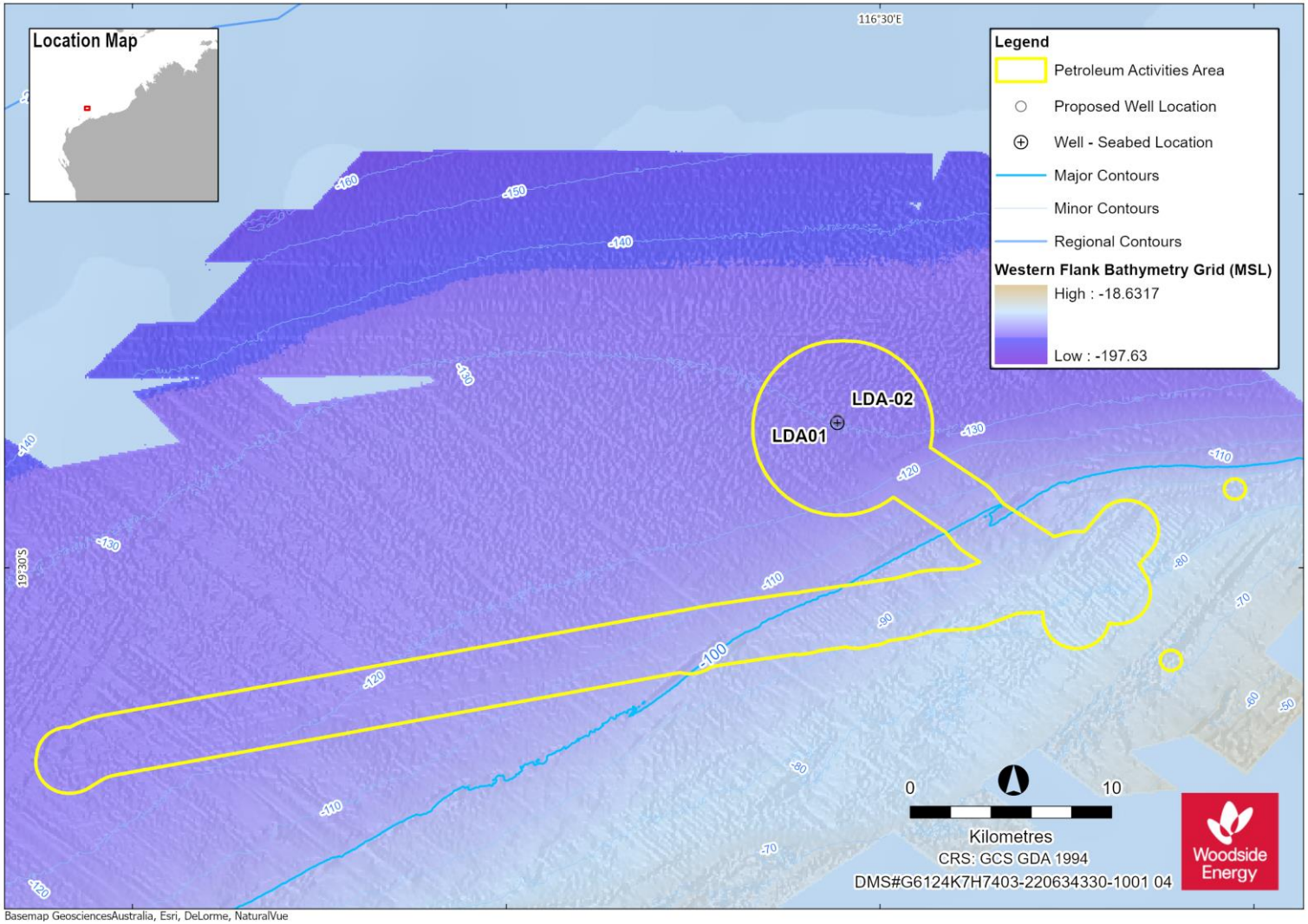


Figure 4-3: Bathymetry of the Petroleum Activities Area

4.5 Habitats and Biological Communities

Sediments in the PAA are broadly consistent with those in the NWS Province, as found in a survey conducted by BMT in 2021 around the Angel facility which found across all sites tested, the sediments collected were predominantly well sorted, yellow/brown coloured fine to coarse sand with large proportions of shell fragments (BMT, 2021). Based on surveys conducted in 2014, as part of the Lambert Deep baseline investigations the sediment surveyed within the PAA are classified as sub-littoral sediments predominantly coarse silt and some shell fragments with burrows, mounds, polychaetes and occasional hydroids, interspersed with areas of muddy sand and occasionally polychaetes and sparse epibiota (Jacobs, 2014).

This is reasonably consistent with the Woodside sampling programs undertaken at Glomar Shoals and the Goodwyn Alpha (GWA) platform (Australian Institute of Marine Science (AIMS), 2014a; BMT Oceanica, 2015a). Sediments in the outer NWS Province are relatively homogenous and are typically dominated by sands and a small portion of gravel (Baker et al., 2008). 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, the proportion of fine sediments increases along the continental slope towards the Exmouth Plateau and the abyssal plain (Baker et al., 2008).

Glomar Shoals KEF itself lies approximately 15 km east of the PAA (**Figure 4-3**). These submerged shoals are large (215 km^2), complex bathymetrical features on the outer continental shelf off the Pilbara. Glomar Shoals rises gently on the south-west side of the reef from 80 m depth to a single plateau at 40 m depth. The north-eastern side of the reef rises steeply from 70 m to 40 m depth. The shoals are relatively shallow, with water depths reaching 22 to 28 m at its shallowest point. Glomar Shoals has been identified as a KEF of the continental shelf within the NWMR, based on its regionally important habitat supporting high biological diversity and high localised productivity (Falkner et al., 2009). On a regional level, the Glomar Shoals KEF is also known to be an important area for commercial and recreational fish species. Approximately 0.015% of the KEF overlaps the PAA (**Figure 4-11**), in water depths between 65 and 72 m. Together with Rankin Bank, these remote shallow water areas represent regionally unique habitats and are likely to play an important role in the productivity of the Pilbara region (AIMS, 2014b; Wahab et al., 2018).

Benthic habitats of the Glomar Shoals KEF vary with depth and are characterised by coarse unconsolidated sediment at depths greater than 60 m to hard substrate supporting benthic communities comprising spare hard and soft corals sponges and macroalgae at depths <40 m. Total cover of benthic taxa (hard coral, soft coral, sponges and other benthic biota) is highest at depths <40 m and decreases with depth (Wahub, 2018). At depths of 60 to 80 m, benthic cover is low and approximately 2%; at depths greater than 80 m, benthic cover is barely present, with baseline survey data indicating 0.1% cover of benthic biota. The results of a baseline survey and habitat modelling undertaken by AIMS in 2013 indicate the portion of the Glomar Shoals KEF overlapping the PAA is composed of soft sediment seabed and not areas of higher, phototrophic benthic biota (AIMS, 2014). Structurally complex biodiverse benthic habitats are mainly found within the north-eastern portion of Glomar Shoals KEF.

Overall, the benthic habitats of the Glomar Shoals KEF are considered pristine and hosts regionally distinct ecological communities. The fish abundance and diversity of the demersal fish communities of the Glomar Shoals KEF are influenced by the seabed habitat type, with genera associated with sandy habitats common, including threadfin breams (Nerripterus spp.) and triggerfish (Abalisters spp.). Species richness and abundance are influenced by habitat depth and the degree of coral cover. In general, the fish abundance and diversity of the Glomar Shoals KEF 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 (Wahab et al., 2018).

The PAA overlaps the Ancient Coastline KEF, an ancient submerged coastline, with areas of hard substrate which provides habitat that supports the KEF's higher diversity and enhanced species richness, relative to the surrounding area. The KEF is relatively poorly understood; however, the following fauna are associated with the escarpment: crinoids, molluscs, echinoderms sponges, corals and other benthic invertebrates representative of hard substrate fauna in the region.

Within the Ancient Coastline KEF, several discrete areas of hard substrate exist, which play host to sessile filter feeding communities. However, from five sample locations within the PAA conducted in 2014 as part of the Lambert Deep baseline surveys, two overlap the Ancient Coastline KEF, with no areas of habitat characterised by hard substrate found (Jacobs, 2014). The sediment identified within the samples that are found within both the PAA and the Ancient Coastline KEF are characterised by sublittoral sediment with a mix of coarse silt and fine sand.

Although several areas with sensitive habitat and features are present within the EMBA and PAA, the majority of the seabed is characterised by relatively expansive areas of featureless sandy substrate.

Key habitats and ecological communities within the EMBA are identified in **Table 4-4** and described in **Appendix C** Section 4.4.

Table 4-4: Key sensitive habitats and communities within the environment that may be affected (distance calculated from Petroleum Activities Area)

Habitat/community	Key locations within the EMBA
Seabed characteristics	
Rankin Bank	Rankin Bank is a sedimentary bank located on the continental shelf approximately 59 km west of the PAA and approximately 105 km away from the Angel facility. The bank rises from around 40 to 50 m to 18 m below the sea surface. The formation includes three major shallow banks (18 to 30 m) defined by the 50 m bathymetric contour (Australian Institute of Marine Science (AIMS), 2014a).
Ancient Coastline at 125 m Depth Contour	The Ancient Coastline at 125 m Depth Contour, overlaps the Lambert West Operational Area (DAWE, 2019a). Areas of this KEF comprise hard substrate and may occur within the PAA. Hard substrate seabed habitats present within the Lambert West Operational Area are likely to support filter feeding biota such as sponges and gorgonians (sea whip and fans), as reported for hard substrate seabed habitat in similar water depths along this outer shelf area of the NWS. Seabed habitat comprising hard substrates were not identified during a video benthic habitat and box grab seabed sediment sampling survey of the Lambert Deep development area (Jacobs, 2014). A previous geophysical survey of this area, however, had identified a scarp area in proximity to two of the sample locations (Fugro Survey Pty Ltd, 2002; Jacobs, 2014). Observations of old dead coral fragments and coral rubble were made at these same two sample locations during the 2014 survey (Jacobs, 2014). Hard substrate seabed habitats present within the Lambert West Operational Area are likely to support filter feeding biota such as sponges and gorgonians (sea whip and fans), as reported for hard substrate seabed habitat in similar water depths along this outer shelf area of the NWS. A reconnaissance survey undertaken of the pipeline route linking the Angel platform and NRC indicated occasional outcrops of cemented substrate occur in localised depressions and identified a plateau-like structure up to 4 m higher than the flat, unconsolidated soft sediment seabed habitat of the south-west section of the proposed pipeline route (SKM, 2006). Further supporting the potential for sparse outcrops of hard substrate within the PAA which is predominantly composed of a flat, unconsolidated soft sediment seabed habitat.

Habitat/community	Key locations within the EMBA
Marine primary producers	
Coral	• Glomar Shoals (15 km east) • Rankin Bank (59 km west) • Montebello Islands (106 km south-west) • Barrow Island (139 km south-west) • Muiron Islands (289 km south- west) • Ningaloo Coast (319 km south-west)
Seagrass beds and macroalgae	• Montebello Islands (106 km south-west) • Barrow Island (139 km south-west) • Muiron Islands (289 km south- west) • Ningaloo Coast (319 km south- west) • Exmouth Gulf (352 km south-west)
Mangroves	• Montebello Islands (106 km south-west) • Ningaloo Coast (319 km south- west) • Exmouth Gulf (352 km south-west)
Other communities and habitats	
Plankton	Plankton within the PAA and EMBA are expected to be representative of the wider NWMR, as detailed in **Appendix C** Section 4.3. Peak primary productivity within the EMBA 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, 2005a) with periodic upwelling throughout the year. Further detail regarding productivity at other notable locations within the EMBA (e.g., North-west Cape) is provided in **Appendix C** Section 4.3.3.
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 C** Section 5.3). Notably, the presence of subsea infrastructure associated with the Angel facility and associated infrastructure has resulted in the development of demersal fish communities that would otherwise not occur in the PAA (McLean et al., 2017). Particular features within the EMBA that are known to support pelagic and demersal fish populations include The Ancient Coastline at 125 m Depth Contour KEF (which is mapped as overlapping the Angel Operational Area), The Continental Slope Demersal Fish Communities KEF, Rankin Bank and Glomar Shoals KEF (including the Glomar Shoals KEF). Detail regarding these features is provided in **Appendix C** Section 9.
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. 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 Angel Operational Area. However, no areas of hard substrate characteristic of this KEF have been identified within the Angel Operational Area (Jacobs, 2014). Filter feeder communities within the PAA are present on the subsea infrastructure and Angel platform, which provides hard substrate for attachment (Jacobs, 2014).

4.6 Protected Species

A total of 67 EPBC Act listed species considered to be MNES were identified as potentially occurring within the EMBA, of which a subset of 43 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**, including several MNES that are not considered to be credibly impacted (e.g., terrestrial species within the EMBA). Criteria for determining species to be considered for impact assessment is outlined in **Appendix C-1** Section 3.2.

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 4-5** to **Table 4-13**. A description of these species is included in **Appendix C-1** and shows the spatial overlap with relevant BIAs and Habitat Critical areas and the PAA and EMBA.

4.6.1 Fish, Sharks and Rays

Table 4-5: Threatened and migratory fish, shark and ray species predicted to occur within the Petroleum Activities Area and environment that may be affected

Species name	Common name	Threatened status	Migratory status	Potential for interaction	
				PAA	EMBA
Pristis zijsron	Green sawfish	Vulnerable	Migratory	Species or species habitat known to occur within area.	Species or species habitat known 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.
Carcharadon carcharias	White shark	Vulnerable	Migratory	Species or species habitat may 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 likely 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 known to occur within area.
Pristis clavata	Dwarf sawfish	Vulnerable	Migratory	N/A.	Species or species habitat known to occur within area.
Sphyrna lewini	Scalloped hammerhead	Conservation Dependant	N/A	Species or species habitat likely 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.
Anoxypristis cuspidata	Narrow sawfish	N/A	Migratory	Species or species habitat known to occur within area.	Species or species habitat known to occur within area.
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.
Manta birostris	Giant manta ray	N/A	Migratory	Species or species habitat likely to occur within area.	Species or species habitat known 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 name	Common name	Threatened status	Migratory status	Potential for interaction	
				PAA	EMBA
Manta alfredi	Reef manta ray	N/A	Migratory	Species or species habitat likely to occur within area.	Species or species habitat known 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.
Lamna nasus	Porbeagle	N/A	Migratory	N/A.	Species or species habitat may occur within area.

Table 4-6: Fish, shark and ray biologically important areas within the Petroleum Activities Area and environment that may be affected

Species	BIA type	Approximate distance and direction of BIA from PAA (km)
Whale shark	Foraging (northward from Ningaloo along 200 m isobath)	Overlaps
	Foraging (high density prey) (Ningaloo Marine Park and adjacent Commonwealth waters)	339 km south-west

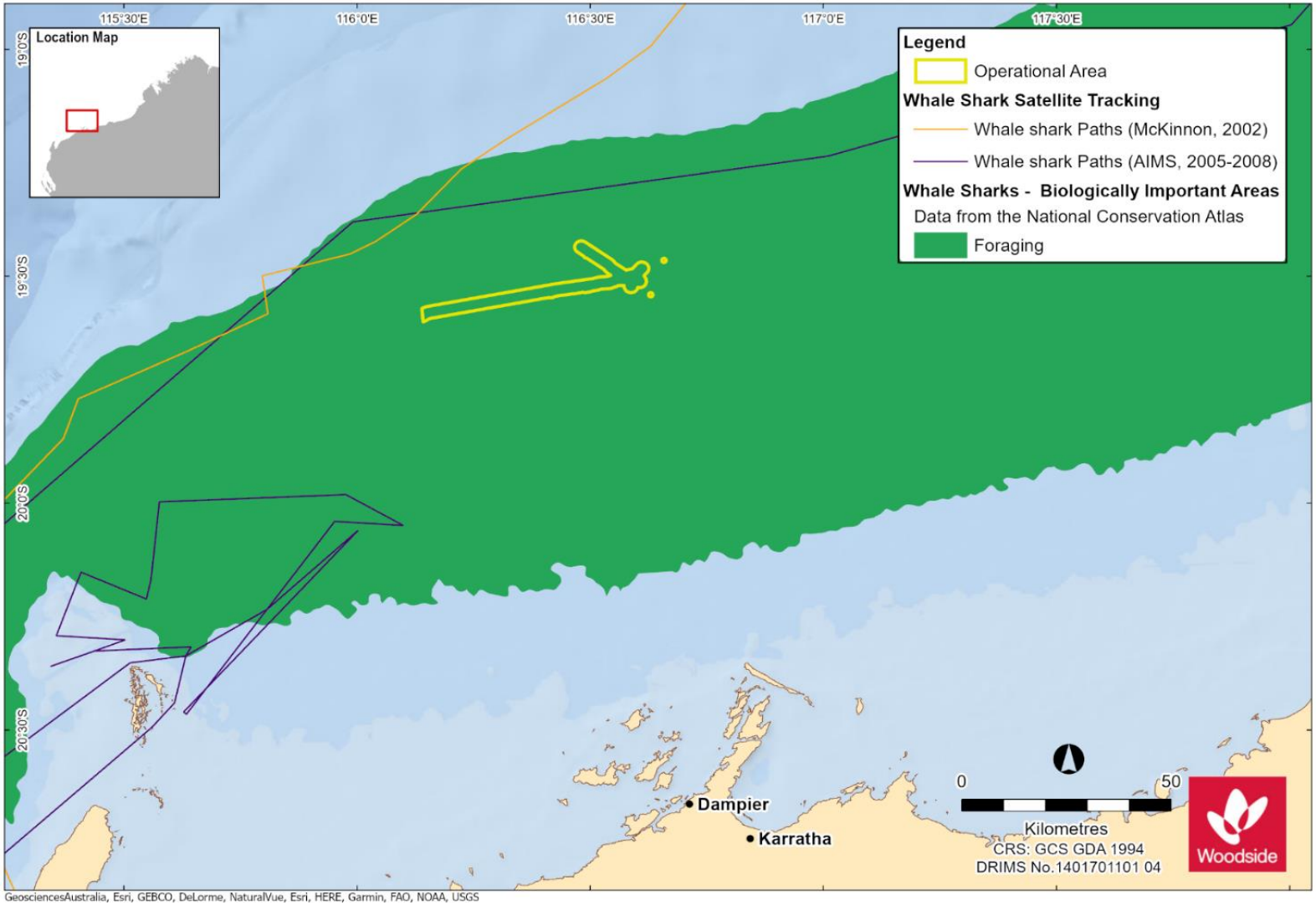


Figure 4-4: Whale shark biologically important areas overlapping the Petroleum Activities Area and satellite tracks of whale sharks tagged between 2005 and 2008 (Double et al., 2012, 2014)

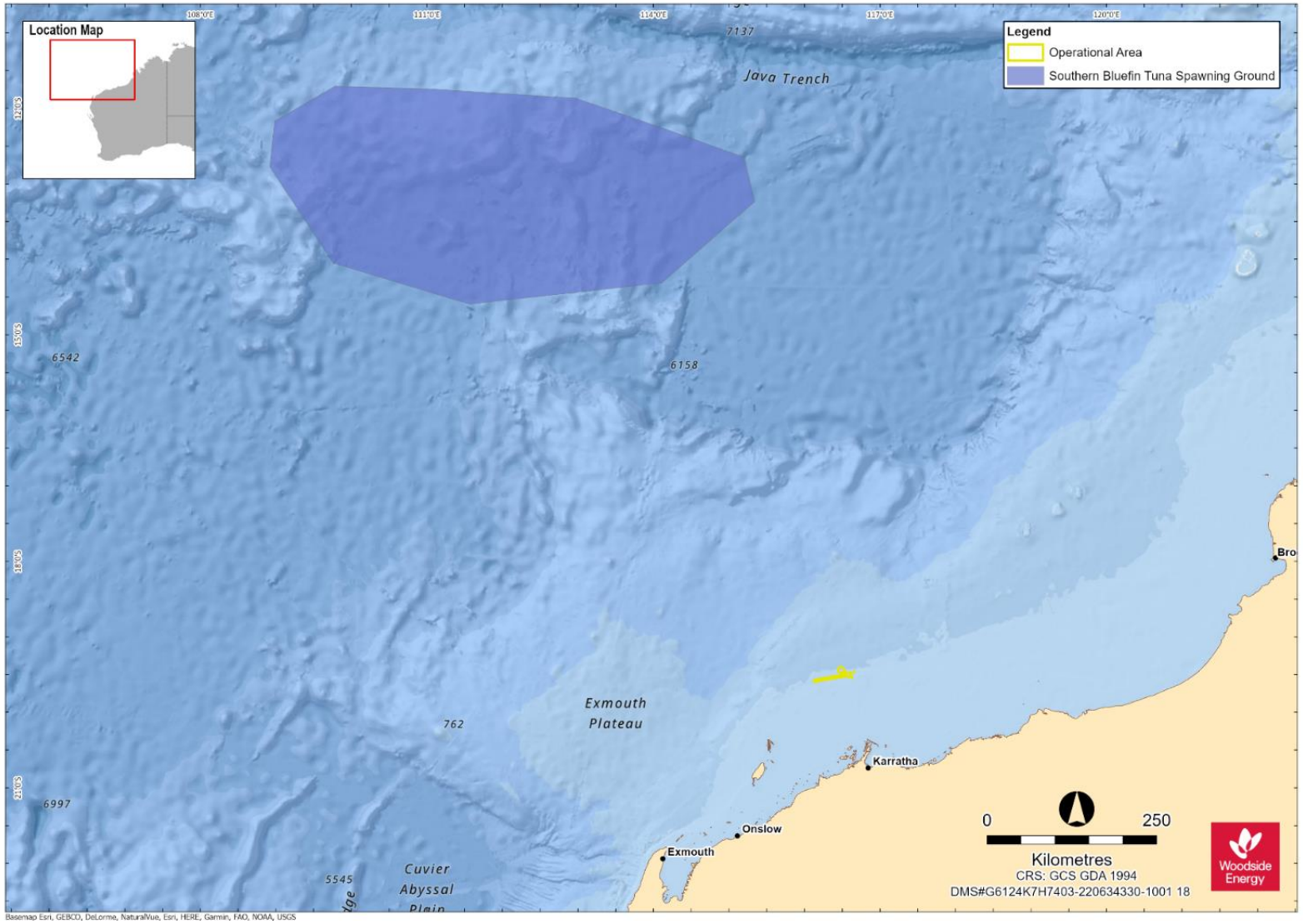


Figure 4-5: Southern blue fin tuna spawning ground

4.6.2 Marine Reptiles

Table 4-7: Threatened and migratory marine reptile species predicted to occur within the Petroleum Activities Area and environment that may be affected

Species name	Common name	Threatened status	Migratory status	Potential for interaction	
				PAA	EMBA
Natator depressus	Flatback turtle	Vulnerable	Migratory	Congregation or aggregation known to occur within area.	Breeding known to occur within area.
Chelonia mydas	Green turtle	Vulnerable	Migratory	Species or species habitat likely to occur within area.	Breeding known to occur within area.
Eretmochelys imbricata	Hawksbill turtle	Vulnerable	Migratory	Species or species habitat likely to occur within area.	Breeding known to occur within area.
Dermochelys coriacea	Leatherback turtle	Endangered	Migratory	Species or species habitat likely to occur within area.	Species or species habitat known to occur within area.
Caretta caretta	Loggerhead turtle	Endangered	Migratory	Species or species habitat likely to occur within area.	Breeding known to occur within area.
Aipysurus foliosquama	Leaf-scaled seasnake	Critically Endangered	N/A	Species or species habitat likely to occur within area.	Species or species habitat known to occur within area.
Aipysurus apraefrontalis	Short-nosed seasnake	Critically Endangered	N/A	Species or species habitat known to occur within area.	Species or species habitat known to occur within area.

Table 4-8: Marine turtle biologically important areas within the environment that may be affected

Species	BIA type (closest location)	Approximate distance and direction of BIA from PAA (km)
Flatback turtle	Internesting Buffer (Dampier Archipelago; Legendre Is, Huay Is, Montebello Is – Hermite Is, NW Is, Trimouille Is, Delambre Is, Intercourse Is, Dixon Island, West of Cape Lambert, Cape Thouin/Mundabullangana/Cowrie Beach, Thevenard Island – South coast, North Turtle Island)	15 km south
	Mating (Montebello Is - Hermite Is, NW Is, Trimouille Is, coral reef habitat west of the Montebello group, Barrow Island)	103 km south-west
	Nesting (Montebello Is - Hermite Is, NW Is, Trimouille Is, Barrow Island, Thevenard Island – south coast)	103 km south-west
	Foraging (Montebello Is - Hermite Is, NW Is, Trimouille Is, Coral reef habitat west of the Montebello group, string of islands between Cape Preston and Onslow, inshore of Barrow Is, Barrow Island)	103 km south-west

Species	BIA type (closest location)	Approximate distance and direction of BIA from PAA (km)
	Aggregation (coral reef habitat west of the Montebello group)	117 km south-west
	Internesting (coral reef habitat west of the Montebello group)	117 km south-west
Green turtle	Internesting Buffer (Montebello Islands, Montebello Is – Hermite Is, NW Is, Trimouille Is, Middle Is. West Coast Barrow Island West Coast and North Coast, North and South Muiron Is and North West Cape)	78 km south-west
	Mating (Montebello Islands, Montebello Is - Hermite Is, NW Is, Trimouille Is, Coral reef habitat west of the Montebello group, Middle Is. West Coast Barrow Island West Coast and North Coast)	98 km south-west
	Nesting (Montebello Islands, Montebello Is – Hermite Is, NW Is, Trimouille Is, Middle Is. West Coast Barrow Island West Coast and North Coast, North and South Muiron Is, North West Cape)	98 km south-west
	Internesting (Montebello Islands, Coral reef habitat west of the Montebello group, Barrow Island)	98 km south-west
	Foraging (Montebello Islands, Montebello Is – Hermite Is, NW Is, Trimouille Is, Coral reef habitat west of the Montebello group, String of islands between Cape Preston and Onslow, inshore of Barrow Is, inshore tidal and shallow subtidal areas around Barrow Island)	98 km south-west
	Aggregation (Coral reef habitat west of the Montebello group)	117 km south-west
	Basking (Middle Is. West Coast Barrow Island West Coast and North Coast)	137 km south-west
Hawksbill turtle	Internesting Buffer (Montebello Is - Hermite Is, NW Is, Trimouille Is, Ah Chong and South East Is, Montebello Is, Trimoulle and NW islands, Lowendal Island Group, Varanus Island, Barrow Island, Thevenard Island, Ningaloo coast and Jurabi coast)	84 km south-west
	Foraging (Montebello Is – Hermite Is, NW Is, Trimouille Is, Lowendal Island Group, String of islands between Cape Preston and Onslow, inshore of Barrow Is, shallow water coral reef and artificial reef (pipeline) habitat)	104 km south-west
	Mating (Montebello Is – Hermite Is, NW Is, Trimouille Is, Lowendal Island Group, Barrow Island)	104 km south-west
	Nesting (Montebello Is – Hermite Is, NW Is, Trimouille Is, Ah Chong and South East Is, Montebello Is, Trimoulle and NW islands, Lowendal Island Group, Barrow Island, Thevenard Island, Ningaloo coast and Jurabi coast)	104 km south-west
	Internesting (Lowendal Island Group)	126 km south-west
Loggerhead turtle	Internesting (Montebello Islands, Lowenthal Island, Muiron Island, Ningaloo coast and Jurabi coast)	92 km south-south-west
	Nesting (Montebello Islands, Lowenthal Island, Muiron Island, Ningaloo coast and Jurabi coast)	112 km south-west
Leatherback turtle	*No BIAs within the EMBA or PAA*	

Table 4-9: Habitat critical to the survival of marine turtle species occurring within the environment that may be affected

Species	Genetic stock	Nesting locations	Approximate distance and direction from PAA (km)	Inter-nesting buffer	Nesting period	Hatching period
Flatback turtle	South-west Kimberley	Eighty Mile Beach, Eco Beach, Lacepede Islands (some within the EMBA)	34 km south-east	60 km	All year (peak: Dec to Jan)	All year
	Pilbara	Montebello Islands, Mundabullangana Beach, Barrow Island, Cemetery Beach, Dampier Archipelago (including Delambre Island and Huay Island), coastal islands from Cape Preston to Locker Island (some within the EMBA)	34 km south	60 km	Oct to Mar (peak: Nov to Jan)	Feb to Mar
Green turtle	North West Shelf	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 (some within the EMBA)	86 km south	20 km	Nov to Mar (peak: Dec to Feb)	Jan to May (peak: Feb to Mar)
Hawksbill turtle	Western Australia	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 (some within the EMBA)	86 km south	20 km	All year (peak: Oct to Jan)	All year (peak: Dec to Feb)
Loggerhead turtle	Western Australia	Dirk Hartog Island, Muiron Islands, Gnaraloo Bay, Ningaloo coast (some within the EMBA)	300 km south-west	20 km	Nov to Mar (peak: Jan)	Jan to May
Leatherback turtle	*No overlap – nesting located in Northern Territory and North Queensland*					

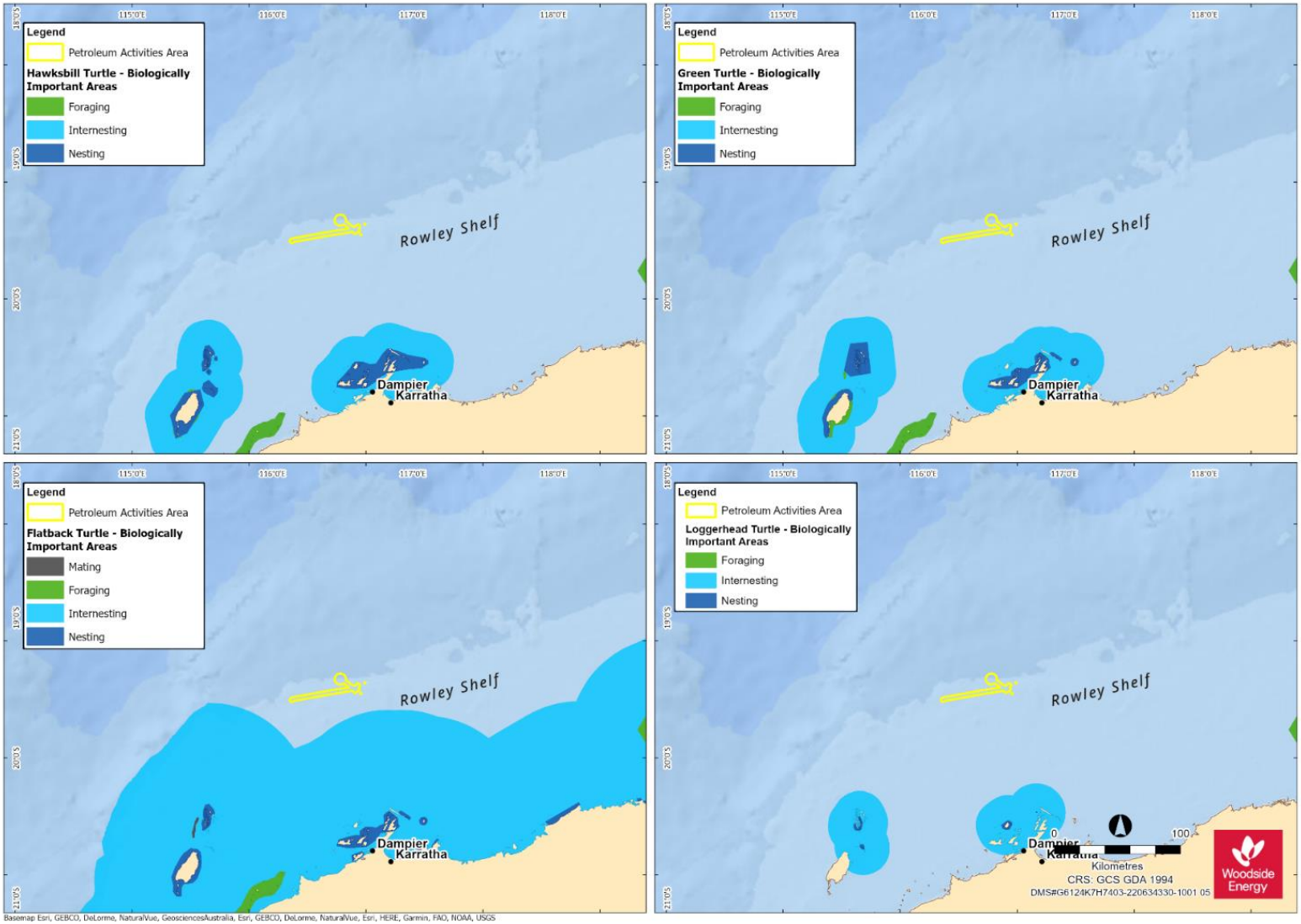


Figure 4-6: Marine reptile biologically important areas overlapping the environment that may be affected

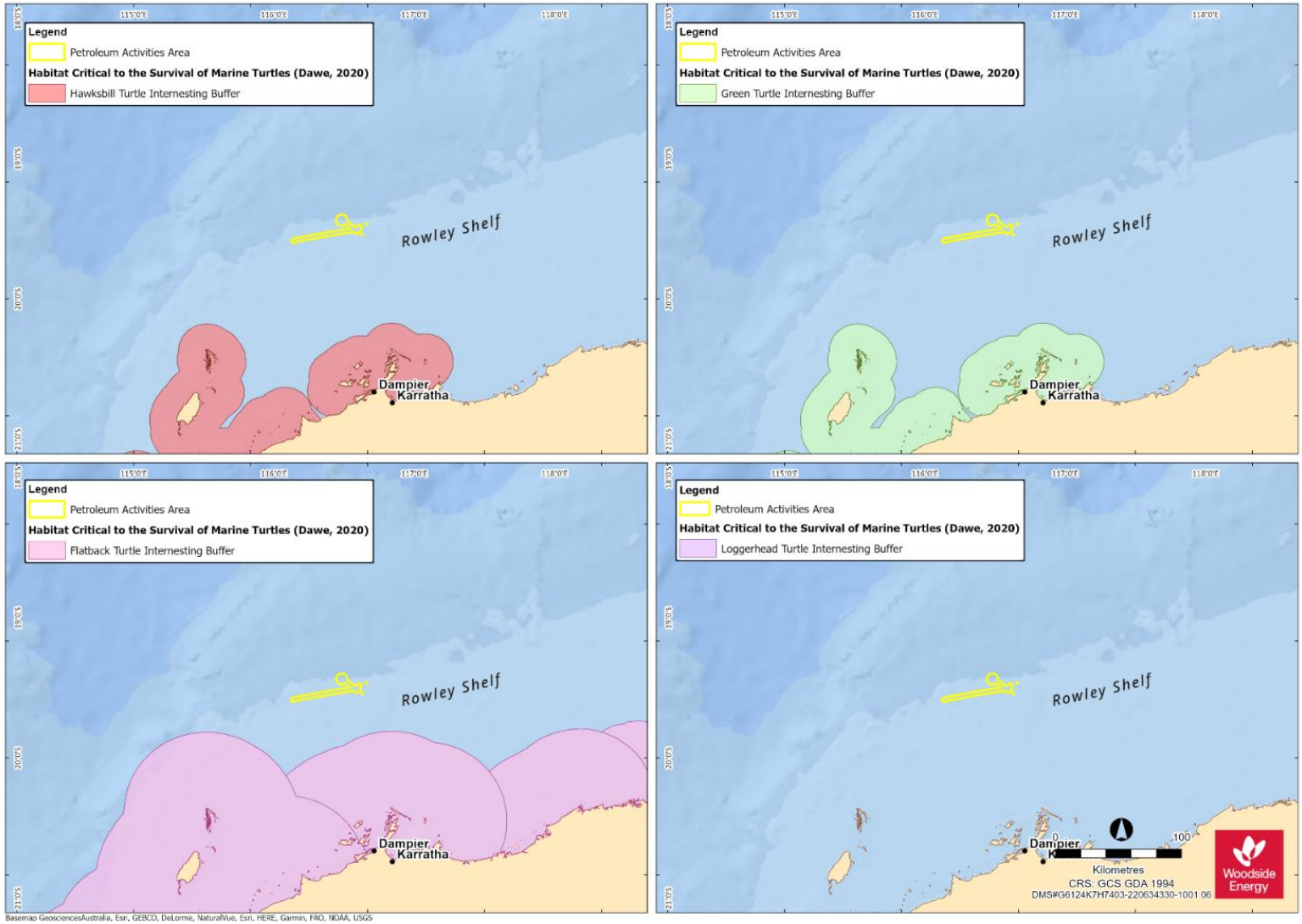


Figure 4-7: Habitat critical to the survival of marine turtles overlapping the environment that may be affected

4.6.3 Marine Mammals

Table 4-10: Threatened and migratory marine mammal species predicted to occur within the Petroleum Activities Area and environment that may be affected

Species name	Common name	Threatened status	Migratory status	Potential for interaction	
				PAA	EMBA
Balaenoptera physalus	Fin whale	Vulnerable	Migratory	Species or species habitat likely to occur within 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 area.	Foraging, feeding or related behaviour likely to occur within area.
Balaenoptera musculus	Blue whale	Endangered	Migratory	Species or species habitat likely to occur within area.	Migration route known to occur within area.
Megaptera novaeangliae	Humpback whale	N/A	Migratory	Breeding known to occur within area.	Breeding known to occur within area.
Balaenoptera edeni	Bryde's whale	N/A	Migratory	Species or species habitat likely to occur within area.	Species or species habitat likely to occur within area.
Orcinus orca	Killer whale	N/A	Migratory	Species or species habitat may occur within area.	Species or species habitat may occur within area.
Physeter macrocephalus	Sperm whale	N/A	Migratory	Species or species habitat may occur within area.	Species or species habitat may occur within area.
Tursiops aduncus (Arafura/Timor Sea populations)	Spotted bottlenose dolphin	N/A	Migratory	Species or species habitat may occur within area.	Species or species habitat known to occur within area.
Orcaella heinsohni	Australian snubfin dolphin	N/A	Migratory	Species or species habitat may occur within area.	Species or species habitat known to occur within area.
Sousa chinensis	Australian humpback dolphin	N/A	Migratory	Species or species habitat may occur within area.	Species or species habitat known to occur within area.
Balaenoptera bonaerensis	Antarctic minke whale	N/A	Migratory	N/A.	Species or species habitat likely to occur within area.
Dugong dugon	Dugong	N/A	Migratory	N/A.	Breeding known to occur within area.

Species name	Common name	Threatened status	Migratory status	Potential for interaction	
				PAA	EMBA
Eubalaena australis	Southern right whale	Endangered	Migratory	N/A	Species or species habitat likely to occur within area.

Table 4-11: Marine mammal biologically important areas within the environment that may be affected

Species	BIA type	Approximate distance and direction from PAA (km)
Dugong	Calving (Exmouth Gulf)	289 km south-west
	Nursing (Exmouth Gulf)	289 km south-west
	Breeding (Exmouth Gulf)	289 km south-west
	Foraging (high density seagrass beds) (Exmouth Gulf)	289 km south-west
Pygmy blue whale	Migration (Augusta to Derby)	37 km north
	Foraging (Ningaloo)	348 km south-west
Humpback whale	Migration (north and south) (south of Shark Bay, north to Kimberley Region)	35 km south
	Resting (Exmouth Gulf)	294 km south-west

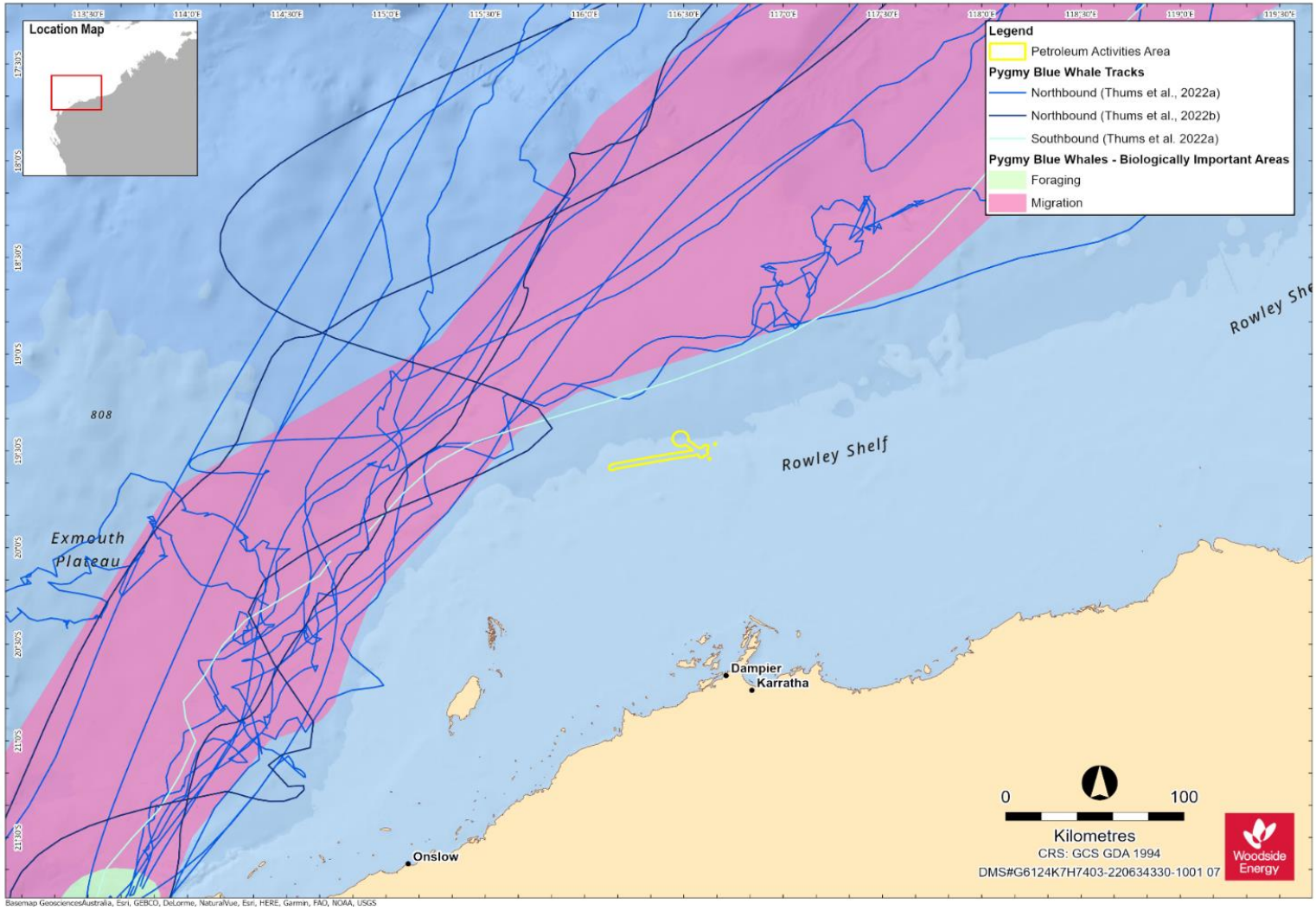


Figure 4-8: Pygmy blue whale biologically important areas overlapping the environment that may be affected and satellite tracks of tagged whales (Double et al., 2012, 2014)

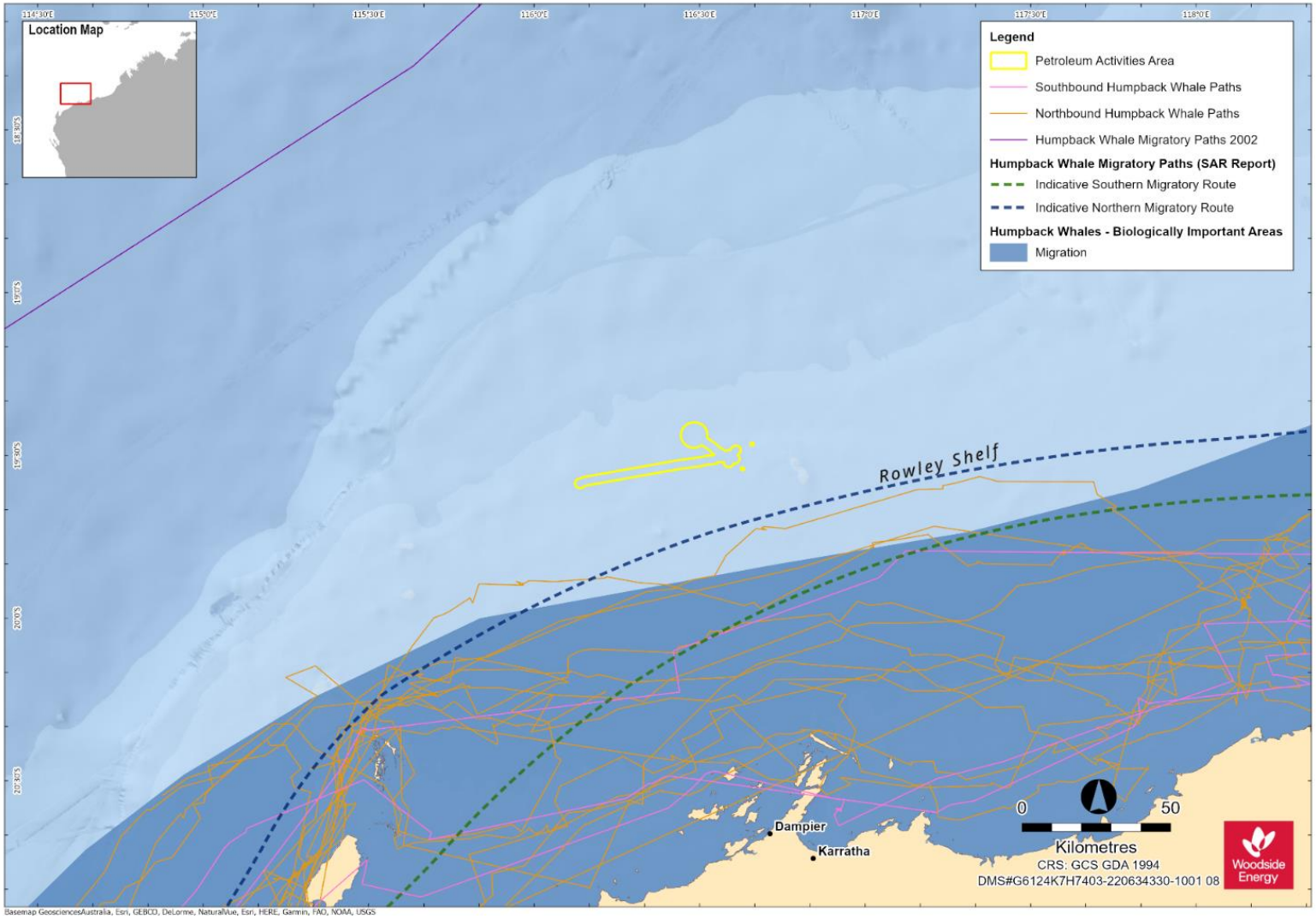


Figure 4-9: Humpback whale biologically important areas overlapping the environment that may be affected and satellite tracks of tagged whales (Double et al., 2012, 2010)

4.6.4 Seabirds and Migratory Shorebirds

Table 4-12: Threatened and migratory seabird and migratory shorebird species predicted to occur within the Petroleum Activities Area and environment that may be affected

Species name	Common name	Threatened status	Migratory status	Potential for interaction	
				PAA	EMBA
Calidris canutus	Red knot	Endangered	Migratory	Species or species habitat may occur within area.	Species or species habitat known to occur within area.
Calidris ferruginea	Curlew sandpiper	Critically Endangered	Migratory	Species or species habitat may occur within area.	Species or species habitat known to occur within area.
Sternula nereis nereis	Australian fairy tern	Vulnerable	N/A	Species or species habitat may occur within area.	Breeding known to occur within area.
Numenius madagascariensis	Eastern curlew	Critically Endangered	N/A	Species or species habitat may occur within 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 area	Species or species habitat may occur within area.
Actitis hypoleucos	Common sandpiper	N/A	Migratory	Species or species habitat may occur within area.	Species or species habitat known to occur within area.
Calidris acuminata	Sharp-tailed sandpiper	N/A	Migratory	Species or species habitat may occur within area.	Species or species habitat known to occur within area.
Calidris melanotos	Pectoral sandpiper	N/A	Migratory	Species or species habitat may occur within area.	Species or species habitat may occur within area.
Phaethon lepturus	White-tailed tropic bird	N/A	Migratory	Species or species habitat likely to occur within area.	Breeding known to occur within area.
Anous stolidus	Common noddy	N/A	Migratory	Species or species habitat may occur within area.	Species or species habitat likely to occur within area.
Fregata minor	Greater frigatebird	N/A	Migratory	Species or species habitat may occur within area.	Species or species habitat may occur within area.
Fregata ariel	Lesser frigatebird	N/A	Migratory	Species or species habitat likely to occur within area.	Breeding known to occur within area.

Species name	Common name	Threatened status	Migratory status	Potential for interaction	
				PAA	EMBA
Calonectris leucomelas	Streaked shearwater	N/A	Migratory	Species or species habitat likely to occur within area.	Species or species habitat likely to occur within area.
Macronectes giganteus	Southern-giant petrel	Endangered	Migratory	N/A.	Species or species habitat may occur within area.
Thalassarche impavida	Campbell albatross	Vulnerable	Migratory	N/A.	Species or species habitat may occur within area.
Thalassarche carteri	Indian yellow-nosed albatross	Vulnerable	Migratory	N/A.	Species or species habitat may occur within area.
Charadrius leschenaultii	Greater sand plover	Vulnerable	Migratory	N/A.	Species or species habitat known to occur within area.
Limosa lapponica menzbieri	Northern Siberian bar-tailed godwit	Critically Endangered	N/A	N/A.	Species or species habitat known to occur within area.
Rostratula australis	Australian painted snipe	Endangered	N/A	N/A.	Species or species habitat likely to occur within area.
Papasula abbotti	Abbott's booby	Endangered	N/A	N/A.	Species or species habitat may occur within area.
Pterodroma mollis	Soft-plumaged petrel	Vulnerable	N/A	N/A.	Foraging, feeding or related behaviour likely to occur within area.
Sternula nereis nereis	Australian fairy tern	Vulnerable	Migratory	N/A.	Breeding known to occur within area.
Phaethon rubricauda	Red-tailed tropicbird	N/A	Migratory	N/A.	Breeding known to occur within area.
Sula leucogaster	Brown booby	N/A	Migratory	N/A.	Breeding known to occur within area.
Limosa lapponica	Bar-tailed godwit	N/A	Migratory	N/A.	Species or species habitat known to occur within area.
Ardenna carneipes	Flesh-footed shearwater	N/A	Migratory	N/A.	Species or species habitat likely to occur within area.
Sterna dougallii	Roseate tern	N/A	Migratory	N/A.	Breeding known to occur within area.
Thalasseus bergii	Greater crested tern	N/A	Migratory	N/A.	Breeding known to occur within area.

Species name	Common name	Threatened status	Migratory status	Potential for interaction	
				PAA	EMBA
Ardenna pacifica	Wedge-tailed shearwater	N/A	Migratory	N/A.	Breeding known to occur within area.
Hydroprogne caspia	Caspian tern	N/A	Migratory	N/A.	Breeding known to occur within area.
Onychoprion anaethetus	Bridled tern	N/A	Migratory	N/A.	Breeding known to occur within area.
Sternula albifron	Little tern	N/A	Migratory	N/A.	Congregation or aggregation known to occur within area.

Table 4-13: Seabird and shorebird biologically important areas within the Petroleum Activities Area and environment that may be affected

Species	BIA type	Approximate distance and direction from PAA (km)
Wedge-tailed shearwater	Breeding (Kimberley, Pilbara and Gascoyne coasts and islands, including Ashmore Reef)	Overlaps
Roseate tern	Breeding (Kimberley, Pilbara and Gascoyne coasts and islands, including Ashmore Reef)	78 km south
Fairy tern	Breeding (Pilbara and Gascoyne coasts and islands)	99 km south
Lesser crested tern	Breeding (Kimberley, Pilbara and Gascoyne coasts and islands, including Ashmore Reef)	100 km south
Lesser frigatebird	Breeding (Kimberley and Pilbara coasts and islands, also Ashmore Reef)	163 km south
White-tailed tropicbird	Breeding (Kimberley, Pilbara and Gascoyne coasts and islands, including Ashmore Reef)	218 km south
Brown booby	Breeding (Kimberley and Pilbara coasts and islands, also Ashmore Reef)	222 km south
Little tern	Resting (Kimberley, Pilbara and Gascoyne coasts and islands, including Ashmore Reef)	315 km south

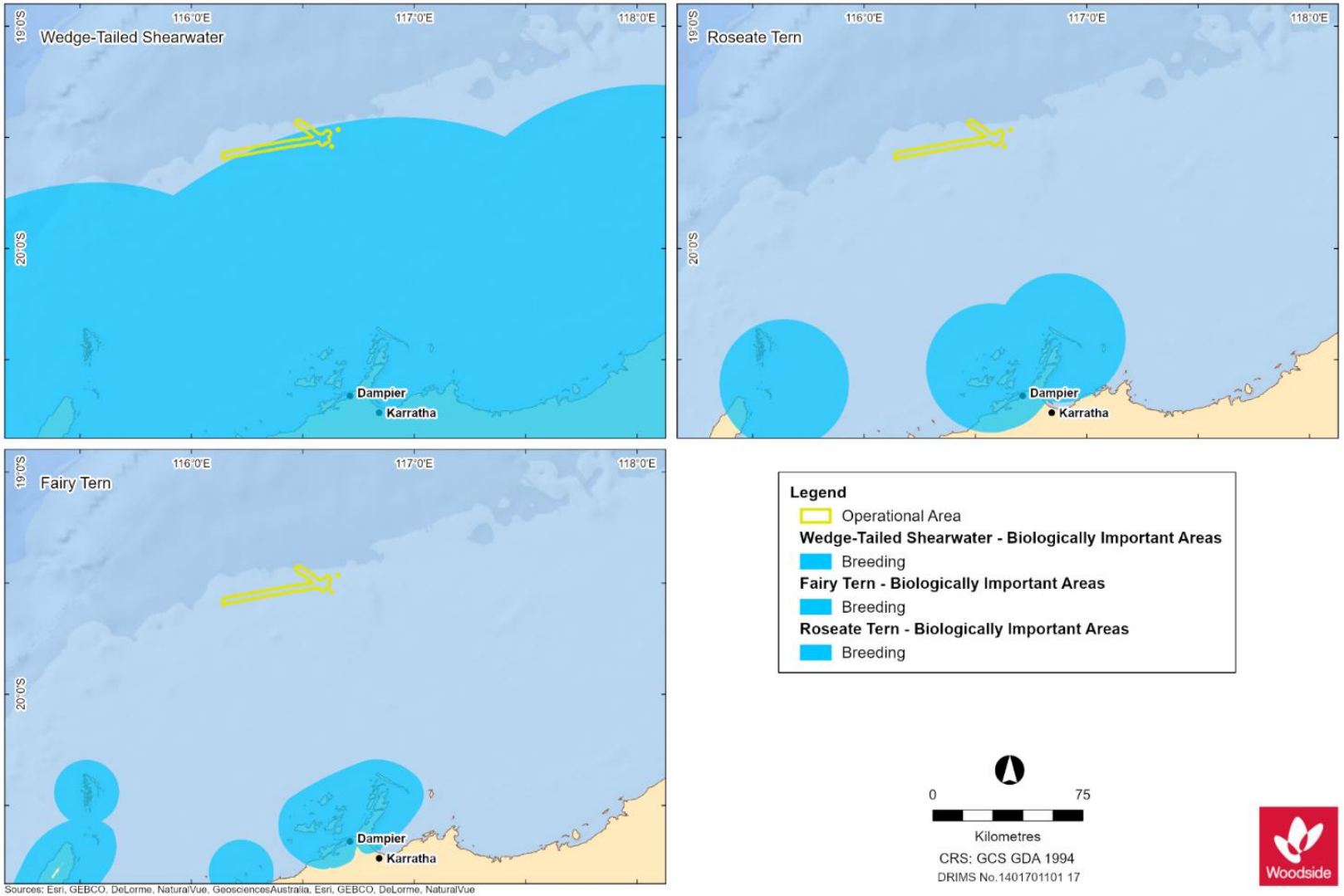


Figure 4-10: Seabird biologically important areas overlapping the Petroleum Activities Area and environment that may be affected

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 C** Sections 6 to 8.

Table 4-14: Key seasonal sensitivities for protected migratory species identified as occurring within the Petroleum Activities Area and environment that may be affected

Species	January	February	March	April	May	June	July	August	September	October	November	December
Fish, sharks and rays												
Whale shark – northern and southern migration (NWMR)[5]												
Whale shark – foraging/ aggregation (Ningaloo Coast)[5]												
Great white shark – northern migration (to North West Cape) [6]												
Marine reptiles[7]												
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												
Leatherback turtle – nesting												
Leatherback turtle – hatching												
Mammals												
Fin whale												
Humpback whale - northern migration [8 9]												

[5] TSSC, 2015d
[6] DSEWPaC, 2013a
[7] 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).
[8] TSSC, 2015a
[9] Double et al, 2010

Species	January	February	March	April	May	June	July	August	September	October	November	December
Humpback whale – southern migration [8]												
Sei whale – migration (DEH, 2005)												
East Indian Ocean (EIO) pygmy blue whale – northern migration[10]												
East Indian Ocean (EIO) pygmy blue whale – southern migration [10]												
Seabirds and shorebirds												
Red knot – non-breeding season (NWMR) [11]												
Eastern curlew – non-breeding (NWMR) [12]												
Wedge-tailed shearwater – various breeding sites [13 14]												
	Species may be present in the PAA											
	Peak period. Presence of animals is reliable and predictable each year											

4.7 Key Ecological Features

Two KEFs overlap the PAA (**Figure 4-11**). KEFs within the PAA and EMBA are identified in **Table 4-15** and described in **Appendix C** Section 9.

Table 4-15: Key ecological features within the Petroleum Activities Area and environment that may be affected

Key ecological feature	Distance and direction from PAA to KEF (km)
Ancient Coastline at the 125 m depth contour	Overlaps
Glomar Shoals KEF	Overlaps
Continental Slope Demersal Fish Communities	68 km west
Exmouth Plateau	180 km west
Canyons Linking the Cuvier Abyssal Plain and the Cape Range Peninsula	258 km south-west
Commonwealth Waters Adjacent to Ningaloo Reef	304 km south-west
Mermaid Reef and Commonwealth waters surrounding Rowley Shoals	302 km north-east*

**KEF is outside of EMBA, but given proximity (approximately 800 m) it has been included*

10 Double et al., 2012; 2014
11 TSSC, 2016a
12 DoE, 2015d
13 DSEWPaC 2012c
14 Environment Australia 2002

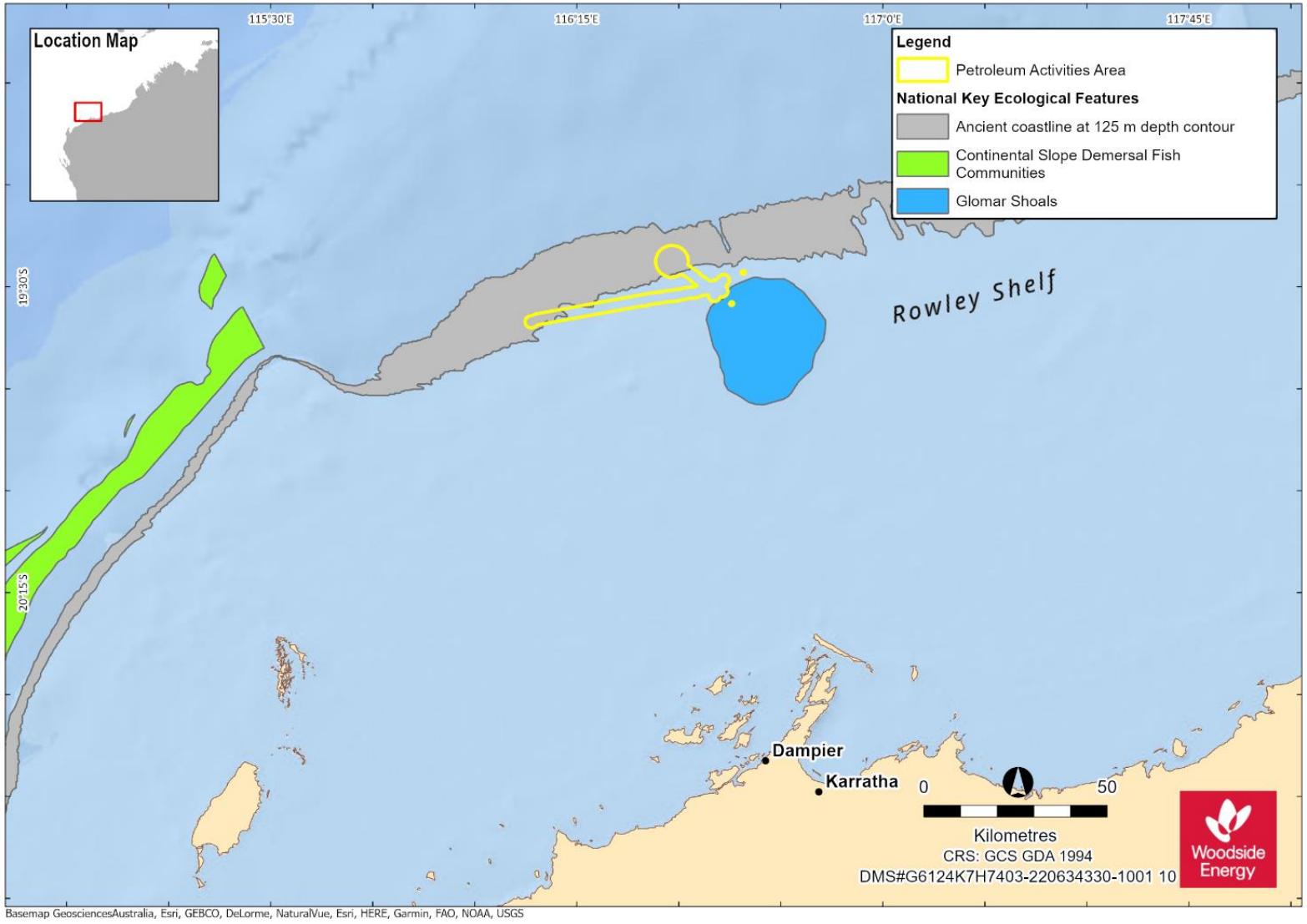


Figure 4-11: Key ecological features overlapping the Petroleum Activities Area and environment that may be affected

4.8 Protected Places

No protected places overlap the PAA. Protected places within the EMBA are identified in **Table 4-16** and presented in **Figure 4-12**. **Appendix C-1** Section 10 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 environment that may be affected

	Distance and direction from PAA to protected place or sensitive area (km)	Park zone and IUCN category* overlapping PAA and/or EMBA
AMPs		
NWMR		
Argo-Rowley Terrace	183 km north	Multiple Use Zone – VI
Gascoyne	277 km south-west	Multiple Use Zone – VI
Montebello	55 km south-west	Multiple Use Zone – VI
Ningaloo	304 km south-west	Recreational Use Zone – IV
Gascoyne	440 km south-west	Habitat Protection Zone – IV
State Marine Parks and Nature Reserves		
Marine Parks		
Barrow Island	151 km south-west	N/A
Montebello Islands	100 km south-west	N/A
Ningaloo	313 km south-south-west	N/A
Conservation Park		
Montebello Islands	106 km south-west	N/A
Marine Management Areas		
Barrow Island	119 km south-south-west	N/A
Muiron Islands	285 km south-south-west	N/A
Nature Reserves		
Boodie, Double Middle Islands	174 km south-west	N/A
Muiron Islands	289 km south-west	N/A
5(1)(h) Reserve		
Jurabi Coastal Park	328 km south-west	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.

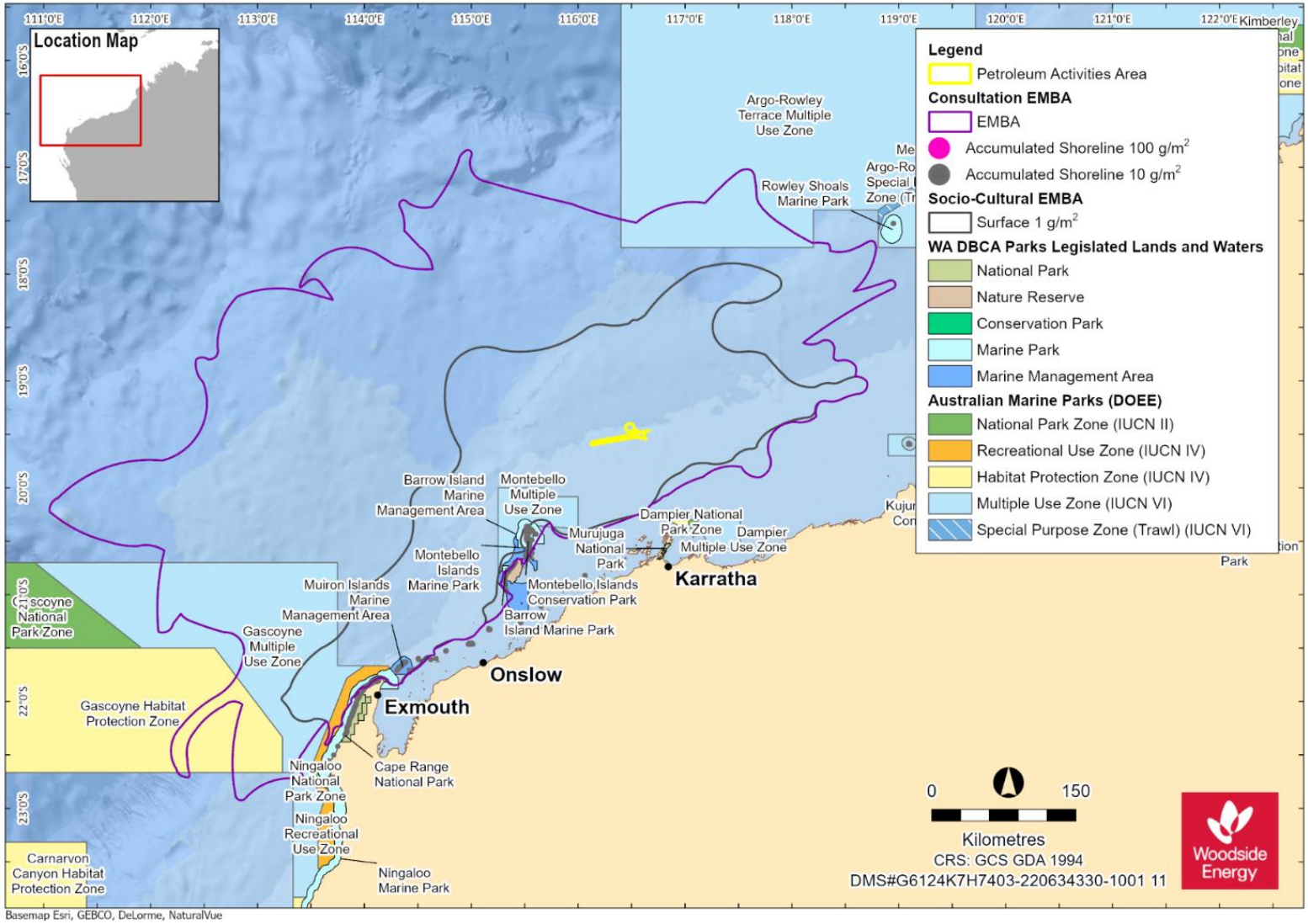


Figure 4-12: Protected Areas adjacent to the Petroleum Activities Area and environment that may be affected

4.9 Socio-economic Environment

4.9.1 Cultural Values and Heritage

4.9.1.1 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 Operational Area and EMBA are described.

In line with The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance (ICOMOS, 2013) (Burra Charter) and associated practice notes, Woodside understands heritage value to refer to the cultural significance of a place to an individual 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 (ICOMOS, 2013).

4.9.1.2 First Nations Peoples

As a starting point for understanding social and cultural features of the environment for Indigenous (First Nations) groups, Woodside uses the existing systems, such as native title, to identify Indigenous groups that may have functions, interests or activities that may be affected. To that end, Woodside identifies native title representative bodies and nominated representative entities (defined in **Section 5.3**), as well as native title claims, determinations and Indigenous Land Use Agreements (ILUAs) which the EMBA overlaps. 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 Indigenous 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 (National Native Title Tribunal).

A requirement to establish 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 utilised 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 native title rights and interests are held communally by an organised society, that native title claims are understood to represent the area over which Indigenous 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 on 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.

For the activity in this EP, there are no native title claims or determinations, or ILUAs overlapping the PAA and therefore also no native title rights or interests identified over the PAA (**Table 4-17**). Claims and determinations have not been differentiated in this table, as it is acknowledged that rights and interests may exist within either of these.

There is one native title claim overlapping the EMBA (**Table 4-17**). There are no ILUAs overlapping the EMBA.

4.9.1.3 Coastally Adjacent First Nations Groups

Woodside understands that Indigenous 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 a 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 Indigenous groups to be consulted (See **Section 5.3**).

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 Indigenous groups and individuals. This may also, over time, build expectations in the broader Indigenous community that a group is responsible for maintaining environmental values in areas for which they do not hold traditional knowledge. Woodside also acknowledges that an Indigenous group's relative proximity to any PAA or EMBA is not necessarily a meaningful indicator of the connection of Indigenous 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.

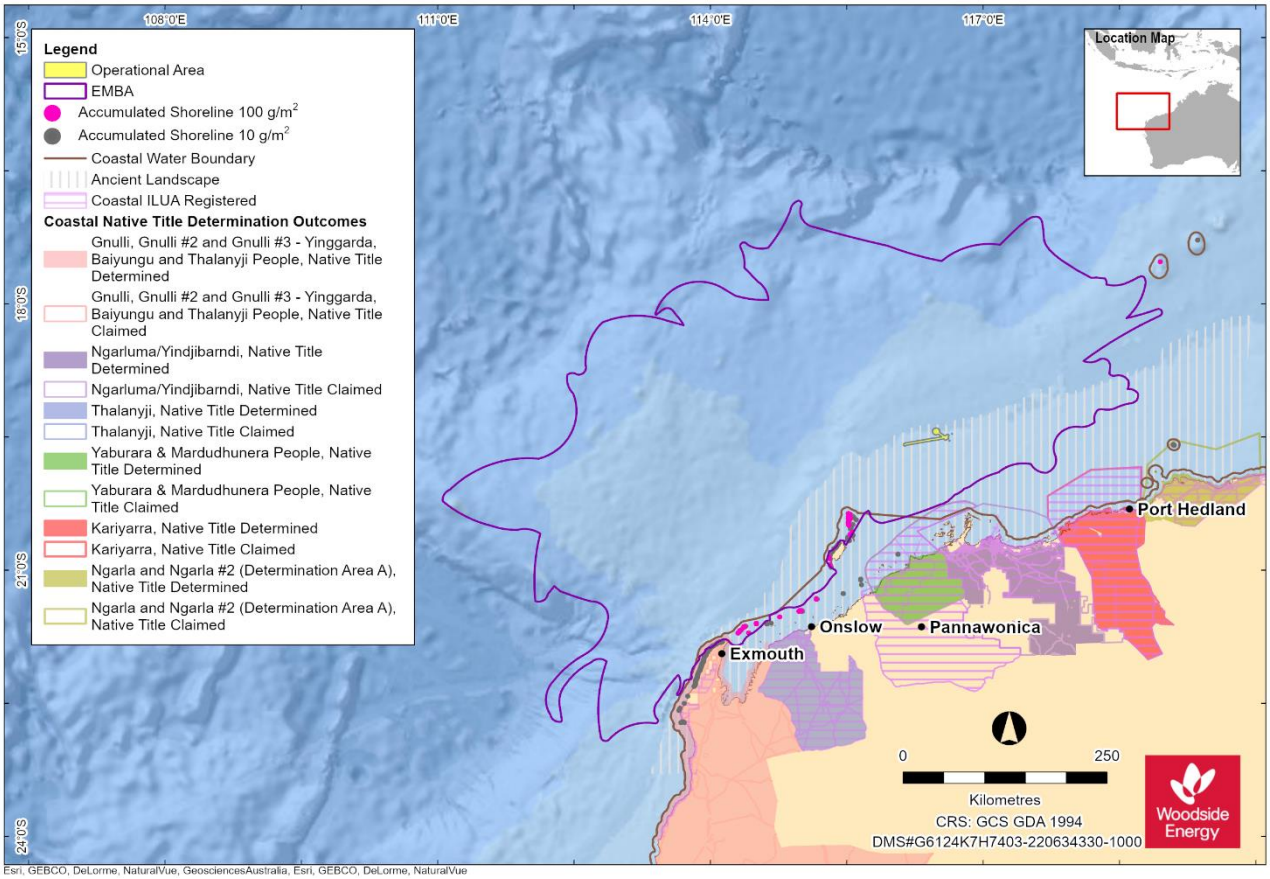


Figure 4-13: Petroleum Activities Area and socio-economic environment that may be affected in relation to native title claims, determinations and Indigenous Land Use Agreements

Table 4-17: Summary of Native Title Claims, Determinations and Indigenous Land Use Agreements which overlap or are coastally adjacent to the environment that may be affected

Claim/determination/ILUA	Registered Native Title Body Corporate	Overlap with EMBA	Coastally adjacent to the EMBA
Claim/Determination			
Gnulli, Gnulli #2 and Gnulli #3 – Yinggarda, Baiyungu and Thalanyji People	Nganhurra Thanardi Garrbu Aboriginal Corporation (NTGAC), Yinggarda Aboriginal Corporation (YAC)	Yes	Yes
Ngarla, Ngarla 2	Wanparta Aboriginal Corporation	No	Yes
Kariyarra People	Kariyarra Aboriginal Corporation	No	Yes
Yaburara & Mardudhunera People	Wirrawandi Aboriginal Corporation	No	Yes
Ngarluma People	Ngarluma Aboriginal Corporation (NAC)	No	Yes
Ngarluma/Yindjibarndi People	NAC, Yindjibarndi Aboriginal Corporation	No	Yes
Thalanyji	Buurabalayji Thalanyji Aboriginal Corporation	No	Yes

Claim/determination/ILUA	Registered Native Title Body Corporate	Overlap with EMBA	Coastally adjacent to the EMBA
ILUA			
Alinta – Kariyarra Electricity Infrastructure ILUA	No identifiable body specified	No	Yes
Anketell Port, Infrastructure Corridor and Industrial Estates Agreement	NAC	No	Yes
Balla Balla Port ILUA	NAC	No	Yes
Cape Preston Project Deed (YM Mardie ILUA)	Wirrawandi Aboriginal Corporation	No	Yes
Cape Preston West Export Facility	Wirrawandi Aboriginal Corporation	No	Yes
FMG – Kariyarra and Land Access ILUA	No identifiable body specified	No	Yes
Gnaraloo ILUA	NTGAC	No	Yes
Kariyarra and State ILUA	Kariyarra Aboriginal Corporation	No	Yes
KM & YM ILUA	Wirrawandi Aboriginal Corporation, Robe River Kuruma Aboriginal Corporation	No	Yes
Kuruma Marthudunera and Yaburara and Coastal Mardudhunera ILUA	No identifiable body specified	No	Yes
Macedon ILUA	Buurabalayji Thalanyji Aboriginal Corporation	No	Yes
Ngarla Pastoral ILUA	Wanparta Aboriginal Corporation	No	Yes
Ngarluma Aboriginal Sustainable Housing ILUA	NAC	No	Yes
Ngarluma and Woodside Power project ILUA	NAC	No	Yes
Ningaloo Conservation Estate ILUA	NTGAC	No	Yes
Onslow ILUA	Buurabalayji Thalanyji Aboriginal Corporation	No	Yes
RTIO Kuruma Marthudunera People ILUA	Robe River Kuruma Aboriginal Corporation	No	Yes
RTIO Ngarluma ILUA (Body Corporate Agreement)	NAC	No	Yes
Thalanyji and Koordarri Pastoral ILUA	Buurabalayji Thalanyji Aboriginal Corporation	No	Yes
Thalanyji and Minderoo Pastoral ILUA	Buurabalayji Thalanyji Aboriginal Corporation	No	Yes
Wickham Motorcross ILUA	NAC	No	Yes

4.9.1.4 Marine Parks

Woodside acknowledges that Commonwealth and State Marine Park Management Plans have sought to recognise cultural values of Indigenous 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 marine parks, we take values into account’. AMP summarises

these values as natural values, cultural values, heritage values and socio-economic values. Woodside is triggered to undertake an assessment of cultural values within Marine Park Management Plans where the Operational Area or EMBA overlaps a Marine Park. Woodside considers the management plans of marine parks that overlap the Operational Area and the EMBA to determine whether cultural features and heritage values have been identified and whether there are specified Traditional Custodians or representative bodies referenced to contact regarding potential cultural features and heritage values.

The PAA does not overlap any Commonwealth Marine Parks. The EMBA overlaps with features of the Argo-Rowley Terrace, Gascoyne, Montebello and Ningaloo AMPs managed under the North-West Marine Parks Network Management Plan 2018. The EMBA overlaps a further six State Marine Parks. Where these plans specify identifiable representative bodies who may hold knowledge of heritage values or cultural features – including but not limited to Registered Native Title Bodies Corporate – these bodies are consulted (**Section 5.3**). Consultation with these groups may identify heritage values and cultural features beyond those addressed in the marine park management plans. No identifiable representative bodies were specified for the marine parks overlapped by the EMBA (**Table 4-18**).

The Marine Park Management Plans note for the Gascoyne, Montebello and Ningaloo MPs that the Yamatji Marlpa Aboriginal Corporation (YMAC) is the relevant Native Title Representative Body. Consultation with YMAC included discussion of the Traditional Custodians who may hold knowledge of heritage values or cultural features (see **Appendix F** Tables 1 and 2).

Table 4-18: Summary of Commonwealth and State Marine Park Management Plan environment that may be affected overlap

Marine Park Management Plan	PAA Overlap	EMBA Overlap	Specified Bodies
Commonwealth Marine Park Management Plan			
Argo-Rowley Terrace AMP	No	Yes	No identifiable body specified.
Gascoyne AMP	No	Yes	YMAC
Montebello AMP	No	Yes	YMAC
Ningaloo AMP	No	Yes	YMAC
State Marine Park Management Plan			
Barrow Island Marine Management Area	No	Yes	No identifiable body specified.
Barrow Island MP	No	Yes	No identifiable body specified.
Cape Range National Park	No	Yes	No identifiable body specified.
Jurabi Coastal Park	No	Yes	No identifiable body specified.
Montebello Islands MP	No	Yes	No identifiable body specified.
Muiron Islands Marine Management Area	No	Yes	No identifiable body specified.
Muiron Islands Nature Reserve	No	Yes	No identifiable body specified.
Ningaloo MP	No	Yes	NTGAC

Management plans for the AMPs note shipwrecks within the AMPs and overlap with World, National and Commonwealth heritage lists. These are addressed in **Sections 4.9.1.8** and **4.9.1.9** below.

The Management Plan for the Ningaloo Marine Park and Muiron Islands Marine Management Area 2005–2015: Management Plan Number 52 (relating to the Muiron Islands Marine Management Area and Ningaloo Marine Park) notes the aesthetic values of the seascape as a cultural value and that "Panoramic vistas of turquoise lagoon waters, reefs, beaches, breaking surf and the blue open ocean beyond the reef line are major attractions of the reserves." In particular the plan notes that "Inappropriate structures along the coastline, on the islands and in the surrounding waters have the potential to degrade the aesthetic values of the reserves. Coastal developments and maritime infrastructure projects must therefore be planned with careful consideration of this issue." As the activity described in this EP does not include the addition of any structures within these parks, no impacts on the aesthetic values of these parks are anticipated.

A number of management plans for the state marine parks also note Indigenous and maritime heritage within the marine parks. These are addressed in **Sections 4.9.1.5.3** and **4.9.1.9**.

4.9.1.5 Sea Country Values

4.9.1.5.1 General Cultural Values of Marine Ecosystems

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 an Indigenous 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 (IPAs). 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, 2023). This intrinsic link is also described in MAC (2021, as cited in Woodside, 2023) as it relates to the values of the marine environment that are of cultural importance to MAC based on engagement with their Elders and Murujuga Land and Sea Unit Rangers. Elders were clear that all living things in Mermaid Sound are connected and important. Mermaid Sound and Dampier Archipelago (Murujuga) are considered one place where the entire environment and all ecosystems hold both cultural and environmental value, with these types of values (cultural and environmental) intrinsically linked (MAC, 2021, also cited in Woodside, 2023).

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 to 30 km 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 Indigenous groups who may have interests and connection in Sea Country are set out in **Section 4.9.1.3**, **Section 4.9.1.4** and **Section 5.3**. 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 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 Indigenous language groups along the entire west coast of Australia.

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**.

Woodside is triggered to consult on cultural values of Sea Country where Traditional Custodians or representative institutions are identified, or self-identify, as relevant persons.

4.9.1.5.2 Other Identified Cultural Values of Marine Ecosystems

During consultation, BTAC advised it has a cultural obligation to care for the environmental values of Sea Country (see **Appendix G** Table 1). Woodside has put a written proposal to BTAC to support BTAC to undertake an ethnographic assessment (to identify Sea Country values) and involve BTAC in the selection of management strategies of cultural feature and heritage values in the area relevant to BTAC.

Woodside has committed to ongoing engagement to further understand these values. 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 (see **Section 7.6**).

Cultural features or heritage values related to marine species within the PAA or EMBA raised by Traditional Custodians in the course of preparing the EP have been outlined in Table 4-20.

4.9.1.5.3 Desktop Assessment of Sea Country Values

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 4-19 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 4-19, noting that the closest boundary of the PAA is greater than 125 km north-west of Dampier, and greater than 100 km from the closest landfall at North West Cape. Where the geographical extent is not specified or unclear, it has been included for completeness.

Table 4-19: 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: Economic_contribution_of_Ningaloo_-_FINAL_25_11_2020.pdf (gdc.wa.gov.au) This document also includes information that is marked that cannot be copied, reproduced or used without consent.	No	Possible (Shoreline accumulation areas)
	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".		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. Feature: ceremonial sites. Feature: dreaming sites.	Department of the Environment and Heritage 2006	No No Possible (unspecified)	Possible Possible (unspecified) Possible (unspecified)
	Value: traditional knowledge recalls that the sea is a source of creation for flying foxes. Value: petroglyphs are understood as permanent signs left by ancestral beings. Value: petroglyphs depict the law. Value: cultural obligations to look after places of special potency. Value: petroglyphs are important in initiation and education.	DEC 2013	Possible (unspecified) No No Possible (unspecified) – unlikely given distance offshore No	Possible (unspecified) Possible (submerged) Possible (submerged) Possible (unspecified) – unlikely given distance offshore 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. Value: traditional knowledge recalls a sea serpent which travelled from the coast to inland pools.	Water Corporation 2019	Possible (turtles, fish) No (dugongs) Possible (unspecified)	Possible (turtles, fish, dugongs) 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. Value: In a separate account a sea serpent punishing people was driven back to the sea by a freshwater serpent.	Barber and Jackson 2011	Possible (unspecified) unlikely given distance offshore Possible (unspecified)	Possible (unspecified) unlikely given distance offshore Possible (unspecified)
	Value: traditional knowledge recalls Manggan created the seas.	NAC n.d.	Possible	Possible
	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
	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; Benjamin et al 2023	No	No
	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; Japingka Aboriginal Art Gallery 2023	Possible (unspecified)	Possible (unspecified)
	Feature: submerged waterholes related to the Kangaroo songline.	Kearney et al 2023	Possible (feature located on the Ancient Landscape)	Possible (unspecified)
	Value; traditional knowledge holds that Songlines continue beyond the current coast and across the submerged landscape.		Possible (unspecified)	Possible (unspecified)
	Value: songlines are captured through storytelling, rock art, songs and dance, and in the landmarks themselves.	Bainger 2021	Possible (unspecified, though could relate to features on the Ancient Landscape))	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.	Possible (unspecified)	Possible (unspecified)
	Feature: rock art	Weerianna Street Media Production 2017.	Possible (unspecified)	Possible (submerged)
	Feature: sacred sites.			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 (feature located on the Ancient Landscape)	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	Possible (unspecified)
	Feature: archaeological sites on Rosemary Island.	McDonald et al 2022b	No	Possible (unspecified)
	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; turtle eggs, mangrove seeds) Possible (not onshore; likely shoreline accumulation around islands)
	Feature: petroglyph and other archaeological sites at Murujuga.	Dortch et al 2019.	No	Possible (submerged)
Ngarla	Value: traditional knowledge recalls that Solitary Island is the petrified form of the ancestral octopus Marnmulkura.	Wanparta Aboriginal Corporation 2022	No	No
	Value: people access waters	Brown (on behalf of the Ngarla People) v State of Western Australia, [2007] FCA 1025	Possible (unspecified)	Possible (unspecified)
	Value: use the waters for subsistence.		Possible (unspecified)	Possible (unspecified)
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) Possible (Barrow Island based on potential shoreline contact) Possible (unspecified)
	Feature: resources include turtles, eggs, fish, shellfish and plants.	DBCA et al. 2002	Possible (turtle; fish)	Possible

First Nations Group	Features and Values	Source	Potential for overlap	
			PAA	***EMBA***
			No (other resources)	
	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 (shoreline accumulation areas)
	Feature: artefact scatters are located in coastal sand dunes. Feature: burials are located in coastal sand dunes. Value: traditional knowledge recalls a water snake is located in inland waters.	Hook 2020.	No No No	Possible (Shoreline accumulation areas) Possible (Shoreline accumulation areas) No (inland waters)
	Feature: archaeological sites are located on Barrow Island.	Ditchfield et al. 2018	No	Possible (Shoreline accumulation areas)
	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.	Dortch et al. 2019.	No No	Possible (Shoreline accumulation areas) Possible (submerged, highly unlikely for most

First Nations Group	Features and Values	Source	Potential for overlap	
			PAA	***EMBA***
	Feature: archaeological evidence of the use of resources including fish, turtles, marine mammals, crocodiles, crabs and sea urchins.			evidence of faunal use to survive inundation)
	Feature: archaeological sites are located on Barrow Island.	Paterson 2017	No	Possible (Shoreline accumulation areas)
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	Possible (unspecified)	Possible (unspecified)
	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. 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.	Kearney et al 2023	Possible (unspecified) Possible (unspecified) Possible (unspecified) Possible (unspecified)	Possible (unspecified) Possible (unspecified) Possible (unspecified) Possible (unspecified)
	Feature; archaeological sites indicate that islands were occupied prior to sea level rise.	DBCA 2020	No	Possible (submerged)
	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;	Smyth 2007	Possible (unspecified) Possible (fauna present)	Possible (unspecified) Possible (activities and fauna present)

First Nations Group	Features and Values	Source	Potential for overlap	
			PAA	***EMBA***
	Collecting fish in stone fish traps; Poisoning fish; Gathering shellfish and other marine resources.			
	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	Possible (unspecified)	Possible (unspecified)
	Feature: tangible and intangible heritage. Feature: archaeological evidence of varied occupation and adaptation. Value: a distinct way of life centred around the use of limited water and coastal resources.	Macfarlane and McConnell 2017	Possible (unspecified) No (feature restricted to Ancient Landscape) No	Possible (unspecified) Possible (submerged, highly unlikely for most evidence of faunal use to survive inundation) No

4.9.1.5.4 Indigenous Archaeological Heritage Assessment

Woodside understands that 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 Indigenous 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., 2020; 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 (see **Section 4.7**) as an area where potential Indigenous archaeological material may exist on the seabed, as this covers the full extent of this possible Indigenous 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*, *Underwate*r *Cultural Heritage Act 2018* or EPBC Act 1999. However, these Acts only extend protection to Indigenous heritage places specified by declaration or otherwise included on a statutory list. Woodside understands that there is no Indigenous archaeology known to exist anywhere within Commonwealth waters and no areas subject to declarations or prescriptions under these Acts are located within the EMBA.

The Department of Planning, Lands and Heritage (DPLH) Aboriginal Heritage Inquiry system was searched for the EMBA, which indicated no Registered Aboriginal Sites and 2 Other Heritage Places (**Appendix I**). 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 consultation in the course of preparing the EP.

The PAA intersects part of the Ancient Landscape but also extends beyond the furthest extent of the Ancient Landscape.

The archaeological potential of the Ancient Landscape is a relevant matter for the proposed activity as there is overlap between the PAA and the Ancient Landscape, and potential for seabed disturbance from planned activities and therefore potential for impact to archaeological material. Woodside has committed to undertake desktop assessment of archaeological potential, based on geophysical and bathymetric data, for any seabed disturbance at depths of less than 130 m (**C 3.1**).

A review will be undertaken by a suitably qualified marine archaeologist for seabed disturbance associated with the Lambert West drilling and tie-back activities, which is not inconsistent with the draft guidelines for working in the near and offshore environment to protect Underwater Cultural Heritage (DCCEEW, 2023) (see **Section 6.6.2**).

4.9.1.5.5 Feedback Received via Consultation to Inform Existing Environment Description

Indigenous 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, including whales and turtles (**Appendix F** Table 1).

During consultation, BTAC advised it has a cultural obligation to care for the environmental values of sea country (**Appendix F**). In the course of consultation specific to another Woodside EP, BTAC raised the importance of archaeological sites on nearshore islands. Given the EMBA for this activity extends to nearshore areas coastally adjacent to BTAC native title lands, these values may be relevant in the event of an unplanned hydrocarbon release. BTAC has not provided further detail regarding heritage value of places or cultural features of the PAA or the EMBA.

Wanparta Aboriginal Corporation indicated the connection to water (saltwater and fresh), totemic species including Kestrel, Octopus, Bream and Sting Ray and Solitary Island/Jarrkunpungu are culturally important. In the context of cultural values, these species and islands are assumed to be nearshore where interactions with Traditional Custodians are likely and outside of the EMBA.

Some persons or organisations who identified as a relevant person in relation to First Nations cultural heritage in other Woodside EPs have indicated knowledge of cultural features or heritage values which may be potentially affected by the activities described in this EP.

As a result of feedback received during consultation on other EPs in the region, it is feasible that additional cultural and broader interests in the environment exist. For completeness in describing the Existing Environment, this feedback on potential cultural features and heritage values are tabulated in **Table 4-20**.

Table 4-20: Summary of Feedback received via consultation to inform Existing Environment Description

Relevant First Nations Group / Individuals	Consultation Context	Description of Value / Feature / Interest	Potential for overlap	
			PAA	***EMBA***
Murujuga Aboriginal Corporation (MAC)	Consultation in the course of preparing this EP	• Cultural obligations to care for Country, including Sea Country Interest: Advised MAC are appropriate cultural authority for Murujuga	No (PAA does not overlap the Murujuga National Park)	No (The EMBA does not overlap the Murujuga National Park)
Buurabalayji Thalanyji Aboriginal Corporation (BTAC)	Consultation in the course of preparing this EP	• Cultural obligations to care for Country, including Sea Country Value: Enduring deep connection to Sea Country north of Onslow, extending out to nearshore islands off the Pilbara coast including the Montebello Islands, Barrow Island and the Mackerel Islands	No (PAA does not overlap the cited Sea Country areas)	Possible
Yinggarda Aboriginal Corporation (YAC)	Consultation in the course of preparing this EP	• Whales (including migration patterns) Interest: Potential impact to patterns of whales, and potential collisions	Possible (species unspecified)	Possible (species unspecified)

Relevant First Nations Group / Individuals	Consultation Context	Description of Value / Feature / Interest	Potential for overlap	
			PAA	***EMBA***
		• Ecosystem health (unspecified). Value: Plants, animals and the environment are inexorably linked to their culture Value: Local communities enjoy fishing along the coast	Yes	Yes
		• Seagrass Value: Seagrass is food source for Dugong	No	Yes
		• Dugong Value: Traditional hunting/ fishing and gathering rights	No	Possible
Kariyarra Aboriginal Corporation (KAC)	Consultation in the course of preparing this EP	• Intergenerational knowledge transfer Value: Passing on traditional knowledge to children	Possible (unspecified)	Possible (unspecified)
		• Cultural obligations to care for Country, including Sea Country Value: Having duties to look after and protect all Kariyarra Sea Country.	Possible (unspecified)	Possible (unspecified)
		• Traditional resource collection (hunting, trapping and collecting) Value: Traditional fishing and gathering rights in the ocean	Possible (unspecified)	Possible (unspecified)
		• Songlines and dreaming (unspecified) Feature: Intangible heritage including the Yinta (associated with Sea Country) Feature: Presence of mythic snakes	Possible (unspecified)	Possible (unspecified)
		• Access to Country including visiting offshore islands at low tide (unspecified) Value: Accessing Sea Country (islands) for fishing, trapping, crabbing catching turtle, hunting dugong, using stingray barbs for spears and collecting shellfish. Interest: Visiting offshore islands at low tide	No	Possible
		• Secret habitat totems Value: Cultural obligation to look after and protect sea country and secret habitat totems	Possible (unspecified)	Possible (unspecified)
		• Turtles	Possible	Yes

Relevant First Nations Group / Individuals	Consultation Context	Description of Value / Feature / Interest	Potential for overlap	
			PAA	***EMBA***
		Value: Accessing Sea Country for catching turtle. Interest: Management controls over periods of times (relating to turtles)		
		• Dugongs Value: Accessing Sea Country for hunting dugong.	No	Possible
		• Crabs Value: Accessing Sea Country for crabbing.	No	Possible
		• Stingrays Value: Accessing Sea Country - using stingray barbs for spears.	Possible	Possible
		• Shellfish Value: Accessing Sea Country for collecting shellfish.	No	Possible
		• Ecosystem health (unspecified) Value: General values and interests in Sea Country	Yes	Yes
		• Coastal landforms and coastal native vegetation Value: Cultural (General Significance)	No (PAA does not intersect KAC NTD Coastline)	No (EMBA does not intersect KAC NTD Coastline)
		• Cultural Heritage Values Value: A cultural interest in cultural heritage sites and intangible cultural heritage associated with the coast and the ocean	Possible (unspecified)	Possible (unspecified)
Wanparta Aboriginal Corporation to represent the Ngarla people	Consultation in the course of preparing this EP	• Cultural obligations to care for Country, including Sea Country Value: Responsibility to look after the ocean and lore Value: Ngarla People have a deep spiritual connection to sea country.	Possible (unspecified)	Possible (unspecified)
		• Dreaming Stories (unspecified) Value: Sea people connected through both fresh and salt water with Dreamtime stories that do connect through the sea.	Possible (unspecified)	Possible (unspecified)
		• Totems Value: Emblems and totems reflected on their logo: Kestrel, Octopus, Spiny Bream, Sting Ray	Possible (all)	Possible (all)
Nganhurra Thanardi Garrbu Aboriginal Corporation (NTGAC)	Consultation in the course of preparing this EP	• Whales and Whale Sharks Interest: expressed a general interest in whales and whale sharks	Possible	Possible
		• Ecosystem health	Possible	Possible

Relevant First Nations Group / Individuals	Consultation Context	Description of Value / Feature / Interest	Potential for overlap	
			PAA	***EMBA***
		Interest: Query around specific chemicals released in marine environment / ballast water discharges		
Ngarluma Aboriginal Corporation (NAC)	Consultation in the course of preparing this EP	• No values raised	-	-
Wirrawandi Aboriginal Corporation (WAC)	Consultation in the course of preparing this EP	• No values raised	-	-
Yindjibarndi Aboriginal Corporation (YAC)	Consultation in the course of preparing this EP	• No values raised	-	-
Yamatji Marlpa Aboriginal Corporation (YMAC)	Consultation in the course of preparing this EP	• No values raised	-	-
Ngarluma Yindjibarndi Foundation Ltd (NYFL)	Consultation in the course of preparing this EP	• (Potential) Cultural heritage and environment values	Possible (unspecified)	Possible (unspecified)
Save Our Songlines, [name redacted] and [name redacted]	Consultation in the course of preparing other EP	• Plankton (Unspecified) Interest: Potential impacts on marine species and natural environment	Possible	Possible
		• Energy lines [Songlines] (unspecified)	Possible (unspecified)	Possible (unspecified)
		• Where saltwater and freshwater meet Value: The places where the saltwater from the sea and the freshwater from the land connect are where the biggest energy lines[15] are, and that connection is a core of creation relevant to a Dreaming story	No	Possible

4.9.1.6 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 of the Environment Regulations.

The cultural features and heritage values identified in Section 4.9.1.5.1 to 4.9.1.5.3 confirms whether there is any potential for these to exist within the PAA or EMBA. As previously described topics which have been raised in the context of an interest linked to the natural environment are impact and risk assessed in Section 6.6, 6.7 and 6.8.

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

[15] Although [name redacted], [name redacted] and Save our Songlines referred to and described Energy Lines, these are understood to be the same as songlines and this document therefore refers to songlines.

necessary knowledge. Assessment of heritage values beyond cultural features alone is addressed in Section 6.10 subject to these caveats.

Table 4-21: 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.	x	✓	Possible (submerged)	Possible (submerged)
Fish traps	Stone arrangements constructed in intertidal areas which fill with fish at high tide and trap them at low tide.	x	✓	Possible (submerged)	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.	x	✓	Possible	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. Value: Where saltwater and freshwater meet relate to Dreaming stories	✓	✓	Possible (submerged; Ancient Landscape) No (active freshwater systems meeting saltwater)	Possible

Identified cultural features and heritage values	Context	EP Source		Potential for overlap	
		Consultation Feedback	***Desktop Literature Assessment***	***PAA***	***EMBA***
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.	x	✓	Possible	Possible
Intangible values					
Songlines/ Energy lines	Publicly available literature talks to songlines associated with ancestral beings that travelled Sea Country.	✓	✓	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.	x	✓	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)
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, gathering of marine species including marine mammals, marine reptiles, fish and invertebrates.	✓	✓	No	Possible
Marine ecosystems and species					
Water quality	Interest only, raised as a natural environment interest	x	✓	Possible	Possible
Marine species	Generally raised in consultation and literature as an interest	✓	✓	Possible	Possible

Identified cultural features and heritage values	Context	EP Source		Potential for overlap	
		Consultation Feedback	***Desktop Literature Assessment***	***PAA***	***EMBA***
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
Marine mammals: Dolphins	Cultural ceremonies associated with communicating with dolphins Culturally important species	x	✓	Possible	Possible
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 Law run through the sea, including fish There are Thalu ceremonies associated with increasing fish stocks 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	Thalu species of totemic importance Resource	✓	✓	Possible	Possible

Identified cultural features and heritage values	Context	EP Source		Potential for overlap	
		Consultation Feedback	***Desktop Literature Assessment***	***PAA***	***EMBA***
Intertidal communities: Bivalves, gastropods, echinoderms (sea urchins), crustaceans	Resource.	✓	✓	No	Possible
Seabirds	Culturally important species Birds (including shags, seagulls and osprey) and bird eggs as a resource	✓	✓	Possible	Possible
Plankton	Interest only, raised as a natural environment interest.	✓	×	Possible	Possible
Benthic habitats: Macroalgal communities	Interest only, raised as a natural environment interest.	X	✓	No	Possible
Shoreline habitats: Mangroves	Critical breeding ground for marine and terrestrial wildlife. Mangroves would have provided shelter, crabbing, digging for shellfish, could be turtle nurseries. Mangrove seeds as resource	x	✓	No	Possible
Shoreline habitats: Intertidal sand/ mudflat communities	Interest only, raised as a natural environment interest.	X	✓	No	Possible
Shorelines	Interest only, raised as a natural environment interest.	✓	x	No	Possible
Marine Park/ coastal reserves	Interest and responsibility	x	✓	No	Yes

4.9.1.6.1 Further Context: Archaeological Heritage

Assessment of the PAA has not identified archaeological sites. Consultation with Traditional Custodians has not identified any Aboriginal cultural features or heritage values specifically associated within the PAA.

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). No archaeological areas 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 located outside of the EMBA boundary. However, it is recognised that there is the potential for submerged archaeological sites on the Ancient Landscape which is overlapped by the PAA and EMBA.

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 potential archaeological sites, these features would have archaeological value relating 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).

4.9.1.6.2 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 intangible heritage 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 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). 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. The PAA overlaps part of 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 increase 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 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 (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.
- 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.

4.9.1.6.3 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 PAA 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 4.5 and 4.6, with further details in Master Existing Environment.

In terms of identified cultural features and heritage values related to marine ecosystems and species summarised in 4.6, 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 as well as dugongs identified as a food source have also been raised by Murujuga Aboriginal Corporation through a consultation report on Mermaid Sound (MAC 2021).While Mermaid Sound is outside of the PAA and EMBA, this cultural information informs the cultural heritage features, values and interests that may exist in the area. Details pertaining to marine mammals including whales, dugongs and dolphins, their distribution, migration patterns and populations are described in Section 4.6, with further details in Master Existing Environment.
- Marine reptiles: Turtles and sea snakes have been identified through consultations 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 Socio-economic Environment that have the potential to interact with the PAA or EMBA. Note the only specific songline related to marine reptiles (turtles) was shared by Murujuga Aboriginal Corporation, 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 with further details in Master Existing Environment.

- 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. 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 4.6, with further details in Master Existing Environment.
- Seabirds: Seabirds, and in particular 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). Details pertaining to seabirds and migratory shorebirds are described in Section 4.6, with further details in Master Existing Environment.
- Benthic habitats: Through consultations for activities not related to this EP, 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 Murujuga Aboriginal Corporation for its aesthetic values. Details pertaining to benthic habitats and communities, including their distribution, are described in Section 4.5, with further details in Master Existing Environment.
- Shoreline habitats: Through consultations for activities not related to this EP, 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, are described in Section 4.5, with further details in Master Existing Environment.

4.9.1.7 Historic Sites of Significance

There are no known sites of European cultural heritage significance within the PAA. **Appendix C-1** Section 11.1.2 describes cultural heritage sites within the EMBA.

4.9.1.8 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 that there are no sites within the PAA, or within 50 km of the PAA. There are 34 (shipwrecks) within the EMBA.

4.9.1.9 World, National and Commonwealth Heritage Listed Places

No listed heritage places overlap the PAA. World, National and Commonwealth heritage places within the EMBA are identified in **Table 4-22**. **Appendix C** Section 10.2 outlines the values and sensitivities of these places.

Table 4-22: World Heritage Properties and National/Commonwealth Heritage Listed Places within the environment that may be affected

Listed Place	Distance and direction from PAA to Listed Place (km)
World Heritage Properties	
Ningaloo Coast	286 km south-west
National Heritage Places	
Ningaloo Coast	286 km south-west
Barrow Island and the Montebello-Barrow Islands Marine Conservation Reserves	1000 km south-west
Commonwealth Heritage Places	
Ningaloo Marine Area – Commonwealth Waters	303 km south-west

4.9.2 Commercial Fisheries

A number of Commonwealth and State fishery management areas are located within the PAA and EMBA. A number of Commonwealth and State fishery management areas are located within the Operational Area and EMBA. The Annual Fishery Status Reports published by the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) were used to identify if Commonwealth managed fisheries have fished within the Operational Area 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 of fishery catch and effort data (2018–2022) to analyse the potential for interaction of fisheries with the PAA. 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. In addition, any impacts to fish are expected to be temporary in nature (see **Section 6.7** and **Section 6.8**) and therefore not extending beyond the life of the EP.

This information was used to determine relevant fisheries for consultation who may be impacted by the proposed petroleum activities. **Table 4-23** provides an assessment of the potential interaction and **Appendix C** provides further detail on the fisheries that have been identified through desk-based assessment and consultation (**Section 5**). One Commonwealth managed and four 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 Petroleum Activities Area and environment that may be affected and potential for interaction during the Petroleum Activities Program

Fishery	Potential for interaction During Activity × no potential for interaction ✓ potential for interaction		
	Overlap with PAA	Overlap with EMBA	Description
Commonwealth Managed Fisheries			
North West Slope Trawl Fishery	×	✓	The North West Slope Trawl Fishery management area overlaps the EMBA. Between one to six vessels have been active in the fishery since 2005. Fishery Status Reports indicate most recent activity inside the EMBA occurred in the 2021–2022 season (Patterson et al., 2022). Accordingly, Woodside considers it a possibility that interactions with the fishery may occur in the EMBA.
Western Deepwater Trawl Fishery	×	✓	The Western Deepwater Trawl management area overlaps the EMBA. Fishery Status Reports indicate most recent activity inside the EMBA occurred in the 2020–2021 season (Patterson et al., 2022). There has been no fishing effort reported within the PAA in the last 5 years. Accordingly, Woodside considers it a possibility that interactions with the fishery may occur in the EMBA.
Western Tuna and Billfish Fishery	×	×	The Western Tuna and Billfish Fishery management area overlaps the EMBA and PAA; however, the majority of Australian catch has concentrated in south-eastern Australia (ABARES, 2021). There has been no fishing effort reported within the PAA in the last 5 years. Accordingly, Woodside considers there to be no potential for interaction with this fishery and the Petroleum Activities Program.
Southern Bluefin Tuna Fishery	×	×	The Southern Bluefin Tuna Fishery management area overlaps the EMBA and PAA. 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 et al., 2022). There has been no fishing effort reported within the PAA in the last 5 years. Accordingly, 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 not currently active and no fishing has occurred since 2009 (Patterson et al., 2022). Accordingly, Woodside considers there to be no potential for interaction with this fishery and the Petroleum Activities Program.

Fishery	Potential for interaction During Activity ✗ no potential for interaction ✓ potential for interaction		
	Overlap with PAA	Overlap with EMBA	Description
State Managed Fisheries			
Pilbara Line Fishery	✓	✓	The Pilbara Line Fishery licensees are permitted to operate anywhere within Pilbara waters (Newman et al., 2021), overlapping the EMBA and PAA. The fishery is active in the EMBA, with ten 60 nm Catch and Effort System (CAES) blocks reporting up to five vessels across the 2017 to 2022 seasons (DPIRD, 2022). The PAA overlaps 60 nm CAES block 19150. FishCube data for the Pilbara Line Fishery is not provided at the 10 nm scale, therefore it is uncertain if the effort reported in the 60 nm CAES block 19150 overlaps with the PAA. Accordingly, Woodside considers it a possibility that interactions with the fishery may occur within the EMBA and PAA.
Pilbara Crab Managed Fishery	✗	✓	The Pilbara Crab Managed Fishery management area overlaps the EMBA and PAA. The fishery is active in the EMBA, with one 60 nm CAES block reporting less than 3 vessels across the 2017 to 2022 seasons (DPIRD, 2022). FishCube data for the Pilbara Crab Managed Fishery is not provided at the 10 nm scale; however, the 60 nm CAES block does not overlap the PAA. Accordingly, Woodside considers it a possibility that interactions with the fishery may occur within the EMBA.
Pilbara Trap Managed Fishery	✓	✓	The Pilbara Trap Managed Fishery management area overlaps the EMBA and PAA. The fishery is active within the EMBA, with twelve 60 nm CAES blocks reporting up to 3 vessels across the 2017 to 2022 seasons (DPIRD, 2022). FishCube data for the Pilbara Trap Managed Fishery is not provided at the 10 nm scale; therefore, it is uncertain if the effort reported in the 60 nm CAES blocks overlaps with the PAA. Accordingly, Woodside considers it a possibility that interactions with the fishery may occur within the EMBA and PAA.
Pilbara Fish Trawl (Interim) Managed Fishery	✓	✓	The Pilbara Fish Trawl (Interim) Managed Fishery management area overlaps the EMBA and the PAA. The fishery has remained consistently active within the EMBA, with six 60 nm CAES blocks reporting up to four vessels across the 2017 to 2022 seasons (DPIRD, 2022). The fishery is active within the PAA with four 10 nm CAES blocks reporting up to four vessels across the 2017 to 2022 seasons (DPIRD, 2022). Therefore, Woodside considers it a possibility that interactions with the fishery may occur within the EMBA and PAA.

Fishery	Potential for interaction During Activity × no potential for interaction ✓ potential for interaction		
	Overlap with PAA	Overlap with EMBA	Description
Mackerel Managed Fishery (Area 2)	×	✓	The Mackerel Managed Fishery management area overlaps the EMBA and PAA (Area 2 only). The fishery has remained consistently active over the last 5 years, with nine 60 nm CAES blocks reporting up to six vessels across each season between 2017 to 2022 (DPIRD, 2022). FishCube data reported no active fisheries at 10 nm overlapping the PAA over the last 5 years (DPIRD, 2022). Accordingly, Woodside considers it a possibility that interactions with the fishery may occur within the EMBA.
Specimen Shell Managed Fishery	×	✓	The Specimen Shell Managed Fishery management area overlaps the EMBA and PAA. The fishery has remained consistently active within the EMBA between the 2017 to 2022 seasons with five 60 nm CAES blocks overlapping the EMBA reporting up to six vessels (DPIRD, 2022). FishCube data reported no active fisheries at 10 nm overlapping the PAA (DPIRD, 2022). Accordingly, Woodside considers it a possibility that interactions with the fishery may occur in the EMBA.
Marine Aquarium Managed Fishery	×	✓	The Marine Aquarium Managed Fishery management area overlaps the EMBA and the PAA. The fishery is active within the EMBA, with five 60 nm CAES blocks reporting six licences across the 2017 to 2022 seasons (DPIRD, 2022). No activity was recorded for 10 NM CAES blocks reporting across the 2017 to 2022 seasons (DPIRD, 2022). Accordingly, Woodside considers it a possibility that interactions with the fishery may occur within the EMBA.
West Coast Deep Sea Crustacean Managed Fishery	×	✓	The West Coast Deep Sea Crustacean Managed Fishery management area overlaps the EMBA and PAA. The fishery is active within the EMBA, with three 60 NM CAES blocks reporting less than three licences across the 2017 to 2022 seasons (DPIRD, 2022). FishCube data reports no active fishing effort within the PAA at 10 nm over the last 5 years (DPIRD, 2022). Accordingly, Woodside considers it a possibility that interactions with the fishery may occur within the EMBA.
Onslow Prawn Managed Fishery (Areas 2 and 3)	×	✓	The Onslow Prawn Managed Fishery management Areas 2 and 3 overlaps EMBA and PAA (Area 3 only). The fishery is active within the EMBA, with five 60 nm CAES blocks reporting less than three licences across the 2017 to 2022 seasons (DPIRD, 2022). FishCube data reports no active fishing effort within the PAA at 10 nm over the last 5 years (DPIRD, 2022). Accordingly, Woodside considers it a possibility that interactions with the fishery may occur within the EMBA.

Fishery	Potential for interaction During Activity × no potential for interaction ✓ potential for interaction		
	Overlap with PAA	Overlap with EMBA	Description
Western Australian Sea Cucumber Fishery	×	✓	The Western Australian Sea Cucumber Fishery management area overlaps the EMBA. The fishery is permitted to operate throughout all WA waters. The target species typically inhabit nearshore waters. FishCube data reports fishing effort occurs within the EMBA across two 60 NM CAES blocks reporting less than three licenses across 2017 to 2019 seasons (DPIRD, 2022). FishCube data reported no active fisheries at 10 nm CAES blocks overlapping the PAA (DPIRD, 2022). Accordingly, Woodside considers it a possibility that interactions with the fishery may occur within the EMBA.
Nickol Bay Prawn Managed Fishery	×	✓	The Nickol Bay Prawn Managed Fishery management area overlaps the EMBA. FishCube data reports five 60 NM CAES blocks with active fishing effort overlapping the EMBA, with up to eight vessels active across the 2017 to 2022 seasons (DPIRD, 2022). FishCube data reported no active fisheries at 10 nm CAES blocks overlapping the PAA (DPIRD, 2022). Accordingly, Woodside considers it a possibility that interactions with the fishery may occur within the EMBA.
Exmouth Gulf Prawn Managed Fishery	×	✓	The Exmouth Gulf Prawn Managed Fishery management area overlaps the EMBA. FishCube data reports two 60 nm CAES blocks overlapping the EMBA, with up to six vessels active across the 2017 to 2022 seasons (DPRID, 2022). No fishing effort has been reported in the 10 nm CAES blocks overlapping the PAA within the last 5 years (DPIRD, 2022). Accordingly, Woodside considers there to be potential for interaction with this fishery within the EMBA.
South West Coast Salmon Managed Fishery	×	×	The South West Coast Salmon Managed Fishery management area overlaps the EMBA and PAA. Historically, no fishing occurs north of the Perth Metropolitan Area. Therefore, no effort is reported within the EMBA (DPRID, 2022) and Woodside considers there to be no potential for interaction with this fishery within the EMBA.
Land Hermit Crab Fishery	×	✓	The Land Hermit Crab Managed Fishery management area overlaps the EMBA, where shoreline contact is predicted. FishCube data reports fishing effort occurs within the EMBA in one CAES block reporting three licenses across the 2017 to 2018 season (DPIRD, 2022). FishCube data reported no active fisheries at 10 nm CAES blocks overlapping the PAA (DPIRD, 2022). Woodside considers there to be potential for interaction with this fishery within the EMBA, although no shoreline contact is predicted where this overlap occurs.

Fishery	Potential for interaction During Activity × no potential for interaction ✓ potential for interaction		
	Overlap with PAA	Overlap with EMBA	Description
Pearl Oyster Managed Fishery (Zone 1 and 2)	×	×	The Pearl Oyster Managed Fishery management area overlaps the EMBA and the PAA however the main fishing area for Zone 1 is located adjacent to the EMBA, in the nearshore waters of Exmouth Gulf and Port Hedland. No fishing has occurred in Zone 1 from 2017 to 2020 (Hart et al., 2021). FishCube data reported no fishing effort within the EMBA (DPIRD, 2022) and therefore, Woodside considers there to be no potential for interaction with this fishery within the EMBA.
Western Australian Abalone Managed Fishery	×	×	The Western Australian Abalone Managed Fishery management area overlaps the EMBA and the PAA. However, FishCube data reports no fishing effort occurred within the EMBA across 2017 to 2022 (DPIRD, 2022). Similarly, FishCube data reported no active fisheries at 10 nm CAES blocks overlapping the PAA (DPIRD, 2022). Accordingly, Woodside considers there to be no potential for interaction with this fishery within the EMBA.
West Coast Rock Lobster Managed Fishery	×	×	The West Coast Rock Lobster Managed Fishery management area overlaps the EMBA. FishCube data reports no fishing effort occurred within the EMBA across 2017 to 2022 seasons (DPIRD, 2022). FishCube data reported no active fisheries at 10 nm CAES blocks overlapping the PAA (DPIRD, 2022). Accordingly, Woodside considers there to be no potential for interaction with this fishery within the EMBA.
WA North Coast Shark Fishery	×	×	The WA North Coast Shark Fishery management area overlaps the EMBA. The PAA overlaps with the WA North Coast Shark Fishery (WANCSF) management area which extends from longitude 114°06'E to 123°45'E (Patterson et al., 2021). However, fishing activity has not been reported by this fishery since the 2008–2009 fishing season (Patterson et al., 2021). Accordingly, Woodside considers there to be no potential for interaction with this fishery within the EMBA.
Charter based commercial operators			
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. FishCube data indicate tour operator fishing effort highest around Ningaloo and Muiron Islands and at Barrow Island and the Montebello Islands. FishCube data reports consistent effort across twenty-four 60 nm CAES blocks that overlap the EMBA (DPIRD, 2022). Effort was reported by up to 20 vessels across the 2017 to 2022 seasons (DPIRD, 2022). The FishCube data reported no active tour operators at 10 nm overlapping the PAA within the last 5 years (DPIRD, 2022). Accordingly, Woodside considers it a possibility that interactions with tour operators may occur within the EMBA.

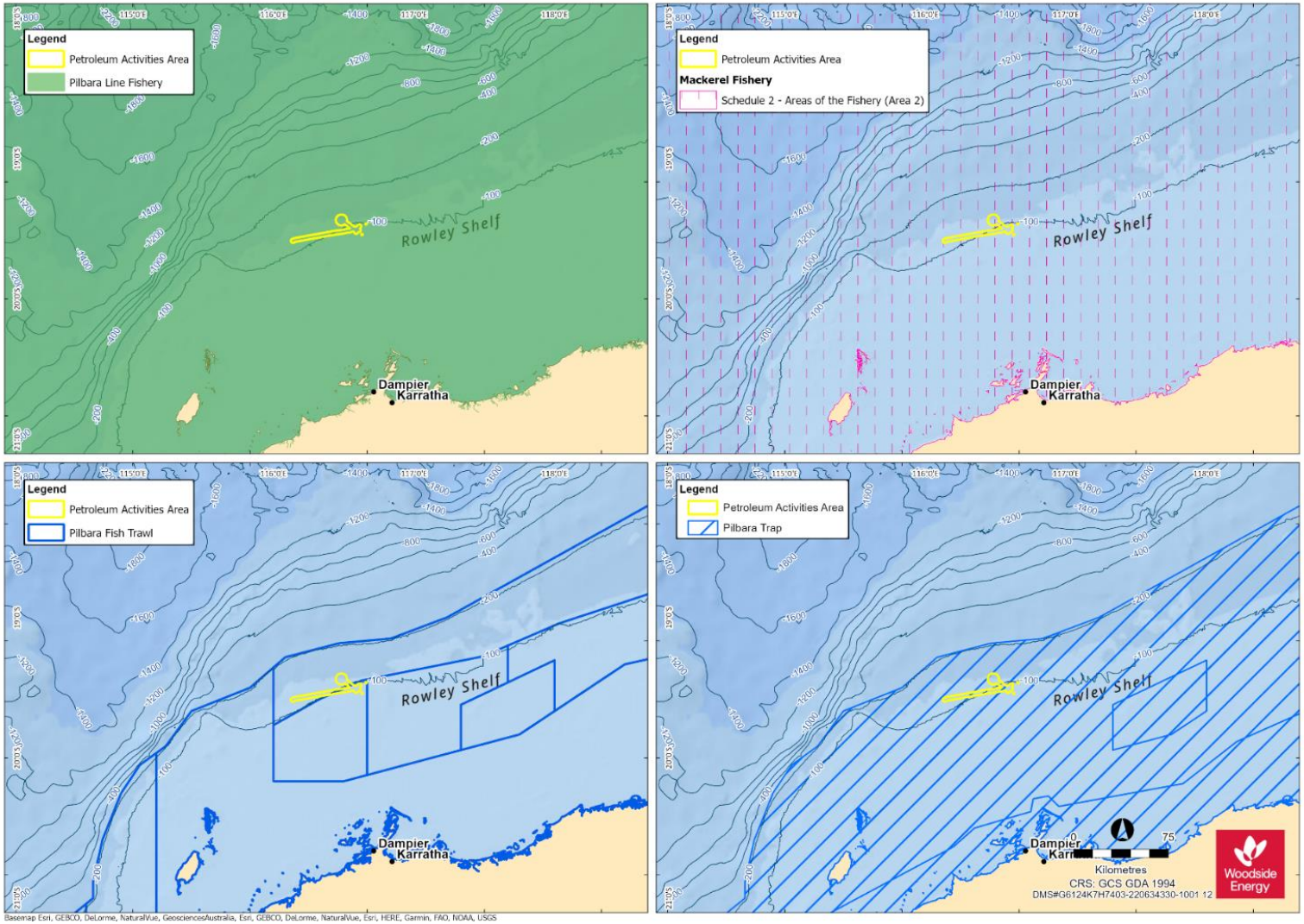


Figure 4-14: Commercial fisheries overlapping the Petroleum Activities Area and environment that may be affected with a potential for interaction with the Petroleum Activities Program

4.9.3 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.

4.9.4 Tourism and Recreation

No tourist activities take place specifically within the PAA; however, it is acknowledged that there are growing tourism and recreational sectors in WA and these sectors have expanded over the last couple of decades. Growth and the potential for further expansion in tourism and recreational activities is recognised for the Pilbara and Gascoyne regions, with the development of regional centres and a workforce associated with the resources sector (SGS Economics and Planning, 2012).

Tourism is one of the major industries of the Gascoyne region and contributes significantly to the local economy in terms of both income and employment. The main marine nature-based tourist activities are concentrated around and within the Ningaloo World Heritage Area (WHA) (approximately 286 km south-west of the PAA). Activities undertaken include recreational fishing, snorkelling and scuba diving and wildlife watching and encounters (including whale sharks, manta rays, humpback whales and turtles) (Schianetz et al., 2009).

The Montebello Islands (located 106 km south-west of the PAA) are the closest location for tourism with some charter boat operators taking visitors to these islands (DEC, 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 and the Glomar Shoals KEF (approximately 54 km west and 15 km east of the PAA respectively). However, due to the distance from access nodes, such as Dampier and Onslow (approximately 126 km south and 237 km south-south west 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

4.9.5 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. It is noted that none of these fairways intersect with the PAA; the nearest fairway is approximately 19 km east of PAA (**Figure 4-15**). Vessel tracking data suggest shipping is concentrated to the east of the PAA, which is likely associated with ports.

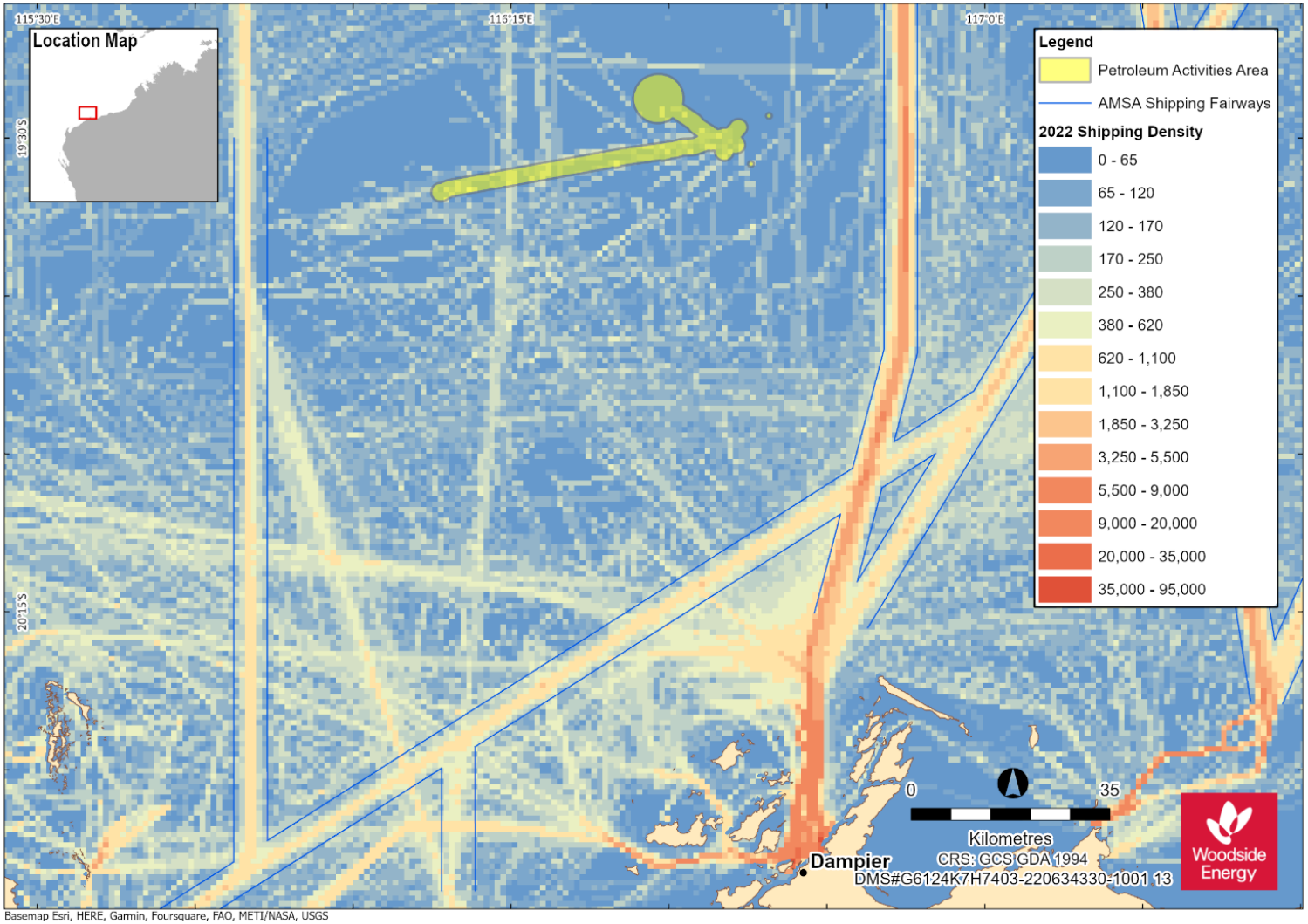


Figure 4-15: Vessel density map for the Petroleum Activities Area and environment that may be affected, derived from Australian Maritime Safety Authority satellite tracking system data; vessels include cargo, liquefied natural gas tanker, passenger vessels, support vessels and others/unnamed vessels

4.9.6 Oil and Gas

Table 4-24 details other oil and gas facilities located within 50 km of the PAA. **Appendix C-1** Section 11.9 describes current oil and gas development within the EMBA, also shown in **Figure 4-16**.

Table 4-24: Other oil and gas facilities located within 50 km of the Petroleum Activities Area

Facility name and operator	Distance and direction from PAA to Listed Place (km)
North Rankin Complex (Woodside)	Overlaps
Okha (Woodside)	5 km south
Goodwyn Alpha (Woodside)	22 km west
Reindeer (Santos)	50 km south-east

4.9.7 Defence

The are no defence areas overlapping the PAA. Defence areas overlapping the EMBA are presented in **Figure 4-17** and **Figure 4-18**.

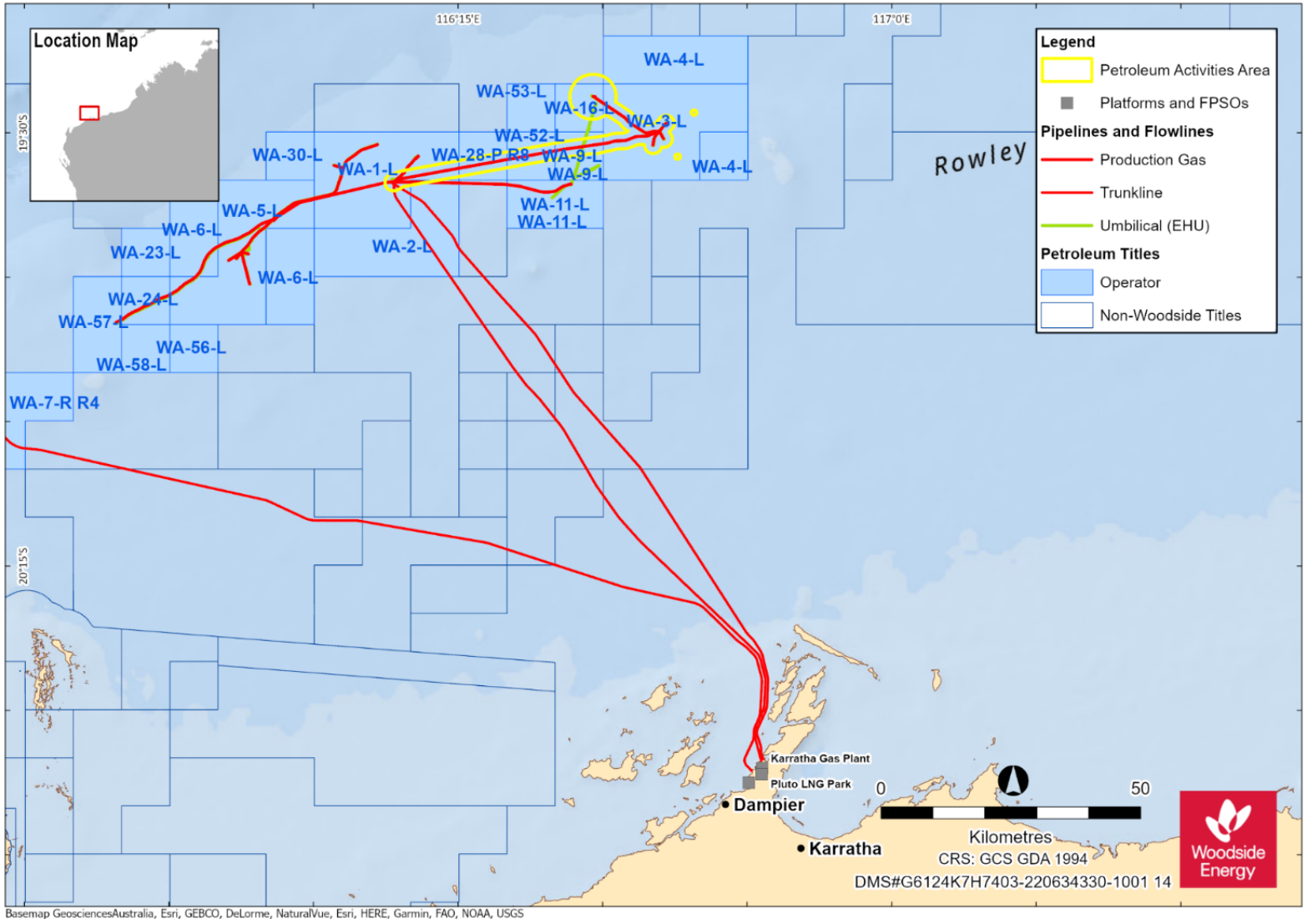


Figure 4-16: Oil and gas Infrastructure within the Petroleum Activities Area and environment that may be affected

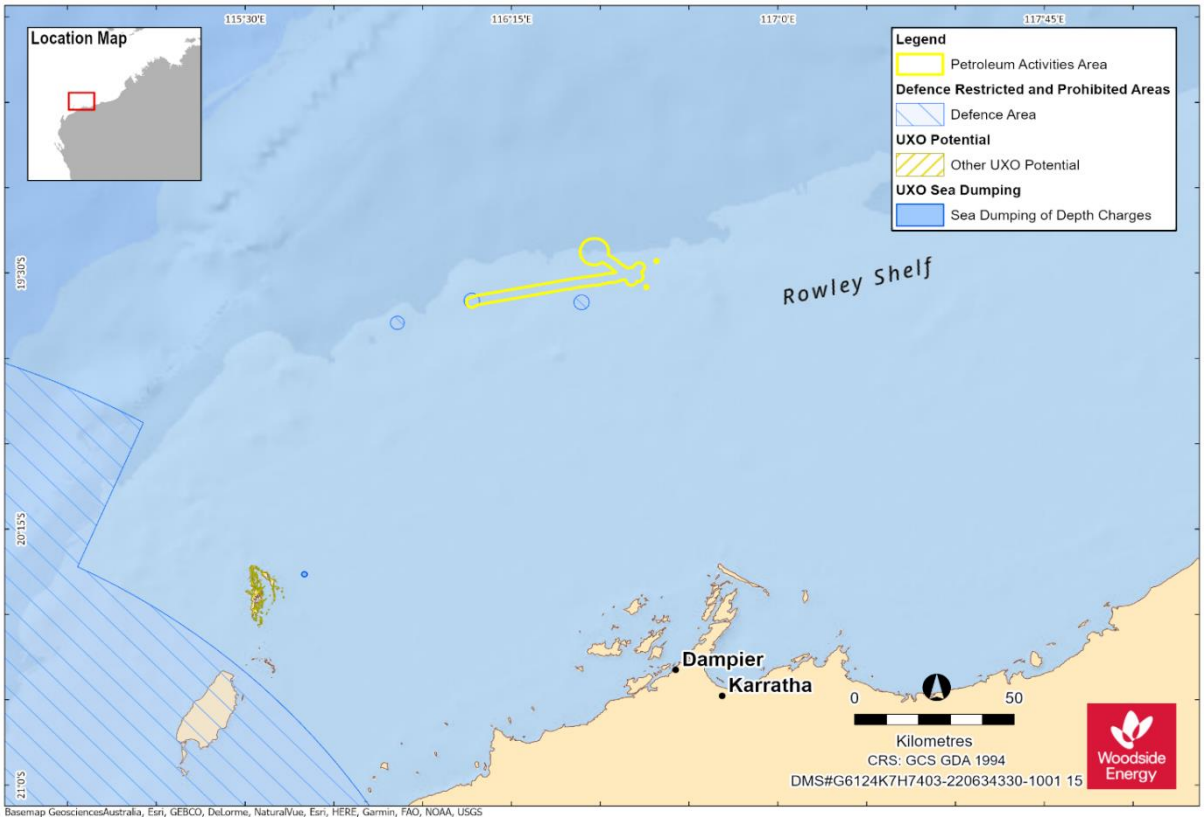


Figure 4-17: Defence areas relative to the Petroleum Activities Area

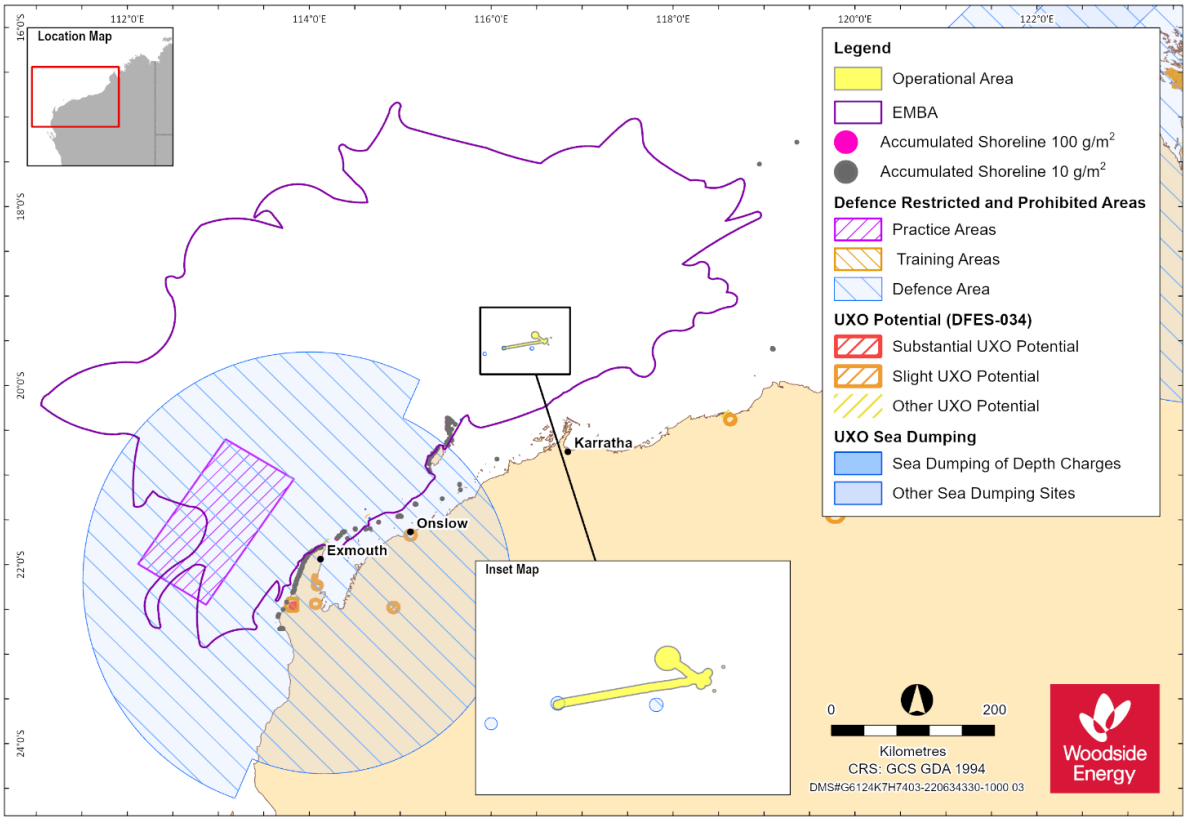


Figure 4-18: Defence areas overlapping the environment that may be affected

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. Consultation 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 to enable titleholders to consider and adopt appropriate measures in response to the objections or claims received from relevant persons. Consistent with **Section 4** of the Environment Regulations, consultation also supports the objective to ensure 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.

Woodside acknowledges that a titleholder's approach to consultation is to be 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 **Section 5.5.1**) delivered on 2 December 2022 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 PAP (see **Section 4**).

Woodside's consultation methodology is divided into two parts:

- The first section (**Section 5.2 to 5.5**) provides an overview of Woodside's consultation methodology for its EPs, including how we apply regulation 25(1) of the Environment Regulations to identify relevant persons.
- The second section (**Section 5.6 to 5.7**) details Woodside's approach to accepting feedback and assessment of the merit of each objection or claim, and engaging in ongoing consultation for this EP.

Woodside's consultation record is at **Appendix F** and includes:

- assessment and identification of relevant persons
- consultation information provided to relevant persons, feedback received and Woodside's assessment of the merits of objections or claims
- engagement with persons or organisations that Woodside chose to contact who are not relevant persons for the purposes of regulation 25(1) of the Environment Regulations (see **Section 5.3.6**)
- opportunities provided to persons or organisations to participate in consultation.

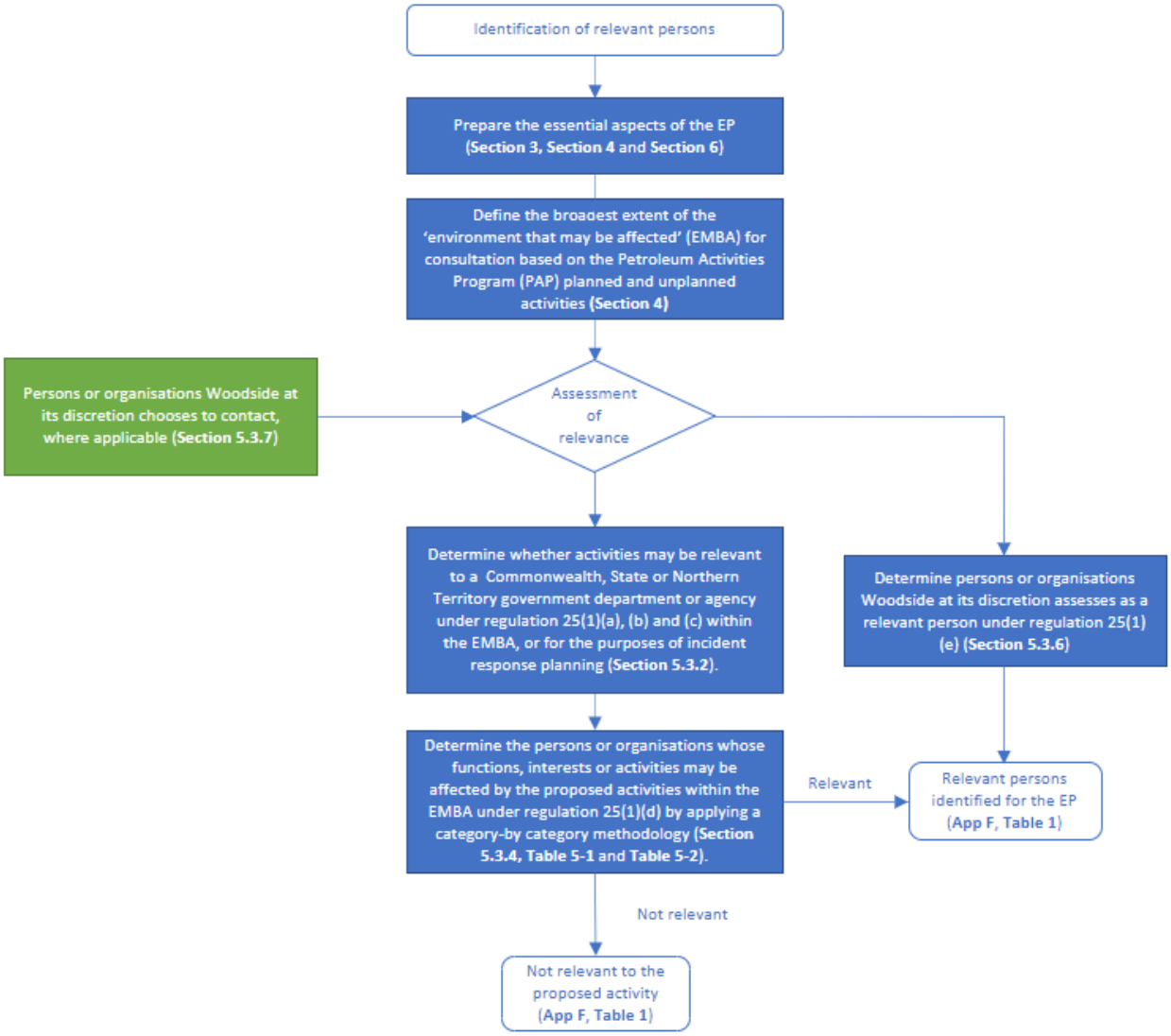


Figure 5-1: Overview of Woodside's methodology to identify relevant persons

5.2 Consultation – General Context

Woodside has a portfolio of quality oil and gas assets and more than 30 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 proposed petroleum activity. 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 Guideline on *Consultation in the course of preparing an environment plan* (12 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**).

In order to undertake consultation, Woodside has developed a methodology for identifying relevant persons, in accordance with regulation 25(1) of the Environment Regulations (**Section 5.5.1**). This methodology is consistent with NOPSEMA's guideline and demonstrates that, in order 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 3.3.1)
- 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 of the Environment Regulations, which requires a titleholder to:

- consult with each of the following (a relevant person) in the course of preparing an environment plan:
  - each Commonwealth, State or Northern Territory agency or authority to which the activities to be carried out under the environment plan 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) of the Environment Regulations)
- 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) of the Environment Regulations)

- allow a relevant person a reasonable period for the consultation (regulation 25(3) of the Environment Regulations)
- 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) of the Environment Regulations).

Further, Woodside seeks to carry out consultation in a manner that:

- is consistent with the principles of ESD 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 (regulation 4 of the Environment Regulations)
- seeks to ensure that the environmental impacts and risks of the activity will be of an acceptable level (regulation 4 of the Environment Regulations)
- 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 7.10).

An overview of Woodside's consultation approach is outlined in **Figure 5-2**.

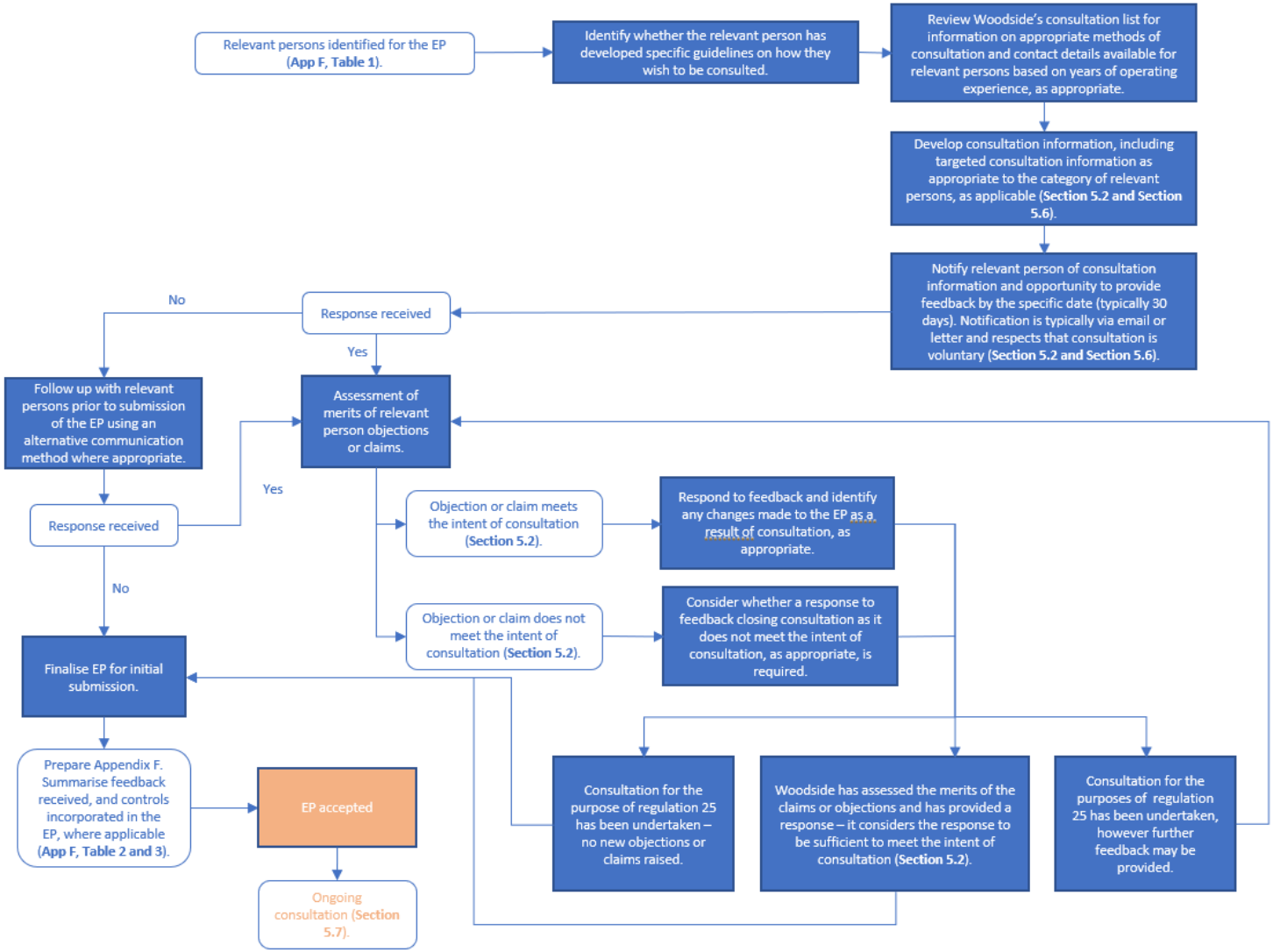


Figure 5-2: Overview of Woodside's consultation approach

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 2024
  - GL 1887 – Consultation with Commonwealth agencies with responsibilities in the marine area – January 2024
- PL9028 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:

- Sea Countries of the North-West; Literature review on Indigenous connection to and uses of the North West Marine Region

Australian Fisheries Management Authority:

- Petroleum industry consultation with the commercial fishing industry

Commonwealth Department of Agriculture, Fisheries and Forestry:

- Fisheries and the Environment – *Offshore Petroleum and Greenhouse Gas Act 2006*
- Offshore Installations Biosecurity Guide

WA Department of Primary Industries and Regional Development:

- Guidance statement for oil and gas industry consultation with the Department of Fisheries

WA Department of Transport:

- Offshore Petroleum Industry Guidance Note

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 within the description of regulations 25(1)(a) and (b) of the Environment Regulations 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) of the Environment Regulations, Woodside consults with the department of the relevant State Minister.

5.3.2 Identification of Relevant Persons under regulation 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 in the EMBA to be carried out under the EP may be relevant. This list of relevant department 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 marine 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 and determines whether those responsibilities overlap with potential risks and impacts specific to the proposed petroleum activity 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 PAP. Feedback received, if any, is assessed in accordance with the intended outcome of consultation.
- The list of those 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 proposed petroleum activity in the EMBA or would not be involved in incident response planning.

5.3.3 Regulation 25(1)(d)

In order 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 that the guidance on the definition of functions, interests and activities is as follows in accordance with 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) of the Environment Regulations includes consideration of:

- whether a person or organisation has functions interests or activities that overlap with the 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) of the Environment Regulations 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 this 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) of the Environment Regulations, Woodside adopts the following methodology, 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 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 includes applying judgement, knowledge and current literature.
- Further, 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 proposed to be carried out under the EP. The broad categories are identified in Table 5-1below and identification methodology applied as set out in Table 5-2.

- The list of those persons or organisations assessed as relevant and 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 5-2, 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* and Western Australian *Fish Resources Management Act 1994*, 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 governed by 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 who hold cultural rights and interests, or have cultural functions or 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 (PBCs). 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* (NTA) with prescribed functions, set out in Part 11 of the *Native Title Act*, 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 governed by the *Local Government Act 1995* (WA) which is responsible for representing the local community. Recognised local community reference/liaison group or organisation in relation to oil and gas matters.

Category	Explanation
Other non-government groups or organisations	Non-government organisation with public website material targeting the proposed activity.
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) of the Environment Regulations – 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 4.9.2**). • Woodside acknowledges WAFIC's consultation guidance[16], that Titleholders develop separate consultation strategies for significant unplanned events (for example, 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 (**see Appendix D:** Oil Spill Preparedness and Response Strategy Selection and Evaluation). • 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 4.9.2**). Assessment of relevance: • State commercial fisheries that have been assessed as having a potential for interaction within the Operational Area or EMBA (see **Section 4.9.2**) are assessed as relevant to the proposed activity. Woodside acknowledges WAFIC's consultation guidance (see above) and applies this by: – directly consulting fishery licence holders that are assessed as having a potential for interaction in the Operational Area – consulting fisheries that are assessed as having a potential for interaction in the EMBA . • Commonwealth commercial fisheries that have been assessed as having a potential for interaction within the Operational Area or EMBA (see **Section 4.9.2**) 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.

16 Consultation Approach for Unplanned Events - WAFIC

Category	Relevant person identification methodology
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: • From Woodside knowledge and operating experience, knowledge of recreational marine users in the area. This assessment is both activity and location based. • 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 next steps in its methodology: • Use WA Petroleum Titles (DMIRS-011) to determine overlap with other Titleholders or Operators permit areas within the EMBA. • From Woodside knowledge and operating experience, 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 next steps in its methodology: • Review 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 Woodside's existing consultation list. • Search websites 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 4.9.1**, 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)

Category	Relevant person identification methodology
	• 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/or individuals. Further detail to Woodside's 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 ILUAs, 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 there representative is a Native Title Representative Body, contacting 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. First Nations groups or individuals 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, interest 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 any 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: • Consult a Representative Aboriginal/Torres Strait Islander Body (RATSIB), which is a regional organisation appointed under the *Native Title Act* with prescribed functions set out in Part 11 of the *Native Title Act*, 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 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* 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 next steps in its methodology: • Use the Australasian Underwater Cultural Heritage Database to assess any known records Maritime Cultural Heritage sites (shipwrecks, aircraft and relics) within the EMBA (see **Section 4.9.1**). 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 next steps in its methodology: • Reviews 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 any overlap between the local government's defined area of responsibility and the EMBA. • Host 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. • Review the community reference/liaison group's terms of reference to determine its area of responsibility and any 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.
Other non-government groups or organisations	Woodside assesses relevance for other non-government groups or organisations using the following next steps in its methodology: • Review Woodside's existing consultation list. • Search the websites 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 material specific to the proposed activity at the time of development of the EP. The organisation should have a publicly available mission statement (or purpose) that clearly describes their collective functions, interests or activities. • Review current website material to identify targeted information which demonstrates functions, interests or activities relevant to the potential risks and impacts associated with planned activities. Assessment of relevance: • 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 will be assessed as relevant.

Category	Relevant person identification methodology
Research institutes and local conservation groups or organisations	Woodside assesses relevance for research institutes and local conservation groups or organisations using the following next steps in its methodology: • Review Woodside's existing consultation list. • Search the websites for research institutes that may operate within the EMBA. This assessment is both activity and location based. • Search the websites 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) of the Environment Regulations, Woodside has discretion to categorise any other person or organisation as a relevant person under regulation 25(1)(e) of the Environment Regulations.

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) of the Environment Regulations.

5.3.7 Persons or organisations Woodside chooses to contact

In addition to undertaking consultation with relevant persons under regulation 25(1) of the Environment Regulations there are persons or organisations that Woodside chooses to contact, from time to time, in relation to a proposed activity. For example, these are persons or organisations:

- that are 'not relevant' pursuant to regulation 25(1) of the Environment Regulations 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) of the Environment Regulations 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 required 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 in **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 in **Appendix F,** Table 1 and **Appendix F,** 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 self-identified and Woodside assessed as not relevant are summarised in **Appendix F,** Tables 1 and 3.

5.4 Consultation Material and Timing

Regulation 25(2) of the Environment Regulations 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) of the Environment Regulations 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 (for the relevant person) and collaborates on a consultation approach where further engagement is sought by the relevant person. Woodside understands that the consultation process should be appropriate for the category of relevant persons and that 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 PAP. Woodside recognises 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 PAA where the activity will take place, the timing and duration of the activity, a location map of the PAA and EMBA, a description of the EMBA, relevant exclusion zones as well as a summary of relevant risks and mitigation and/or management control measures relevant to the proposed petroleum activity. It also sets out contact details to provide feedback to Woodside.

Woodside recognises that 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, also 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 Operational Area as a result of temporary displacement due to exclusion zones, may require more targeted information relevant to their functions, interests or activities. Woodside also acknowledges NOPSEMA's brochure entitled *Consultation on offshore petroleum environment plans information for the community*, which advises consultees 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 and 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* 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 utilises a range of tools to provide sufficient materials to relevant persons, which may include one or more of:

- Consultation Information Sheet available on Woodside's website
- 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
- maps outlining a persons or organisations defined area of responsibility in relation to the proposed activity, for example a fisheries management area or defence training area
- community meetings, as appropriate.

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 persons understands 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 an alternative form of communication is expressed by a person or organisation. Woodside acknowledges that there might be limitations in how it 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 in line with *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, and 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.

Category of relevant person	Typically accepted form of communication
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, 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 is 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 of the Environment Regulations but which Woodside has chosen to contact.

When engaging in consultation, Woodside notifies relevant persons that, in accordance with regulation 25(4) of the Environment Regulations, the relevant person may request 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.

5.4.2 Reasonable Period for Consultation

Woodside seeks to consult in order to support preparation of its Environment Plan. 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 considers its methodology allows relevant persons a reasonable period for consultation (regulation 25(3) of the Environment Regulations). A reasonable period for all relevant persons,

including Traditional Custodian relevant persons, 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 of the Environment Regulations sets out a public consultation period of 30 days.
- The Department of Mines and Petroleum "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 of time 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..."[17]

Woodside seeks feedback in order to support preparation of its environment plan. What constitutes a reasonable period for consultation is considered on a case-by-case basis, with reference to the person being consulted with and the nature, scale and complexity of the activity.

Woodside's typical approach to enable a reasonable period for consultation is:

- advertising in a 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 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 Tables 2 and 3 set out a history of consultation and demonstrate a reasonable period of consultation has been afforded for each relevant person.

Woodside considers that the "reasonable period" of consultation for this EP has closed.

17 Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193 at paragraph [136].

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, at all stages during the life of the EP as per Woodside's ongoing consultation approach as 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 of being met by titleholders (**Section 5.5.1**)[18]. Consultation is a "*real world activity*" and must be capable of reasonable discharge.[19] 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.[20]

When the titleholder demonstrates that it has provided sufficient information and a reasonable period for consultation, the regulation 25 of the Environment Regulations consultation requirements are met.[21] Meeting these obligations requires evaluative judgment to determine reasonable satisfaction of the consultation obligation, and as such, the regulator uses its discretion to determine if these 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.[22]

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.[23] 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 and action the assessment and response. 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 of the Environment Regulations. Woodside considers that consultation under regulation 25 is complete.

Appendix F Tables 2 and 3 of this EP set out the history of consultation under regulation 25. To the extent a relevant person says that it has further information to share or claims that consultation under regulation 25 has not been completed, **Appendix F** Tables 2 and 3 provide reasons specifically 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 environment plan.

18 Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193 [89], [98], [103]-[104] and [109].
19 Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193 at [89].
20 Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193 at [96] and [103].
21 Explanatory Statement, Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, page 29.
22 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].
23 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].

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 (**Section 5.2**). 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 (**Section 5.5.2.1** to **5.5.2.4**).

Woodside notes the Full Federal Court discussed several *Native Title Act 1993* (Cth) (NTA) 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 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,[24] and how obligations to consult "*each and every*" person under regulation 25 of the Environment Regulations 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."[25]

"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" (emphasis added).*[26]

"there is no definition of what constitutes "consultation for the purpose of ref 11A [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"[27] (emphasis added).

The Judgment in the Tipakalippa Appeal makes it clear that a Titleholder will have some decisional choice in identifying which natural 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.[28] Woodside takes this to mean that consultation is not fixed to a rigid process, and indeed, will need to 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 5.2**).

Consistent with the Tipakalippa Appeal, Woodside considers NTA-style "full group" meetings are not the only way for there to be compliance with regulation 25 in relation to Traditional Custodian relevant persons. 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. We do not consider it appropriate for titleholders to direct or challenge the nominated representative corporations on how to engage with their members.

24 Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193 at paragraph [95], [98], [103]-[104] and [109].
25 Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193 at paragraph [98].
26 Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193 at paragraph [96].
27 Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193 at paragraph [104].
28 Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193 at paragraph [47] and [48].

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 having worked within the Commonwealth native title and cultural heritage systems and state and territory cultural heritage and land rights systems, for several decades. 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 First Nations team exercises its professional judgement and is deeply 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* (Cth) because the vast majority of the Western Australian coastline is settled under the native title regime. This means 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.[29] 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 5.5.2.2**), and to provide feedback to inform the management of environmental impacts and risks.

Using these tools, Woodside communicates information about Environment Plans in these ways:

- advertising in relevant newspapers 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, provides 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.

29 Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193 at paragraph [95].[104].[153].

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 of the Environment Regulations consultation, Woodside introduced 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.
- 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 whom to appropriately consult with (such as elders).
- Woodside holds meetings on Country at a place and time agreed with the Traditional Custodians, offering and providing financial assistance for meeting expenses (as appropriate).

- Woodside provides information specifically designed to be easily understood, to reach all relevant people, and gives 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 teams' 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. In order to establish cultural features, it is necessary that the beliefs and values are held by the *relevant* people *as a people*. In order 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 to, and demonstrate that the "individual beliefs are broadly representative of the beliefs of other members of the group"[30]. 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[31]. When the First Nations team is told that a particular value is cultural by a 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.

5.5.2.1 Identification of Relevant Persons

In order to undertake consultation, Woodside has developed a methodology for identifying relevant persons, in accordance with regulation 25(1) of the Environment Regulations (**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

[30] *Munkara v Santos NA Barossa Pty Ltd* (No 3) [2024] FCA 9 at [205]
[31] *Munkara v Santos NA Barossa Pty Ltd* (No 3) [2024] FCA 9 at [205]

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 5.5.2.4**). 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 representative corporations. 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 5.5.2.4**, 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* (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 aims to seek, from members, authorisation of agreements and native title/compensation claims under the *Native Title Act 1993* (Cth)[32].

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.

5.5.2.2 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 5.5.2.1**). Woodside's approach to providing individual Traditional Custodians the opportunity to self-identify and consult for an Environment Plan 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

32 Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193, at [104]

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.
- Modern Indigenous engagement practices rely on the building and maintaining of respectful relationships. Most nominated representative corporations to date 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 Environment Plan 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.

5.5.2.3 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 also may depend on the degree to which a relevant person is potentially affected.

Woodside produces a Consultation Information Sheet for each Environment Plan which is provided to relevant persons and organisations to provide the opportunity for feedback on the activity (**Section 5.4.1**). In response to Traditional Custodians' feedback, 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 Consultation Summary Sheet developed and reviewed by Indigenous representatives so that content is appropriate to the intended recipients, 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.

5.5.2.4 Reasonable Period for Consultation

Woodside seeks to consult in order to support preparation of its Environment Plan. 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**).

5.5.2.5 Discharge of Regulation 25

Woodside's consideration and approach to discharging regulation 25 of the Environment Regulations for relevant persons is discussed in **Section 5.4.3**. In addition to this, Woodside has considered the application of regulation 25 specifically 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. Woodside considers that consultation under regulation 25 is complete (**Section 5.4.3**).

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 environment plan 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. While 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 environment plan and approval process, for example, statements of fundamental objection to offshore petroleum activities or information containing personal threats or profanities. Under Regulation 34(g) of the Environment Regulations, 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 5.3.6**). This information is summarised in **Appendix F** Tables 1 and 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) of the Environment Regulations, 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 7.10**), 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 (as set out in **Section 5.2**).

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 7.2.5**).

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 6.7**.

6.2 Analysis and Evaluation

As required by regulations 21(5) and 21(6) of the Environment Regulations, the analysis and evaluation demonstrate that the identified risks and impacts associated with the Petroleum Activities Program 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[33] (e.g., emissions, physical presence, etc). For all hazardous events considered, the worst credible consequence was assumed.

The ENVID identified 11 impacts and 17 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 Petroleum Activities Program 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 **Sections 6.6**, **6.7** and **6.8**.

33 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 (routine and non-routine)

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
Physical Presence: Interaction with other Marine Users	**6.6.1**	Presence of facility excluding and/or displacing other users from PSZ and PAA respectively.	Potential isolated social impact resulting from interference with other sea users (e.g., commercial and recreational fishing, and shipping).	F	Social and Cultural – No lasting effect (<1 month). Localised impact not significant to areas/items of cultural significance.	Broadly Acceptable
		Presence of MODU, installation vessels and other support vessels excluding and/or displacing other users during tie-back activities.				
		Presence of subsea infrastructure interfering with or displacing third party vessels (commercial fishing).				
Physical Presence: Disturbance to Seabed	**6.6.2**	Presence of facility and subsea infrastructure modifying marine habitats.	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 installation of pig receivers at the subsea wells resulting in disturbance to seabed.	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.	E	Environment – Slight, short-term impact (<1 year) on species, habitat (but not affecting ecosystem function), physical or biological attributes.	
		Disturbance to seabed from drilling operations.		F	Environment – No lasting effect (<1 month). Localised impact not significant to environmental receptors.	
		Disturbance to seabed from subsea installation of infrastructure (flowlines, umbilicals, flying leads, etc.) and span rectification (concrete mattresses, etc).		E	Environment – Slight, short-term impact (<1 year) on species, habitat (but not affecting ecosystem function), physical or biological attributes.	
		Disturbance to seabed from ROV operation (including localised sediment relocation from sediment mobilisation techniques and marine growth removal).		F	Environment – No lasting effect (<1 month). Localised impact not significant to environmental receptors.	
		Disturbance to seabed from mooring installation.		F	Environment – No lasting effect (<1 month). Localised impact not significant to environmental receptors.	
		Placement and retrieval of seabed transponders and temporary installation aids.		F	Environment – No lasting effect (< 1month). Localised impact not significant to environmental receptors.	
Routine Acoustic Emissions: Generation of Noise during Routine Operations	**6.6.3**	Noise generated within the PAA from: • Angel facility and associated infrastructure • vessel • helicopters • IMMR activities.	Potential localised behavioural impacts to marine fauna around and within the PAA.	F	Environment – No lasting effect (< 1month). Localised impact not significant to environmental receptors.	Broadly Acceptable
Routine Acoustic Emissions: Generation of Noise during Tie-Back Activities	**6.6.4**	Generation of acoustic signals from project vessels (MODU, installation vessels), AHVs and support vessels) during tie-back operations.	Slight, short-term impacts to marine mammals, reptiles and fish, varying from behavioural responses to physiological impact (TTS).	E	Environment – Slight, short-term impact (<1 year) on species, habitat (but not affecting ecosystem function), physical or biological attributes.	Broadly Acceptable
		Generation of acoustic signals from DP systems on project vessels.				
		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.	
Routine and Non-Routine Discharges: Discharge of Hydrocarbons and Chemicals during Subsea Precommissioning,	**6.6.5**	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 pipelines/flowlines and equipment as a result of subsea intervention works.	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.	

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
Operations and Intervention Activities		Discharge of chemicals remaining in subsea pipeworks 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 hydrocarbon 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 flowline and subsea installation fluids to the marine environment.	Potential slight, short-term toxic effects on marine biota.	E	Environment – Slight, short-term impact (<1 year) on species, habitat (but not affecting ecosystems function), physical or biological attributes.	
		Discharge of subsea fluids during well intervention activities.	Potential slight, short-term toxic effects on marine biota.	F	Environment – No lasting effect (<1 month). Localised impact not significant to environmental receptors.	
Routine and Non-Routine Wastewater Discharges: Utility Systems, Drains and Project Vessels	**6.6.6**	Discharge of sewage, grey water and putrescible waste from the facility, MODU and project 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 facility, MODU and project vessels to the marine environment.	Potential localised, short-term decrease in water quality (increased hydrocarbon and chemical concentrations) at the discharge location.			
		Discharge brine and cooling water from MODU and project vessels to the marine environment.	Negligible, localised increase in salinity at the discharge location.			
Routine and Non-Routine Discharges: Produced Water	**6.6.7**	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	**6.6.8**	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.				
		Routine discharge of treated NWBM drill cuttings to the marine environment.				
		Non-routine discharge of wash water from mud pits and vessel tank wash fluids.				
		Routine discharge of well clean-out fluids.				
		Non-routine discharge of well annular fluids.				
		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.				
Routine and Non-Routine Discharges: Cement, Cementing Fluids, Subsea Well Fluids, Unused Bulk Product and Subsea Chemicals	**6.6.9**	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.	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 subsea well fluids (inc. BOP and well construction activity control fluids).				
		Produced/reservoir water disposal.				
		Non-routine discharge of unused bulk products.				
	6.6.10	Operational flaring, fugitive emissions and vessel emissions.		F		Broadly Acceptable

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 and GHG Emissions: Fuel Combustion, Flaring and Fugitives		Exhaust emissions from internal combustion engines and incinerators on project vessels and helicopters.	Potential short-term localised decrease in air quality, limited to the airshed local to the facility.		Environment – No lasting effect (< 1 month). Localised impact not significant to environmental receptors.	
		Contingent flaring (well test non-routine) during well unloading for pressure test and clean up.				
		Contingent venting of gas during drilling (e.g., well kick).				
Routine Light Emissions: Light Emissions from the Facility, MODU and Project Vessels	**6.6.11**	Light emissions from the facility, MODU and project 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

Table 6-2: Environmental impact and risk analysis summary table – unplanned events (including major environmental events)

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 (MEE-01)	**6.7.3**	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 short-term interference with or displacement of other sea users.	A	Environment – Catastrophic, long-term impact (>50 years) on highly valued ecosystems, species, habitats or physical or biological attributes.	1	H	Acceptable if ALARP
Unplanned Hydrocarbon Release: Pipeline and Riser Loss of Containment (MEE-02)	**6.7.4**	Release of hydrocarbons resulting from loss of export pipeline containment (Angel Export Pipeline (AEP), including 1TL inventory).	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 to 50 years) on highly valued ecosystems, species, habitat or physical or biological attributes.	1	M	Acceptable if ALARP
		Release of hydrocarbons resulting from loss of containment of subsea flowlines and infrastructure.		D	Environment – Minor short-term impact (1 to 2 years) on species, habitat (but not affecting ecosystem function), physical or biological attributes.	2	M	
Unplanned Hydrocarbon Release: Loss of Structural Integrity (MEE-03)	**6.7.5**	Surface or subsea release from flowline, pipeline and riser to the marine environment and atmosphere (MEE-02).	Potential significant impacts to the marine environment: • medium-term impacts to sensitive offshore and nearshore areas • disruption to marine fauna, including protected species.	B	Environment – Major, long-term impact (10 to 50 years) on highly valued ecosystems, species, habitat or physical or biological attributes.	1	M	Acceptable if ALARP
		Hydrocarbon release from topsides equipment to the marine environment and atmosphere.		D	Environment – Minor short-term impact (1 to 2 years) on species, habitat (but not affecting ecosystem function), physical or biological attributes.	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	
		Marine environment footprint and associated hydrocarbon and chemical release associated with structural collapse of riser platform.	• potential short-term interference with or displacement of other sea users.	B	Environment – Major, long-term impact (10 to 50 years) on highly valued ecosystems, species, habitat or physical or biological attributes.	0	M	
Unplanned Hydrocarbon Release: Loss of Marine Vessel Separation (MEE-04)	**6.7.6**	Surface or subsea release from flowline, pipeline and riser to the marine environment and atmosphere (MEE-02).	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 to 50 years) on highly valued ecosystems, species, habitat or physical or biological attributes.	1	M	Acceptable if ALARP
		Hydrocarbon release from topsides equipment to the marine environment and atmosphere.		D	Environment – Minor short-term impact (1 to 2 years) on species, habitat (but not affecting ecosystem function), physical or biological attributes.	1	M	
		Marine environment footprint and associated hydrocarbon and chemical release associated with structural collapse of riser platform.		B	Environment – Major, long-term impact (10 to 50 years) on highly valued ecosystems, species, habitat or physical or biological attributes.	0	M	
		Surface release from support vessel diesel tank.		D	Environment – Minor short-term impact (1 to 2 years) on species, habitat (but not affecting ecosystem function), physical or biological attributes.	1	M	
Unplanned Hydrocarbon Release: Loss of Control of Suspended Load from Platform (MEE-05)	**6.7.7**	Surface or subsea release from flowline, pipeline and riser to the marine environment and atmosphere (MEE-02).	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 to 50 years) on highly valued ecosystems, species, habitat or physical or biological attributes.	1	M	Broadly Acceptable
		Hydrocarbon release from topsides equipment to the marine environment and atmosphere (not an MEE).	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 to 2 years) on species, habitat (but not affecting ecosystem function), physical or biological attributes.	1	M	
Unplanned events (accidents/incidents)								
Unplanned Hydrocarbon Release: Loss of Well Integrity during Drilling Operations	**6.8.1**	Loss of hydrocarbons to marine environment due to loss of well containment.	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 to 50 years) on highly valued ecosystems, species, habitat or physical or biological attributes.	1	M	Acceptable if ALARP
Unplanned Hydrocarbon Release: Topsides Loss of Containment	**6.8.2**	Hydrocarbon release from topsides process 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 to 2 years) on species, habitat (but not affecting ecosystem function), physical or biological attributes.	1	M	Acceptable if ALARP

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 Hydrocarbon Release: Vessel Collision	**6.8.3**	Loss of hydrocarbons to marine environment due to a vessel collision (e.g., project vessels or other marine users).	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.	D	Environment – Minor short-term impact (1 to 2 years) on species, habitat (but not affecting ecosystem function), physical or biological attributes.	1	M	Broadly Acceptable
Unplanned Discharge: Release of Hydrocarbons during Bunkering, Transfer, Storage and Use	**6.8.4**	Accidental discharge of marine diesel to the marine environment during transfer, storage or use.	Potential slight short-term impacts to marine water quality with no lasting effect.	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: Deck and Subsea Spills	**6.8.5**	Accidental discharge of chemicals from MODU and project vessels deck activities and equipment, 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.	F	Environment – No lasting effect (<1 month). Localised impact not significant to environmental receptors.	2	L	Acceptable if ALARP
Unplanned Discharge: Drilling/Project Fluids	**6.8.6**	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 routine MODU operations.	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	**6.8.7**	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 – Slight, short-term impact (<1 year) on species, habitat (but not affecting ecosystem function), physical or biological attributes.	2	M	Broadly Acceptable
Physical Presence: Seabed Disturbance from Dropped Objects or Loss of Station Keeping Leading to Anchor Drag	**6.8.8**	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 to 2 years) on species, habitat (but not affecting ecosystem function), physical or biological attributes.	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 to 2 years) on species, habitat (but not affecting ecosystem function), physical or biological attributes.	1		
Physical Presence: Interactions with Marine Fauna	**6.8.9**	Physical presence of 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 of bird proofing/exclusion devices resulting injury to seabirds.	Potential injury of seabird (single animal), including protected species.	F	Environment – No lasting effect (<1 month). Localised impact not significant to environmental receptors.	1	L	Broadly Acceptable
Physical Presence: Introduction of Invasive Marine Species	**6.8.10**	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 Petroleum Activities Program in relation to other relevant petroleum activities that could realistically result in overlapping temporal and spatial extents. Other facilities located close to the PAA consist of NRC, which lies within the western end of the PAA where the export pipeline terminates, and Okha, which is approximately 5 km from the PAA. However, given the concentration of sources of environmental risks and impacts from the Petroleum Activities Program 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.

EPOs, EPSs and MC for the Petroleum Activities Program have been identified to allow Woodside's environmental performance to be measured and through the implementation of this EP, to determine whether the EPOs and EPSs have been met.

The EPOs, EPSs and MC specified are consistent with legislative requirements and Woodside's standards and procedures. They have been developed based on the legislation, codes and standards, good industry practices and professional judgement outlined in **Sections 2.6.1.1.4** and **2.8**, as part of the acceptability and ALARP justification process.

The EPOs, EPSs and MC are presented throughout this section and in **Appendix D**. A breach of these EPOs or EPSs constitutes a 'Recordable Incident' under the Environment Regulations (refer to **Section 7.11.4**).

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*

Impacts and Risks Evaluation Summary ***Summary of ENVID outcomes***														
Source of Risk ***Regulation 21(1)***	***Environmental Value Potentially Impacted*** ***Regulations 21(2)(3)***							***Evaluation*** ***Section 2***						
	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 risk/ impact														

Description of Source of Risk or Impact
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. Regulation 21(5)(6). *Description of potential impacts to environmental values aligned to Woodside Risk Matrix consequence descriptors.*

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[34]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
ALARP/Hierarchy of Control Tools Used – Section 2.6.2				
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 No. provided.*
Major Environmental Events				
*MEEs are subject to additional analysis and evaluation as outlined in **Sections 2.7** and **6.7.2**. 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.*				

34 Qualitative measure

Demonstration of ALARP
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[35]* *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(5)(c).*	***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).*

35 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 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.

6.5.1 Shallow/Near-shore Activities

The Petroleum Activities Program is located in water depths of approximately between 71 and 130 m and at a distance approximately 94 km from nearest landfall (Dampier Archipelago), consequently risks/impacts associated with shallow activities such as anchoring, and vessel grounding were assessed as not credible. It is noted that the Glomar Shoals KEF overlaps the PAA; however, the Glomar Shoals themselves (<50 m depth) lie approximately 15 km east of the PAA and will not credibly be impacted by anchoring and vessel grounding.

6.6 Planned Activities

6.6.1 Physical Presence: Interaction with other Marine Users and Values

Context		
Facility Layout and Description – **Section 3.4** Project Vessels – **Section 3.5** Subsea IMMR Activities – **Section 3.4.15** Tie-back Activities – **Section 3.5**	Socio-economic– **Section 4.9** Cultural Values and Heritage – **Section 4.9.1**	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***
Presence of facility excluding and/or displacing other users from Petroleum Safety Zone and routine/ IMMR activities within the PAA respectively							✓	A	F	-	-	LC S GP PJ	Broadly Acceptable	**EPO 1**
Presence of MODU, installation vessels and other support vessels excluding and/or displacing other users during tie-back activities							✓							
Presence of subsea infrastructure interfering with or displacing third party vessels (commercial fishing)							✓							

Description of Source of Impact

Operations

The facility was commissioned in 2008 and is marked on nautical charts. The facility 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 facility, which increases safety for both vessels and the facility. Implementation of the PSZ excludes other users from a small area (approximately 0.79 km^2). The riser platform is highly visible under most conditions and is lit to meet operational requirements and navigational codes and regulations, and the nature of the facility (large steel structure) ensures a clear radar return to alert ships fitted with anti-collision radars.

Routine vessel activities associated with operational activities are mostly concentrated within the PSZ (e.g., activities performed by platform support vessels at the Angel facility). Subsea support vessels may undertake activities (e.g., IMMR activities, removing 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.

There is a series of subsea infrastructure associated with operations that may have interactions with other marine users. The AHO has been notified of the location of all existing subsea infrastructure, including all infrastructure maintained for decommissioning and not normally producing, for marking on nautical charts. Water depths of the existing subsea infrastructure range between 70 and 130 m.

Tie-back activities will include the addition of new infrastructure within the PAA. The proposed LDA-02 wellhead, subsea Xmas tree and other subsea infrastructure will remain for the duration of field life. The footprint of new infrastructure remains within the footprint of the existing Angel facility and will not constitute a significant increase in the physical presence of the facility.

The AHO will be notified of the LDA-02 well and associated subsea infrastructure locations.

Tie-back Activities

The Lambert West tie-back consists of one well, LDA-02 tied back to existing Lambert Deep infrastructure, and the installation of associated subsea infrastructure (~300 to 500 m flexible jumper and a subsea distribution unit).

A MODU is planned be present for approximately 50 to 60 days, including mobilisation, demobilisation and contingency activities. When underway, activities will be 24 hours per day, seven days per week. The MODU will have a 500 m diameter SEZ around it within the PAA for the duration of the drilling activity. An offshore support vessel (OSV) would be present in proximity to the MODU, which would also be supported periodically by another OSV to facility resupply.

Installation vessels will be used to install, pre-commission and cold commission the flexible jumper, subsea distribution unit, and other subsea infrastructure following completion of drilling of the new well, as described in **Section 3.5**. This is expected to take approximately four 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 Lambert West Operational Area. A smaller vessel (IMMR type) may be utilised to undertake components of the installation activity before or after primary installation has been completed.

Drilling and installation activities are expected to be temporally discrete (i.e., conducted at different times), however they may overlap. If these activities coincide, a vessel (IMMR or PIV type) would be active in the tie-back 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.

Once Lambert West infrastructure is operational, potential interactions with other marine users will be managed as per all other subsea infrastructure associated with Angel operations.

Impact Assessment

Exclusion and Displacement of Other Users

Interaction with other marine users due to the physical presence of in the Petroleum Activities Program may result in localised changes to the functions, interests or activities of other users. The duration of change will be for the period of the Petroleum Activities Program.

Commercial Fishing

The PAA overlaps five Commonwealth and 13 State managed commercial fisheries management areas. However, historical fisheries data indicate that only one Commonwealth fishery and four State managed fisheries have the potential for interaction with the Petroleum Activities Program (**Section 4.9.2**).

The Commonwealth managed North West Slope Trawl Fishery, and State-managed Pilbara Line Fishery, Pilbara Crab Managed Fishery, Pilbara Fish Trawl (Interim) Managed Fishery and Pilbara Trap Managed Fishery are considered to have limited potential for interaction with project activities in the PAA (**Table 4-23**).

The PAA is located within 60 NM CAES block 19160, and 10 NM CAES blocks 193160, 193161, 193162, 193163, 192162 and 192163. The Pilbara Fish Trawl (Interim) Managed Fishery reported up to 4 vessels active in the overlapping 10 nm CAES blocks 192163, 193161, 193162, 193163 across the 2017 to 2022 seasons respectively. The Pilbara Line, Trap and Crab Managed Fisheries have remained consistently active in the 60 nm CAES block that overlaps the PAA between 2017 to 2022; however, FishCube data for these fisheries is not reported at the 10 NM scale therefore it is uncertain if the effort reported in the 60 nm CAES blocks overlaps with the PAA. FishCube data indicates the effort is concentrated east of the PAA, around the Southern Pilbara Islands. Given the overlap of the PAA with the fishing block and the annual fishing effort, interactions with these Pilbara Line, Trap and Crab Managed Fisheries and Pilbara Fish Trawl (Interim) Managed Fishery may occur.

Fisheries Status Reports indicate that the North West Slope Trawl Fishery has remained active in the PAA over the last five years, and subsequently interactions with this fishery are considered possible.

Continued Presence of the Angel Facility and Subsea Infrastructure

The potential impact to commercial fisheries in the PAA is limited to the navigational hazard of the facility and localised displacement/avoidance by commercial fishing vessels within the immediate vicinity. As such, the potential impact is considered to be localised with no lasting effect.

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. The Pilbara Trap and Fish Trawl Managed Fisheries and the North West Slope Trawl Fishery employs several gear types, including trawling and are active in the 10 NM blocks that overlap the PAA.

However, **Section 4.9.2** indicated that trawl fisheries are not active in the PAA and therefore, are not at risk of interference. The magnitude of potential impacts to commercial fisheries from activities associated with the ongoing presence of the Angel facility and subsea infrastructure are assessed as having no lasting effect, given the historically lower fishing effort in the region as a result of relatively high density of oil and gas infrastructure in the North West Shelf region.

Tie-back Activities

During tie-back activities, vessels will be temporarily present in the PAA 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 PAA. Use will particularly be restricted within the 500 m safety exclusion zone (temporary) that will be established around the MODU and installation vessel when undertaking drilling and installation activities, which represents a relatively small area when compared to the extent of the individual fishery boundaries that overlap. The MODU is planned to only be present for approximately 50-60 days, and the installation vessels for up to four weeks. Potential impacts to commercial fisheries include damage to fishing equipment and physical displacement from fishing grounds.

Given the distance offshore, the PAA is not 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 tie-back activities in the PAA are not expected to impact commercial fishing activities or the economic viability of the fisheries.

If the subsea installation and drilling activities coincide, a SIMOPS plan will be in place to manage vessel interaction in the field.

Tourism and Recreation

Tourism and recreation activity in the PAA is expected to be infrequent. Recreational and charter fishing from vessels are the only tourism and recreation activities identified as potentially occurring in the PAA. These are most likely to occur around the Glomar Shoals KEF (approximately 15 km east of the PAA) and Rankin Bank (approximately 59 km west of the PAA at the closest point).

Recreational and charter fishing from vessels is largely undertaken using lines. Given the distance from boating facilities, lack of natural attractions and water depth of the PAA, very little recreational or charter fishing is expected to occur. As such, impacts to recreational and charter fishing are expected to be localised and of no lasting effect.

Shipping

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. While no shipping fairways overlap the PAA, several fairways are located within the vicinity. The closest shipping fairway is approximately 19 km east of the PAA. The use of shipping fairways is considered to be good seafaring practice, with Australian Ship Reporting System (AUSREP) data from AMSA indicating cargo ships and tankers routinely navigate within the established fairways.

As the facility has been operational since 2008, is marked on nautical charts and is surrounded by a 500 m PSZ, the likelihood of interactions between commercial vessels and the facility is inherently low. Similarly, the MODU and installation vessel utilised for tie-back activities will also be surrounded by a 500 m SEZ.

The presence of the facility and project vessels will not result in impacts to commercial shipping beyond a localised exclusion of shipping traffic from the PSZ and SEZs, and the limited potential for temporary displacement of commercial shipping from vessels undertaking activities in the PAA. This is considered to be a localised impact, and of no lasting effect.

Oil and Gas

The nearest facility to Angel is the Okha FPSO operated by Woodside; impacts from the Petroleum Activities Program to Okha do not affect third parties. The nearest facility not operated by Woodside is the Santos-operated Reindeer platform, which lies approximately 50 km south-east of the PAA. Given the distance between the PAA and petroleum activities undertaken by other operators, no impacts are expected to other operators.

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. Complying with Marine Orders 21, 27 and 30 reduces the likelihood of interaction of vessels with the facility.	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 safety exclusion zone around MODU and 500 m exclusion zone around the 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 installation vessel reduces the likelihood of interaction with other marine users.	Benefits outweigh cost/sacrifice. Control is also standard practice.	Yes **C 1.3**
Activity support vessel on continuous standby (as per requirements of the Safety Case) during drilling activities to assist in third party vessel interactions (including warning to vessels approaching the MODU 500 m safety exclusion zone) to prevent unplanned interaction and assist in	F: Yes CS: Additional cost. Standard practice.	In accordance with the requirements of the Safety Case.	Benefits outweigh cost/sacrifice.	Yes **C 1.4**

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
emergencies as required.				
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 1.5**
Marine Charterers Instructions implemented which define the role of activity support vessels in maintaining safety exclusion zones, preventing unplanned third-party vessel interactions, monitoring the effectiveness of navigation controls (e.g., signals), and warning third party vessels of navigation hazards.	F: Yes. CS: Minimal cost. Standard practice.	Marine Charterers Instructions detail the role of activity support vessels, thereby reducing the likelihood of interference with other marine users.	Benefits outweigh cost/sacrifice.	Yes **C 1.6**
Good Practice				
Location of permanent Angel infrastructure shown on AHO marine charts reducing the likelihood of unplanned interactions with Angel infrastructure.	F: Yes. CS: Minimal cost. Standard practice.	Include location of permanent Angel infrastructure on maritime charts thereby reducing the likelihood of unplanned interactions with Angel infrastructure.	Benefits outweigh cost/sacrifice.	Yes **C 1.7**
Consultation undertaken in support of the Petroleum Activities Program, to ensure marine users are informed and aware, thereby reducing the likelihood of unplanned interactions with Angel infrastructure.	F: Yes. CS: Minimal cost. Standard practice.	Consultation ensures marine users are informed and aware, thereby reducing the risk of unplanned interactions with Angel infrastructure.	Benefits outweigh cost/sacrifice.	Yes **C 1.8**
Notify AHO of activities no less than four working weeks prior to scheduled activity commencement date, where vessels will be in the Operational Area, but outside of the Petroleum Safety Zone >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**

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Notify AMSA Joint Rescue Coordination Centre (JRCC) of activities where vessels will be in the field >3 weeks, 24 to 48 hrs before activities.	F: Yes CS: Minimal cost. Standard practice.	Communicating the Petroleum Activities Program 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 of activities prior to commencement and upon completion of activities.	F: Yes. CS: Minimal cost. Standard practice.	Communication of the Petroleum Activities Program 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**
Develop a SIMOPS Plan to manage rig interactions with other facilities/vessels, 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. Develop SIMOPS Management Plan where multiple	F: Yes. CS: Minimal cost. Standard practice.	SIMOPS Management Plans between Woodside operated vessels in the PAA will reduce the likelihood of collision.	Benefits outweigh cost/sacrifice.	Yes **C 1.12**

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
campaigns occur within the PAA.				
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 Petroleum Activities Program 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				
Angel'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.	Angel'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 **C 1.13**
Over-trawl protection on subsea infrastructure.	F: Yes. Over-trawl protection on subsea infrastructure could be fitted to Angel subsea infrastructure. CS: Significant additional cost	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

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
	associated with designing and installing trawl protection on subsea infrastructure.			

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. 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, physical presence of the Petroleum Activities Program represents a negligible impact that is unlikely to result in a potential impact greater than an isolated social impact to commercial fishing, recreational fishing and shipping, and other oil and gas titleholders. Further opportunities to reduce the impacts have been investigated above. The adopted controls are considered good oil-field practice/industry best practice and meet requirements of Australian Marine Orders, and expectations of AMSA and AHO provided in consultation with relevant persons.

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 physical presence of the Angel facility, subsea infrastructure, MODU and project vessels to a level that is broadly acceptable.

EPOs, EPSs and MC for Angel Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 1a Prevent adverse interactions between operational vessels/ facility/subsea infrastructure and other marine users during the Petroleum Activities Program.	**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.	**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 Angel Facility Operations			
	C 1.2 Implementation of a 500 m Petroleum Safety Zone around riser platform.	**PS 1.2** Petroleum Safety Zone maintained and monitored for incursions.	**MC 1.2.1** Records of adverse interactions in 500 m Petroleum Safety Zone with other marine users are recorded.
	C 1.7 Permanent infrastructure shown on AHO maritime charts.	**PS 1.7** Woodside to notify AHO of location of permanent infrastructure.	**MC 1.7.1** Records demonstrate that permanent Angel infrastructure is shown on AHO maritime charts.
	C 1.8 Undertaking consultation program to advise relevant persons of the Petroleum Activities Program and provide opportunity to raise objections or claims.	**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, where vessels will be in the Operational Area, but outside of the Petroleum Safety Zone >3 weeks.	**PS 1.9** Woodside to notify AHO of activities where vessels will be in the Operational Area, but outside of the Petroleum Safety Zone >3 weeks.	**MC 1.9.1** Records demonstrate that AHO notifications complete.
	C 1.13 Angel'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 1.13** Integrity managed in accordance with Performance Standard(s) and Safety Critical Element Management Procedure (**Section 7.2.6**) 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 1.13.1** Records demonstrate implementation of SCE Performance Standard(s) and Safety Critical Element Management Procedure.

EPOs, EPSs and MC for Drilling and Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 1b Prevent adverse interactions between MODU/ vessels/ subsea infrastructure and other marine users during the Petroleum Activities Program.	**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.	**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).
	C 1.3 Establishment of a 500 m safety exclusion zone around MODU and 500 m exclusion zone around the installation vessel and communicated to marine users.	**PS 1.3** No entry of unauthorised vessels within the 500 m safety exclusion zone.	**MC 1.3.1** Daily Operations Reports and Incident records demonstrate breaches by unauthorised vessels within the safety exclusion zone are recorded.
			MC 1.3.2 Consultation records demonstrate that AHO has been notified prior to commencement of the activity.
	C 1.4 Activity support vessel on continuous standby (as per requirements of the Safety Case) during drilling activities to assist in third party vessel interactions (including warning to vessels approaching the MODU 500 m safety exclusion zone) to prevent unplanned interaction and assist in emergencies as required.	**PS 1.4** Activity support vessel will be on standby during activities to assist in third party vessel interactions.	**MC 1.4.1** Daily Operations Reports demonstrate an activity support vessel was on standby during activities.
	C 1.5 MODU mooring systems (chains/wires and anchors) will be removed.	**PS 1.5** Mooring systems (chains/wires and anchors) will be removed.	**MC 1.5.1** Records demonstrate mooring systems (chains/wires and anchors) were removed.

EPOs, EPSs and MC for Drilling and Tie-back Activities			
	C 1.6 Marine Charterers Instructions implemented which define the role of activity support vessels in maintaining safety exclusion zones, preventing unplanned third-party vessel interactions, monitoring the effectiveness of navigation controls (e.g., signals), and warning third party vessels of navigation hazards.	**PS 1.6** Marine Charters Instruction implemented by activity support vessels to prevent adverse interactions with other marine users.	**MC 1.6.1** Records demonstrate provision and implementation of Marine Charters Instructions by activity vessels.
	C 1.8 Undertaking consultation program to advise relevant persons of the Petroleum Activities Program and provide opportunity to raise objections or claims.	**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 where vessels will be in the Operational Area, but outside of the Petroleum Safety Zone >3 weeks. no less than four working weeks prior to scheduled activity commencement date.	**PS 1.9** Woodside to notify AHO of activities where vessels will be in the Operational Area, but outside of the Petroleum Safety Zone >3 weeks.	**MC 1.9.1** Consultation records demonstrate that AHO notifications complete.
	C 1.10 Notify AMSA Joint Rescue Coordination Centre (JRCC), of activities where vessels will be in the Operational Area, but outside of the Petroleum Safety Zone >3 weeks, 24 to 48 hrs before activities commence.	**PS 1.10** AMSA's JRCC is notified 24 to 48 hrs before mobilisation, for activities in the Operational Area, but outside of the Petroleum Safety Zone >3 weeks, for awareness should emergency response be required.	**MC 1.10.1** Consultation records demonstrate notification provided to AMSA's JRCC within required timeframes, before mobilisation.
	C 1.11 Notify relevant persons of activities prior to commencement and upon completion of activities.	**PS 1.11** AFMA, DAFF – Fisheries, DPIRD, CFA, WAFIC, Recfishwest, Searcher Seismic, and Wanparta will be notified no less than 10 days prior to scheduled activity commencement date and upon completion of activities.	**MC 1.11.1** Consultation records demonstrate that listed relevant persons have been notified prior to commencement and following completion of activities.

EPOs, EPSs and MC for Drilling and Tie-back Activities			
	C 1.12 SIMOPS Plan in place when MODU working in vicinity of other facilities/vessels, 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 1.12** MODU and applicable vessels compliant with SIMOPS Plan.	**MC 1.12.1** Records demonstrate implementation of SIMOPS Management Plan when MODU working in vicinity of other facilities/vessels, i.e., during Xmas tree installation.

6.6.2 Physical Presence: Disturbance to the Seabed

Context		
Facility Layout and Description – **Section 3.4** Project Vessels – **Section 3.5** Subsea IMMR Activities – **Section 3.4.15** Tie-back Activities – **Section 3.5** Maintaining for Decommissioning – **Section 7.3.1**	Physical Environment – **Section 4.4** Biological Environment – **Section 4.5**	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***
Presence of Angel facility and subsea infrastructure		✓	✓		✓			A	E	-	-	LCS GP PJ	Broadly Acceptable	**EPO 2** **EPO 3**
Subsea operations, inspection, monitoring maintenance and repair activities including installation of pig receivers/launchers at the subsea wells		✓	✓		✓				E					
Presence of redundant infrastructure remaining infield until Facility EOFL		✓	✓		✓				E					
Disturbance to seabed from drilling operations		✓	✓		✓				F					
Disturbance to seabed from subsea installation of infrastructure (flowlines, umbilicals, flying leads, subsea distribution unit, etc) and span rectification (concrete mattresses, etc)		✓	✓		✓				E					

Disturbance to seabed from ROV operation (including localised sediment relocation from sediment mobilisation techniques and marine growth removal)		✓	✓		✓				F					
Disturbance to seabed from mooring installation		✓	✓		✓				F					
Placement and retrieval of seabed transponders and temporary installation aids		✓	✓		✓				F					

Description of Source of Impact

Seabed disturbance associated with the Petroleum Activities Program can occur during operations and associated activities including:

- physical presence of the facility and subsea infrastructure (operational and redundant)
- drilling and tie-back activities associated with LDA-02
- scour, spans, and flowline movement inherent in design
- subsea IMMR activities.

Operations

Subsea infrastructure has been installed throughout the PAA (**Section 3.4**) and impacts to the seabed during installation of this equipment has been subject to separate EPs. The seabed disturbance from installation of infrastructure associated with the proposed LDA-02 well is outlined in the tie-back activities section below.

The facility and associated subsea infrastructure provides hard substrate habitat; extending from the sea surface through the water column to the seabed (e.g., jacket and risers), as well as along the seabed (e.g., pipelines, flowlines, manifolds, etc).

The presence of subsea infrastructure may result in localised scouring around the infrastructure due to currents, subsurface waves and seabed sediment fluid dynamics. Scour around subsea infrastructure may necessitate IMMR activities as part of integrity management practices.

Flowline movement may occur as per design and within integrity margins along the flowline corridor. Normal flowline operational movement occurs due to factors such as unexpected metocean conditions. Lateral movement can occur within the flowline corridor. Lateral movement which is larger than expected may necessitate IMMR activities. Flowline lateral buckling and walking are no longer expected to occur due to the cessation of gas production from the Angel wells.

Refer to MEE-02 Subsea equipment loss of containment (**Section 6.7.4**) which includes controls to limit scour and flowline movement within integrity requirements. To maintain the integrity of subsea infrastructure, Woodside may be required to undertake routine subsea IMMR activities, as described in **Section 3.4.15**. Activities that constitute IMMR may impact the benthic environment in the vicinity of the activity. IMMR activities identified as impacting the benthic environment include, but are not limited to:

- inspections – localised sediment resuspension by ROV
- marine growth removal – localised resuspension of sediment; removal of marine biota from subsea infrastructure and the Angel 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
- jumper and umbilical replacement – minor, localised modification of benthic habitat in the vicinity of the jumper/umbilical
- spool repair/replacement – minor, localised modification of benthic habitat in the vicinity of the spool
- temporary placement of tools on the seabed, e.g., 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 100 m^2 impacted.

Tie-back Activities

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 LDA-02 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 not considered in this section; refer to **Section 6.6.8** for an assessment of drill cuttings and drilling fluids and **Section 6.6.9** for an assessment of cement and cementing fluids.

Mooring Installation and Anchor Hold Testing

The LDA-02 well may be drilled using a moored or hybrid MODU. Seabed disturbance will result from the MODU anchor mooring system, including placement of anchors and chain/wire on the seabed, potential dragging during tensioning, and recovery of anchors. Mooring may require an 8 --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 km^2 (13,000 m^2), 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 Petroleum Activities Program, 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 m^2
- 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 3.5.3**. The total footprint of the LDA-02 well is 24 m^2, with additional subsea infrastructure including the 500 m jumper, subsea distribution unit and flying leads.

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 jumper 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 jumper 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 by the use of the vessel crane and ROV. The dimensions for each concrete mattress are expected to be 6 m by 3 m by 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 jumper.

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 Lambert West UTA if required, to mitigate scouring.

Stabilisation

Stabilisation is a post lay activity to ensure light items, such as HFL, EFL and jumpers, 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 jumpers at a predetermined distance apart. Sand bags 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 Lambert West flexible jumper subject to detailed design.

Crossings

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

Wet Storage of Equipment

Temporary wet storage of installation aids may be required intermittently during tie-back activities. Installation aids will be recovered at the completion of tie-back activities by ROV and project vessels (**Section 3.5.3.9**).

ROV Operations

The use of an ROV during drilling and subsea installation activities as described in **Section 3.6.2** 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, the ROV may be used to relocate small amounts of sediment material (**Section 3.5.5.10**) 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 wells within the PAA. 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 LDA-02 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, being:

- 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 Angel jacket to maintain structural integrity on an as-required basis would cause localised temporary decrease in water quality and suspended sediment from water jetting activities.

Benthic Habitats

The seabed of the PAA is characterised by soft sediments, with sparse epifauna (**Section 4.5**). 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, no areas of hard substrate characteristic of this KEF have been identified within the PAA (Jacobs, 2014).

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 may disturb a small

area (typically <100 m^2) of soft sediment habitat. Scour and flowline movement may result in localised impacts to soft sediment habitats, typically on the scales of metres to tens of metres. To prevent or remediate scour or flowline movement, soft sediment habitat is replaced by hard substrate (e.g., concrete mattresses, rocks, etc), which is generally uncommon in the middle and outer NWS Province. Over time, this hard substrate is expected to be colonised by sessile benthic biota (e.g., sponges, gorgonians, etc), which may support higher biodiversity than surrounding soft sediment habitats.

Marine life such as deepwater benthic communities epifauna and infauna (living on and in the sediment dominated habitat), may be impacted from the placement of project infrastructure (i.e., LDA-02 wellhead, flowline and subsea distribution unit), 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).

If required, mooring installation activities 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 km^2) 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).

Seabed disturbance will be limited to the wellhead (100 m radial distance), subsea infrastructure and anchoring physical footprint (estimated at up to 0.013 km^2); a small proportion of the benthic habitat and associated communities of the PAA will be affected.

The epifauna and infauna benthic communities associated with the predominantly soft sediment habitats of the PAA are likely to be well represented elsewhere in the vicinity, with impacts restricted to a highly localised proportion of benthic communities. No threatened or migratory species, or ecological communities (as defined under the EPBC Act), were identified in the benthic communities during studies completed in the region (Jacobs, 2014). Potential impacts to epifauna and infauna are likely to be highly localised, and temporary in nature.

ROV activities 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.

The use of water jetting to remove marine growth on wellheads and subsea infrastructure will result in temporary suspension of organic matter and localised increase in turbidity. Water jetting will be limited to what is necessary to clean infrastructure prior to intervention or other necessary activity.

The contingent cutting and removal of a wellhead, including the laydown of mud mats, may affect a relatively small footprint of the seabed and lead to localised, temporary suspension of sediments. As such, no significant impacts to benthic fauna are expected should wellhead removal be required.

In the unlikely event that the wellhead cannot be removed following abandonment, over time the cement surrounding the wellhead will likely become buried in sediment as a result of prevailing ocean currents. The steel wellhead structure will also corrode over time and marine fouling is expected to accumulate, whereby a marine life structure may remain above the seafloor. If the wellhead remains in-situ, it is expected to have a localised impact not significant to environment receptors. No further impacts to benthic habitats are likely.

Artificial Habitat

The presence of the facility and subsea infrastructure provides hard substrate for the settlement of marine organisms; the availability of hard substrate is often a limiting factor in benthic communities. As such, the presence of the facility and subsea infrastructure has led to the development of ecological communities which would not have existed otherwise. For example, pipeline infrastructure has been shown to support more diverse fish assemblages and benthic biota (McLean et al., 2017; Bond, 2018). These communities are relatively diverse compared to the open water and soft sediment habitats in the broader PAA.

The provision of artificial habitat associated with the facility and subsea infrastructure has either no adverse environmental impact or a low level of positive environmental impact through increasing biological diversity.

Values and Sensitivities

Glomar Shoals KEF

Benthic habitats of the Glomar Shoals (the KEF that overlaps with the eastern extent of the PAA) are characterised by sand/silt substrate and low epibenthic cover (approximately 53% total cover), with soft corals and sponges the most abundant fauna (AIMS, 2014a). While the PAA overlaps the Glomar Shoals KEF (approximately 0.89 km^2 of the Glomar Shoals KEF lies within the Angel Operational Area), the Glomar Shoals KEF feature is over 15 km from the PAA and 17 km from the Angel facility). The majority of suspended sediments from drilling, subsea installation and IMMR activities are expected to remain localised adjacent to infrastructure (i.e., potentially depositing in a small area

of the Glomar Shoals KEF but not impact Glomar Shoals itself). The NWS Province experiences naturally high episodic sediment resuspension due to events such as tidal movements and cyclones, and the biota in the region are adapted to such conditions. Thus, impacts to Glomar Shoals KEF due to seabed disturbance are not expected to occur.

Cultural Heritage

As described in **Section 4.9.1**, the PAA overlaps the Ancient Coastline at 125 m depth contour KEF and therefore there is 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, further archaeological studies will be undertaken prior to the activity commencing to understand any potential cultural features.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Legislation, Codes and Standards				
A ROV as left survey is undertaken at the end of activity, 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 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**

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
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 additional complexities and HSE risk that can be avoided if removed during EOFL decommissioning.	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 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.	No
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 (**C 3.3** above).	F: Yes. CS: Additional cost. Standard practice.	In accordance with OPGGS Act Section 572.	Benefits outweigh cost/ sacrifice.	Yes **C 2.4**
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 2.5**
LDA-02 well site location as planned within the Well Location and Site Appraisal Data Sheet (WLSADS).	F: Yes. CS: Minimal cost. Standard practice	Ensures risks appropriately addressed for seabed disturbance.	Benefits outweigh cost/sacrifice.	Yes **C 2.6**

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
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. Assessment of seabed topography reduces the likelihood of anchor drag leading to seabed disturbance.	Benefits outweigh cost/sacrifice.	Yes **C 2.7**
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 2.8**
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 2.9**

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Review of existing survey data by a suitably qualified maritime archaeologist to inform areas for laydown and/or installation of equipment to avoid or where not possible, minimise physical impacts to cultural heritage areas or prospective areas.	F: Yes. CS: Minimal costs associated with review of data and avoidance or minimisation options.	Review of data by suitably qualified maritime archaeologist will inform potential exclusion or avoidance areas for seabed disturbance. Implementing this process will protect and minimise any physical impacts to underwater cultural heritage. Additionally, this process is not inconsistent with the draft guidelines for working in the near and offshore environment to protect Underwater Cultural Heritage (DCCEEW, 2023).	Benefits outweigh cost/ sacrifice.	Yes **C 3.1**

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
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 7.6**.	F: Yes. CS: Cost of implementation.	Allows management of Unexpected Finds in accordance with legislative requirements, (including Underwater *Cultural Heritage Guidance for Offshore Developments and the DRAFT Guidelines to Protect Underwater Cultural Heritage under the UCH Act*, expert advice and community expectations.	Benefits outweigh cost/ sacrifice.	Yes **C 3.2**
Report any potential underwater cultural heritage finds to relevant stakeholders and authorities in accordance with the Unexpected Finds Procedure, *Underwater Cultural Heritage Act 2018* and the *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (ATSIHP Act).	F: Yes. CS: Minimal costs associated with reporting process.	Meets legislative requirements and community expectations.	Benefit outweighs cost/ sacrifice.	Yes **C 3.3**
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 (**C 3.2**).	F: Yes. CS: Minimal cost.	Ensures workforce are suitably aware of legal and process requirements for managing cultural features and heritage values.	Benefits outweigh cost/ sacrifice.	Yes **C 3.4**
Professional Judgement – Eliminate				
Vessels used for IMMR 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 2.10**

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 2.11** 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 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 represents a slight short-term impact that is unlikely to result in a potential impact greater than slight, short-term impact to benthic habitats. 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 tie-back activities and subsea IMMR activities to a level that is broadly acceptable.				

EPOs, EPSs and MC for Angel Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 2 Limit adverse impacts to seabed to Slight (E)[36] beyond the physical footprint of the facility infrastructure	**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.

36 Defined as 'slight, short-term impact (<1 year) on species, habitat (but not affecting ecosystem function), physical or biological attribute' as in **Table 2-3**, **Section 2.6.3.**

EPOs, EPSs and MC for Angel Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
during the Petroleum Activities Program.	**C 2.2** Location of subsea infrastructure, brought into the Operational Area 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 2.10 Vessels used for IMMR will not anchor under routine operations.	**PS 2.10** Vessels used for IMMR activities will not anchor under routine operations.	**MC 2.10.1** Records demonstrate no anchoring during IMMR activities.
	C 2.11 Monitoring and maintenance of subsea infrastructure to manage scour and flowline movement within integrity envelope.	**PS 2.11** Integrity will be managed in accordance with SCE Management Procedure (**Section 7.2.6**) 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.	**C 2.11.1** Records demonstrate implementation of SCE technical Performance Standard(s) and SCE Management Procedure.
EPO 3 No adverse impact to Underwater Cultural Heritage[37] without a permit[38].	**C 3.1** Review of existing survey data by a suitably qualified maritime archaeologist to inform areas for laydown and/or installation of equipment to avoid or where not possible, minimise physical impacts to cultural heritage areas or prospective areas.	**PS 3.1** Existing survey data reviewed by a suitably qualified maritime archaeologist to inform areas for laydown and/or installation of equipment.	**MC 3.1** Records demonstrate review of existing archaeological data completed prior to commencement of activities.

37 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

38 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 Angel Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	C 3.2 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 7.6**.	**PS 3.2** In the event that an Underwater Cultural Heritage site or feature is identified, implement an Unexpected Finds Procedure set out in **Section 7.6**.	**MC 3.2.1** No non-compliance with the Unexpected Finds Procedure.
	C 3.3 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 3.3.1** Report any finds of potential UCH in accordance with the Unexpected Finds Procedure (**Section 7.6**) including to the Australasian Underwater Cultural Heritage Database.	**MC 3.3.1** Records of potential UCH finds reported to relevant authorities and stakeholders.
	C 3.4 Relevant vessel crew 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 (**C 3.2**).	**PS 3.4.1** Relevant vessel crew (including ROV operators) are made aware of the requirements of the Unexpected Finds Procedure through an induction.	**MC 3.4.1** Records demonstrate vessel crew are made aware of potential to encounter UCH.

EPOs, EPSs and MC for Drilling and Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 2 Limit adverse impacts to seabed to Slight (E)[39] beyond the physical footprint of the facility infrastructure during the Petroleum Activities Program.	**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 reports confirm temporary equipment is removed.
	C 2.2 Location of subsea infrastructure, 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 Reasonable attempt(s) at removal of wellhead will be undertaken in the event of a respud, and if unable to be removed, infrastructure is monitored and maintained (**C 3.4** above).	**PS 2.4** Removal of wellhead attempted following respud of the well.	**MC 2.4.1** Records demonstrate routine removal of the wellhead was attempted.

39 Defined as 'slight, short-term impact (<1 year) on species, habitat (but not affecting ecosystem function), physical or biological attribute' as in **Table 2-3**, **Section 2.6.3**.

EPOs, EPSs and MC for Drilling and Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	C 2.5 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 PAA.	**MC 2.5.1** As built survey reports verify location installation of equipment within the design footprint within the PAA.
	C 2.6 Well site locations as planned within the Well Location and Site Appraisal Data Sheet (WLSADS).	**PS 2.6** All wells will be drilled as planned within the WLSADS.	**MS 2.6.1** Records demonstrate wells drilled as per the WLSADS.
	C 2.7 Project specific Basis of Well Design, which includes an assessment of seabed sensitivity.	**PS 2.7** MODU well site locations consider seabed sensitivities.	**MC 2.7.1** Approved Basis of Well Design includes the assessment of seabed sensitivities.
	C 2.8 Project specific MODU Mooring Design Analysis.	**PS 2.8** Seabed disturbance from MODU mooring limited to that required to ensure adequate MODU station holding capacity.	**MC 2.8.1** Records demonstrate Mooring Design Analysis approved and implemented during anchor deployment.
	C 2.9 Positioning technology used to place seabed infrastructure within the design footprint to reduce seabed disturbance.	**PS 2.9.1** Infrastructure will be positioned in the planned location where impacts have been assessed.	**MC 2.9.1** As-built survey reports verify installation of equipment within acceptable tolerance[40].
		PS 2.9.2 Transponder equipment, including clump weights/frames, will be removed at the end of the Petroleum Activity Program.	**MC 2.9.2** As left survey reports confirm temporary equipment is removed.
	C 2.10 Vessels used for IMMR will not anchor under routine operations.	**PS 2.10** Vessels used for IMMR activities will not anchor under routine operations.	**MC 2.10.1** Records demonstrate no anchoring during IMMR activities.
EPO 3 No adverse impact to Underwater Cultural	**C 3.1** Review of existing survey data by a suitably qualified maritime archaeologist to inform areas for laydown and/or installation of equipment to avoid or where not possible, minimise physical impacts to cultural heritage areas or prospective areas.	**PS 3.1** Existing survey data reviewed by a suitably qualified maritime archaeologist to inform areas for laydown and/or installation of equipment.	**MC 3.1** Records demonstrate review of existing survey data completed prior to laydown and/or installation of equipment.

40 Acceptable tolerance is considered to be ±150 m, given the homogenous and low sensitivity habitat.

EPOs, EPSs and MC for Drilling and Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
Heritage[41] without a permit[42].	**C 3.2** 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 7.6**.	**PS 3.2** In the event that an Underwater Cultural Heritage site or feature is identified, implement an Unexpected Finds Procedure set out in **Section 7.6**.	**MC 3.2.1** No non-compliance with the Unexpected Finds Procedure.
	C 3.3 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 3.3.1** Report any finds of potential UCH in accordance with the Unexpected Finds Procedure (**Section 7.6**) including to the Australasian Underwater Cultural Heritage Database.	**MC 3.3.1** Records of potential UCH finds reported to relevant authorities and stakeholders.
	C 3.4 Relevant vessel crew 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 (**C 3.2**).	**PS 3.4.1** Relevant vessel crew (including ROV operators) are made aware of the requirements of the Unexpected Finds Procedure through an induction.	**MC 3.4.1** Induction records demonstrate vessel crew are made aware of potential to encounter UCH.

41 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

42 Permit for Entry into a Protected Zone or to Impact Underwater Cultural Heritage would be acquired under the UCH Act.

6.6.3 Routine Acoustic Emissions: Generation of Noise during Routine Operations

Context		
Facility Layout and Description – **Section 3.4** Facility Operations – **Section 3.4.5** Process Description – **Section 3.4.6** Vessels – **Section 3.5** Helicopter Operations – **Section 3.7** Subsea IMMR Activities – **Section 3.4.15**	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***
Noise generated within the PAA from: • Angel facility and associated infrastructure • vessels • helicopters • IMMR activities						✓		A	F	-	-	GP PJ	Broadly Acceptable	EPO 4

Description of Source of Impact

The Angel facility, vessels and helicopters generate noise both in the air and underwater, due to the operation of machinery noise, propeller movement, etc. These noises 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).

Continuous (Non-Impulsive) Sources

Platform Machinery

Production platforms have machinery mounted on decks raised above the sea, hence, most noise is transmitted to the marine environment from air. Normal platform operations generate sound at 162 dB SPL (Hannay. et al., 2004). Machinery noise onboard the Angel facility may be radiated into the underwater environment via the jacket legs and risers, which may act as transducers. Underwater noise generated by the Angel facility is expected to be minimal, with monitoring programs indicating that underwater noise from platforms is typically very low or not detectable (McCauley, 2002).

Flaring

The HP and LP flare system generate noise from combustion. Noise from flaring is emitted at the top of the flare tower, which is approximately 115 m above sea level. Noise from the tip of the flare is not constrained and spreads spherically in all directions.

Received levels from airborne propagation modelling were used to ascertain the underwater received levels during flaring activities for a drilling and subsea installation activity (Woodside, 2019). Only a very small fraction of the acoustic energy produced from flaring will transmit through the air/water boundary due to the surface of water acting as a reflective plane and a significant component of acoustic energy reflecting back into the air. While underwater received sound pressure level during flaring is estimated to be 136 dB re 1µPa at 1m (SPL) below the sea surface it is estimated to attenuate to ambient levels within a very short distance (e.g., metres) and therefore is not considered further in the impact assessment.

Wellhead, 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 SPL, 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 three 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 SPL 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 flow noise in pipelines, noise produced along a pipeline may be expected to be similar to that described for wellheads, with the radiated noise field falling to ambient levels within a hundred meters of the pipeline.

Woodside has undertaken acoustic measurements on the noise generated by the operation of choke valves associated with the Angel facility (JASCO, 2015). 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 to 155 dB re 1 µPa (SPL), with higher production rates (85% and 74% choke positions) resulting in lower noise levels (141 to 144 dB re 1 µPa SPL). Noise from choke valve operation was broadband in nature, with the majority of noise energy concentrated above 1 kHz. Noise from choke valve operation was considered minor compared to noise generated by vessels using thrusters in the area.

Given the low levels of noise emitted by subsea infrastructure such as wellheads, choke valves and flowlines, no impacts to marine fauna from these noise sources are expected. Measurements of noise generated by choke valves indicated it is relatively high frequency (>1 kHz), and hence it attenuates over relatively short distances in the water column; significant impacts to marine fauna are not considered credible and therefore not considered further in the impact assessment.

Vessels and Operation of Dynamic Positioning Systems

Vessels used for routine operations are detailed in **Section 3.5**, and include DP capable vessels. The sound levels and frequencies generated by vessels varies with the size of the vessel, speed, engine type and the activity being undertaken. Vessels produce low frequency sound (i.e., below 1 kHz) from the operation of machinery, hydrodynamic flow sound around the hull and from propeller cavitation, which is typically the dominant source of sound (Ross, 1987, 1993).

Vessels in the 50 to 100 m size class (e.g., supply ships, crew boats, research vessels) produce broadband source levels in the 165 to 180 dB re 1 µPa (SPL) range (Gotz et al., 2009). In comparison, underwater sound levels generated by large ships can produce levels exceeding 190 dB re 1 µPa (Gotz et al., 2009), and small vessels up to the 20 m size class typically produce sound at source levels of 151 to 156 dB re 1 µPa (Richardson et al., 1995). McCauley (1998) measured underwater broadband noise equivalent to about 182 dB re 1 µPa at 1 m (SPL) from a support vessel holding station in the Timor Sea; it is expected that similar noise levels will be generated by support vessels used for routine operations.

Helicopter Transfers

Helicopter activities occur in the PAA, including landing and take-off on the facility or vessel helidecks. 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.

Non-routine Impulsive 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 1 to 6 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 1-6 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 1 µPa PK at 1 m.

Positioning Equipment

An array of long baseline (LBL) and/or ultra-short 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).

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)**.

The PAA overlaps BIAs for whale sharks (foraging) and wedge-tailed shearwaters (breeding). Whale sharks are present between March and November. Cetaceans, such as pygmy blue and humpback whales, and marine turtle species may also be present within the PAA seasonally; however, no BIAs or other important areas for these species overlap the PAA. While the Ancient Coastline KEF may be associated with outcroppings of hard substrate, limited areas of hard substrate were identified in the PAA, with no evidence of significant reef habitats associated with such outcroppings (Jacobs, 2014). Some demersal fish are likely to be associated with subsea infrastructure such as pipelines (McLean et al., 2017).

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 that 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 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 LF cetaceans, while odontocetes (toothed whales and dolphins) are categorised as HF or 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 6-3**). 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 6-3: Thresholds for permanent threshold shift, 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***
	SEL_{24h}	***PK***	***SEL_{24h}***	***PK***	***SPL***	***SEL_{24h}***	***SEL_{24h}***	***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).

SEL_{24h} 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 pygmy blue whales 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 4.6.3**, the PAA is located approximately 37 km south of the pygmy blue whale migration BIA, with the nearest foraging BIA (Ningaloo possible foraging area) approximately 348 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 petroleum activities program must not:

- result in injury[43] (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.

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 PAP. McCauley (1998) measured underwater broadband noise equivalent to about 182 dB re 1 µPa SPL (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 PAP.

PTS and TTS thresholds for LF cetaceans are 199 dB re 1 μPa^2 s (SEL weighted) and 179 dB re 1 μPa^2 s (SEL weighted), respectively for continuous noise sources (refer **Table 6-3**). Typical sound exposures generated by the facility and a support vessel using DP would not exceed these levels (except at extremely close ranges to the source), so PTS and TTS in LF cetaceans, such as large baleen whales, is not anticipated.

Potential impacts to cetaceans may instead include behavioural disturbance from vessels. The thresholds that could result in behavioural response for cetaceans is expected to be 120 dB re 1 µPa (SPL) for continuous noise sources such as vessels (refer **Table 6-3**). Acoustic modelling undertaken for an operating FPU and support vessel on DP predicted that sound from each sound source individually would exceed the 120 dB threshold up to a maximum distance of 670 m, while combined sound sources exceeded the threshold to a distance of 1.07 km (McPherson et al., 2019). Although some site and facility-specific differences may exist, 1 km is considered broadly indicative of the range at which underwater sound propagating from the Angel facility and PSV may cause a behavioural response in cetaceans.

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 pygmy blue whales may be seasonally present in the PAA, though limited to individuals infrequently transiting through the area. Interactions between pygmy blue whales or humpback whales with vessels typically result in avoidance behaviour, with whales generally moving away from

43 For the purpose of interpreting and applying Action Area A.2 of the Blue Whale CMP, injury is both permanent and temporary hearing impairment (Permanent Threshold Shift and Temporary Threshold Shift) and any other form of physical harm arising from anthropogenic sources of underwater noise (DAWE, 2021).

vessels (Bauer, 1986; Stamation et al., 2010). Because the PAA is approximately 37 km from the blue whale migration BIA and 34 km from the humpback whale migration BIA, no impacts are predicted to occur from project vessel noise on individuals using these areas. In summary, potential impacts to blue whales, humpback whales and other cetaceans from predicted noise levels are expected to be limited to behavioural impacts within a localised area around vessels 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 not exceed criteria for HF cetaceans beyond 2 to 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 that PK and SEL_{24h} thresholds for PTS are not exceeded. The potential for TTS resulting from SEL_{24h} 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 3 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.

Marine Turtles

Species Sensitivity and Exposure Thresholds

There is a paucity of data regarding responses of marine turtles to underwater noise. 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 to 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 6-4** are considered appropriate for the assessment of effects from impulsive and continuous sound sources during the Petroleum Activities Program.

Table 6-4: Thresholds for permanent threshold shift, temporary threshold shift and behavioural response onset in marine turtles for continuous and impulsive noise

Hearing group	***Impulsive***			***Continuous***		
	PTS onset thresholds: SEL_{24h} (dB re 1 µPa².s)	***TTS onset thresholds: SEL_{24h} (dB re 1 µPa².s)***	***Behavioural response (dB re 1 µPa)***	***PTS onset thresholds: SEL_{24h} (dB re 1 µPa².s)***	***TTS onset thresholds: SEL_{24h} (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 PAP, 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 PAP.

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 6-4**). PTS and TTS thresholds for turtles are 220 dB re 1 μPa^2 s (SEL weighted) and 200 dB re 1 μPa^2 s (SEL weighted), respectively (refer **Table 6-4**). 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.

As outlined above, 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 to 700 kHz) and SSS (75 to 900 kHz) are well above the hearing range of turtles (0.1 to 2 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) 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 to 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.

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 6-5**. 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 6-5: 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 Angel 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 6-4**). 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.

Considering the overlap of the whale shark foraging BIA with the PAA, it is likely there may be increased numbers of individuals during migratory periods. 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 project 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 project vessels/facility.

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 operating facility, project vessels, and IMMR survey activities are not considered to be ecologically significant at a population level.

Cultural Values and Heritage

Through consultation and review of available literature (**Section 4.9.1**), Woodside understands that marine fauna that may be affected by noise emissions, such as marine mammals and turtles, are culturally important to Traditional Custodians. Traditional Custodians value these species both tangibly as well intangibly as they can be considered a resource or linked to songlines and dreaming stories. Traditional Custodians also have connection to many marine species through kinship and totemic systems; an individual may have obligation to care for a species to which they are kin. Traditional Custodians may also have a cultural obligation to care for the environmental values of Sea Country.

For example, activities that impact turtle populations and their marine environment may have an indirect impact on some Indigenous communities if they deplete hunting areas and threaten local food security (Delisle et al., 2018:251). Whale species are subject of First Nations' increase ceremonies/rituals which are performed to enhance or maintain populations. As these 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, it is anticipated 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). 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, potential impacts to marine fauna are predicted to be at an individual level, which are not considered to be ecologically significant at a population level. 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.

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[44]: • Support vessels will not travel greater than 6 knots within 300 m of a cetacean or turtle (caution zone) and not approach closer than 100 m from a whale. • Support vessels will not approach closer than 50 m for a dolphin or turtle and/or 100 m for a whale (with the exception of animals bow riding). • If the cetacean or turtle shows signs of being disturbed, support vessels will immediately withdraw from the caution zone at a constant speed of less than 6 knots. • 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 these controls is primarily intended to reduce the likelihood of a collision between a cetacean, whale shark or turtle 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 4.1**

44 *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***
Good Practice				
Vary the timing of the Petroleum Activities Program to avoid migration periods.	F: No. The Petroleum Activities Program occurs continuously, modifying the timing of the Petroleum Activities Program is not feasible. CS: Not considered, control not feasible.	Not considered, control not feasible.	Not considered, control not feasible.	No
Implement a shutdown zone around MBES, SSS and sub-bottom profiler for: • 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/TTS is 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 to 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
Have a dedicated experienced and trained Marine Fauna Observer (MFO) onboard vessels to undertake marine fauna observations.	F: Yes, however additional cost for dedicated and experienced MFO to be present during IMMR CS: Moderate, requires the provision of a dedicated experienced MFO to undertake Marine Fauna Observations.	Use of an MFO may detect fauna in the area, however control provides limited benefit when managing impacts associated with vessel noise alone.	Given limited benefit associated with the management of vessel noise impacts and costs associated with control implementation an experienced MFO is not considered necessary.	No

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
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 a MEE – **Section 6.7.6**). 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				
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 routine acoustic emissions from vessels, helicopters, wellheads, pipelines and the Angel 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.				
Demonstration of Acceptability				
Acceptability Statement: The impact assessment has determined that, given the adopted controls, impacts from routine acoustic emissions from vessels, helicopters, wellheads, pipelines and the Angel platform represent a negligible impact /disturbance to marine fauna within the PAA. 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.				

EPOs, EPSs and MC for Angel Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 4 Limit adverse impacts on fauna from noise emissions (no impact greater than F[45]) during the Petroleum Activities Program.	**C 4.1** EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans, which include the following measures[46]: • Vessels will not travel greater than 6 knots within 300 m of a cetacean or turtle (caution zone) and not approach closer than 100 m from a whale. • Vessels will not approach closer than 50 m for a dolphin or turtle and/or 100 m for a whale (with the exception of animals bow riding). • If the cetacean or turtle shows signs of being disturbed, activity support vessels will immediately withdraw from the caution zone at a constant speed of less than 6 knots. • 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 4.1** 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 4.1.1** Records demonstrate no breaches with EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans and Woodside Marine Charterers Instructions. **MC 4.1.2** Records demonstrate reporting cetacean ship strike incidents to the DCCEEW.

45 Defined as 'No lasting effect (< 1 month); localised impact not significant to environmental receptors' as in **Table 2-3**, **Section 2.6.3**.
46 For safety reasons, the specified distances requirements are not applied for a vessel holding station or with limited manoeuvrability (e.g., loading, back-loading, close standby cover for overside working and emergency situations).

6.6.4 Routine Acoustic Emissions: Generation of Noise During Tie-back Activities

Context		
Project Vessels – **Section 3.5.6** Tie-back Activities – **Section 3.5**	Regional Context – **Section 4.2** Protected Species – **Section 4.6** Socio-economic Environment – **Section 4.9**	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 acoustic signals from project vessels (MODU, installation vessels, AHVs and support vessels) during tie-back activities					✓		A	F	-	-	LC S GP PJ	Broadly Acceptable	**EPO 4**
Generation of acoustic signals from DP systems on project vessels					✓			F					
Generation of noise from, cutting of well infrastructure and contingency activities					✓			F					

Description of Source of Impact

During tie-back activities, sound will be generated from a number of sources including MODU drilling operations, vessels, and 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 project vessels may be used to complete tie-back activities associated with the Petroleum Activities Program including moored/DP MODU,, subsea installation vessels and other support vessels (**Section 3.5.6**).

The MODU (DP or moored) is expected to be on location for drilling operations for approximately 50-60 days including mobilisation, demobilisation and contingency. Vessels associated with subsea installation, pre-commissioning and cold commissioning activities may be on location for up to 4 weeks.

The project vessels will generate noise both in the air and underwater, due to the operation of thrusters, engines, propeller movement, etc (as described in **Section 6.6.3**). Vessels, including the MODU (optional), installation vessels, AHVs, general support vessels will use DP where propellers and thrusters are used to hold position, rather than anchoring.

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 to 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 tie-back activities are detailed in **Section 3.5.6**, and include a number of DP capable vessels. As discussed in **Section 6.6.3,** sound levels and frequencies generated by vessels varies with the size of the vessel, speed, engine type and the activity being undertaken.

A DP MODU or IMMR vessel may be used as described above. Indicative DP 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 6.6.3**.

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 (XNA02 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 LDA-02 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 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 (**Table 6-6**). Given water depth at the LDA-02 location is 130 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 LDA-02 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 DP MODU and support vessels planned for use during tie-back activities. Several DP MODU scenarios were modelled, including with an OSV in ~172 m at the XNA02 well location (**Table 6-7**). As above, this modelling is considered a suitable analogue for similar vessels and activities at the LDA-02 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 6-6: 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 6-7: Summary of modelled scenarios at the Xena (XNA02) field as an analogue for DP operations (source: Wecker et al., 2022).

Scenario number	*Description*
6	MODU under DP, drilling at XNA02 (24 hr)
7	MODU under DP, drilling at XNA02 (24 hr) + support vessel resupply, under DP (2 hr)

8	MODU under DP, drilling at XNA02 (24 hr) + support vessel resupply, under DP (8 hr)
9	MODU under DP, drilling at XNA02 (24 hr) + support vessel on standby (24 hr)
10	MODU under DP, drilling at XNA02 (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 6-8**.

The source sounds were applied to the modelling scenarios for drilling and subsea installation activities.

Table 6-8: Vessel source levels used in the acoustic modelling for the Petroleum Activities Program 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 6-6** and **Table 6-7**. Vessel scenarios during Lambert West tie-back 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, L_p), and as accumulated sound exposure levels (SEL, L_E) 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 SEL_{24h} 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 SEL_{24h} 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 SEL_{24h} 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 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, USBL transponders 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 while the DP MODU is on location.

Cumulative Noise Sources

Underwater noise generated during tie-back activities has the potential for cumulative impacts with acoustic emissions from routine operations (e.g., machinery, flaring, IMMR activities etc), which may result in slightly elevated acoustic levels.

As described above, tie-back activities are likely to include a MODU and installation vessel 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, as described in **Table 6-9**. 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 6-9: Concurrent activities considered in the assessment of cumulative underwater vessel noise.

Concurrent Activities	*Approx. Duration[1]*	*Vessels*	*Approximate distance between vessels*
MODU drilling Subsea installation – tubing head spool installation (or similar activity)	2 days	DP MODU + supply vessel Installation or IMMR vessel (DP)	<3 km
Pre-commissioning and start-up of Lambert West tie back Platform operations and supply	5 days	Commissioning (IMMR class) vessel (DP) Platform + DP supply vessel	~13 km

1. Relates to period of overlap, not entire duration of activity.

Impact Assessment

Potential impacts to environmental values

Receptors

The PAA is located in water depths of approximately 70 to 130 m (**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 PAA. Relevant actions included in recovery plans for these species are outlined in **Section 6.9**.

A pygmy blue whale migration BIA is located 37 km north of the PAA and a humpback whale migration BIA 34 km south (**Section 4.6.3**). Migration periods for pygmy blue whales are April to July and October to January. The migration period for humpback whale is June to November. It is possible that individuals may transit through the PAA during these periods of higher abundance, though it is expected that the majority will be transit within or near to the respective BIAs.

No marine turtle BIAs or Habitat Critical overlaps the PAA, the closest located 15 km south (flatback turtle internesting BIA/flatback turtle Habitat Critical). Given the water depths and distance from shore, the PAA 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).

A whale shark foraging BIA overlaps with the PAA. Peak whale shark numbers are expected in the region from March to July.

Two KEFs overlap the PAA: The Glomar Shoals KEF and the Ancient Coastline at 125 m depth contour KEF (**Section 4.7**). The Glomar Shoals KEF is identified as regionally important for high biological diversity and localised productivity (DEWHA, 2008). The Ancient Coastline KEF is valued as a unique seafloor feature, with ecological properties of regional significance (DEWHA, 2008).

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 (TTS, referred to as auditory fatigue), or 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 that 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

As identified in **Section 6.6.3**, protected species including migratory humpback whales and pygmy blue whales may be encountered near the PAA, and therefore could be impacted by acoustic emissions associated with 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 6-3** in **Section 6.6.3** above.

Predicted Underwater Noise Impacts to Cetaceans

Results – Modelling of a Moored Mobile Offshore Drilling Unit

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), as outlined in **Table 6-6** above (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 (**Table 6-10**)**.** 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 (**Table 6-10**). Scenario descriptions are given in **Table 6-6**.

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 PAA 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.

Table 6-10: Thresholds for permanent threshold shift, 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 SEL_{24h} threshold ($L_{E,24h}$; dB re 1 µPa²·s)*	*Scenario 1*	*Scenario 2*	*Scenario 3*	*Scenario 4*	*Scenario 5*
		R_{max} (km)	*R_{max} (km)*	*R_{max} (km)*	*R_{max} (km)*	*R_{max} (km)*
PTS						
Low-frequency cetaceans	199	–	–	0.05	0.07	0.07
High-frequency cetaceans	198	–	–	0.04	0.05	0.02
Very high-frequency cetaceans	173	0.15	0.15	0.19	0.21	0.19
Marine Turtles	220	-	-	0.03	0.01	-
TTS						
Low-frequency cetaceans	179	0.23	0.23	0.42	0.84	0.92
High-frequency cetaceans	178	0.09	0.09	0.12	0.15	0.13
Very high-frequency 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 6-10 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 Dynamically Positioned Mobile Offshore Drilling Unit

The analogous sound transmission loss modelling study by JASCO for a MODU on DP (Wecker et al., 2022) indicated that 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 (**Table 6-11**). Scenario descriptions are given in **Table 6-7**. 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 PAA 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 and humpback whale transiting through the PAA. The PAA is not known to represent significant foraging/aggregation habitat for cetaceans and individuals are not expected to dwell within the PAA 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.

Table 6-11: Thresholds for permanent threshold shift, 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 SEL_{24h} threshold ($L_{E,24h}$; dB re 1 µPa²·s)*	*Scenario 6*	*Scenario 7*	*Scenario 8*	*Scenario 9*	*Scenario 10*
		R_{max} (km)	*R_{max} (km)*	*R_{max} (km)*	*R_{max} (km)*	*R_{max} (km)*
PTS						
Low-frequency cetaceans	199	0.08	0.11	0.13	0.08	0.13
High-frequency cetaceans	198	0.02	0.07	0.09	0.02	0.09
Very high-frequency 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 cetaceans	179	1.87	2.12	2.57	2.17	2.66
High-frequency cetaceans	178	0.09	0.11	0.13	0.09	0.13
Very high-frequency 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 pygmy blue whales 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 pygmy blue whales may exhibit similar responses.

There is limited data to indicate that the PAA represents an area where opportunistic foraging by pygmy blue whales 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 pygmy blue whales 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 PAA is located. Hence, it cannot be reasonably predicted that pygmy blue whale foraging is probable in the PAA. 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 a migration BIA located 34 km south of the PAA. 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 PAA 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 pygmy blue whales 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.

Marine Turtles

Species Sensitivity and Thresholds

As discussed in **Section 6.6.3**, 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 6-4**.

Impact Assessment

Marine turtles may be present in the region, with a flatback turtle internesting BIA located 15 km south of the PAA. 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 in **Table 6-4,** it is reasonable to expect that marine turtles may demonstrate avoidance or attraction behaviour to the noise generated by the Petroleum Activities Program. 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 (**Table 6-10** and **Table 6-11**). However, marine turtles within the PAA 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 Petroleum Activities Program are expected to be short-term and localised.

Given the water depths and distance from shore, the PAA does not represent suitable foraging or internesting habitat. The PAA does not overlap BIAs or Habitat Critical and it is noted that 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 PAA is utilised 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 6-12** and are considered appropriate to assess continuous acoustic discharges to fish from the Petroleum Activities Program.

Table 6-12: 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, 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).

Impact Assessment

Given the thresholds outlined in **Table 6-12**, it is reasonable to expect that fish, sharks and rays may demonstrate avoidance or attraction behaviour to the noise generated by the Petroleum Activities Program. 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 PAA which overlaps the Glomar Shoals KEF and Ancient Coastline at 125 m depth contour 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 PAA 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 PAA 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.

Given the thresholds outlined in **Table 6-12**, it is reasonable to expect that fish, sharks and rays may demonstrate avoidance or attraction behaviour to the noise generated by the Petroleum Activities Program. 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.

Cultural Values and Heritage

Through consultation and review of available literature (**Section 4.9.1**), Woodside understands that marine fauna that may be affected by noise emissions, such as marine mammals and turtles, are culturally important to Traditional Custodians. Traditional Custodians value these species both tangibly as well intangibly as they can be considered a resource or linked to songlines and dreaming stories. Traditional Custodians also have connection to many marine species through kinship and totemic systems; an individual may have obligation to care for a species to which they are kin. Traditional Custodians may also have a cultural obligation to care for the environmental values of Sea Country.

For example, activities that impact turtle populations and their marine environment may have an indirect impact on some Indigenous communities if they deplete hunting areas and threaten local food security (Delisle et al., 2018:251). Whale species are subject of First Nations' increase ceremonies/rituals which are performed to enhance or maintain populations. As these 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, it is anticipated 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). 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, potential impacts to marine fauna are predicted to be at an individual level, which are not considered to be ecologically significant at a population level. 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.

Cumulative Impacts

As identified above, tie-back activities will coincide with routine operations of the Angel facility and may result in cumulative impacts from underwater noise emissions. The combined sound fields 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 PAA 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. 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. Therefore, PTS and TTS impacts to pygmy blue whales are not expected given to the distance from the migratory BIA (37 km).

Any cumulative impacts will be limited to the duration of tie-back activities (~12 weeks) and would be discontinuous over this time.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[47]***	***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[48]: • Project vessels will not travel greater than 6 knots within 300 m of a cetacean or turtle (caution zone) and not approach closer than 100 m from a whale. • Project vessels will not approach closer than 50 m for a dolphin or turtle and/or 100 m for a whale (with the exception of animals bow riding). • If the cetacean or turtle shows signs of being disturbed, project vessels will immediately withdraw from the caution zone at a constant speed of less than 6 knots. • 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 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 4.1**
Good Practice				
The use of dedicated marine fauna observers (MFOs) on support vessels for the duration of the Petroleum Activities Program 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, additional MFOs would not further reduce the likelihood of an individual being within close proximity of the acoustic source during start-up or during operations.	Disproportionate. The cost/sacrifice outweighs the benefit gained.	No

47 Qualitative measure

48 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)[47]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Develop SIMOPS Management Plan where multiple campaigns occur concurrently within the PAA.	F: Yes. CS: Minimal cost. Standard practice.	SIMOPS management plans between Woodside operated vessels in the PAA will assist in the management of cumulative noise sources.	Benefits outweigh cost/sacrifice.	Yes **C 4.2**
Professional Judgement – Eliminate				
Remove support vessel on standby at the Petroleum Activities Program 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 Petroleum Activities Program 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 that the predicted impacts from noise sources associated with the Petroleum Activities Program 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)[47]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Professional Judgement – Engineered Solution				
Passive Acoustic Monitoring (PAM).	F: No. PAM has limited ability to detect calls from baleen whales such as the pygmy blue whale, particularly with added background noise from drilling/ installation vessel activities and known reliability and practicality limitations of the technology. CS: Costs associated with PAM technology acquisition and implementation.	Not considered – control not feasible.	Not considered – control not feasible.	No
Use of thermal imaging equipment at night or periods of low visibility to identify cetacean presence.	F: Yes. Feasible to install on support vessel. CS: Costs associated with infrared technology acquisition and implementation.	Can increase likelihood of identifying cetacean presence; however, limitations on detection distance/depth, interpretation of data (identification of cetacean type for example) and practicality.	Cost/sacrifice outweighs benefit. Lack of proven application in detection of cetaceans in deep water environment and limitations of the technology reduce potential benefit gained when compared with low likelihood of expected cetacean activity and low likelihood of MODU/ installation vessel movement at night.	No

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[47]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Use of autonomous underwater vehicle (AUV) to monitor for presence of pygmy blue whales using detection of their vocalisations.	F: Yes. Could be deployed from support vessel. CS: Costs associated with obtaining and operating the technology. Schedule delays while data is collected and interpreted (not real-time monitoring).	Limited benefit as the technology relies on pygmy blue whale vocalisation, which is currently not well understood, particularly during foraging activities. Technology and applications still under development and not widely tested in field. Application limited due to lack of real time capability.	Cost/sacrifice outweighs benefit. Due to distance of PAA from PBW migration and foraging BIAs, presence of PBWs carrying out opportunistic foraging activities in the area is expected to be low. Adequate observations are able to be made from the MODU Bridge due to height and surveillance by a trained crew. It is not expected that an AUV would add significantly more value than this, to warrant deployment.	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 noise emissions from 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 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 Petroleum Activities Program is not considered to be inconsistent with the overall recovery objectives and actions of these recovery plans and conservation advice (**Section 6.9**). In particular, the Conservation Management Plan for the Blue Whale (Commonwealth of Australia, 2015a) and associated guidance on key terms requires that pygmy blue whales not be displaced from a foraging area. The nearest recognised foraging BIA is off the Ningaloo Coast, approximately 336 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 (**Table 6-10**) or up to 20.7 km from the noise source during DP vessel activities (**Table 6-11**; less than one tenth of the distance to the foraging BIA). Hence, displacement of pygmy blue whales from this foraging BIA as a result of the Petroleum Activities Program will not occur. 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 acoustic emissions to a level that is broadly acceptable.				

EPOs, EPSs and MC for Drilling and Tie-back Activities			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
EPO 4 Limit adverse impacts on fauna from noise emissions (no impact greater than F[49]) during the Petroleum Activities Program.	**C 4.1** See **Section 6.6.3**.	**PS 4.1.1** See **Section 6.6.3**.	**MC 4.1.1** See **Section 6.6.3**.
	C 4.2 Develop SIMOPS Management Plan where multiple campaigns occur concurrently within the PAA.	**PS 4.2.1** SIMOPs management plan is in place where multiple campaigns occur concurrently within the PAA.	**MC 4.2.1** Up-to-date and approved SIMOPS Plan in place.

49 Defined as 'No lasting effect (<1 month); localised impact not significant to environmental receptors' as in **Table 2-3**, **Section 2.6.3**.

6.6.5 Routine and Non-routine Discharges: Discharge of Hydrocarbons and Chemicals During Tie-back and Operations

Context		
Wells and Reservoirs– **Section 3.4.3** Subsea Infrastructure – **Section 3.4.4** Hydrocarbon and Chemical Inventories and Selection – **Section 3.8** Subsea IMMR Activities – **Section 3.4.15** Tie-back Activities – **Section 3.5**	Physical Environment – **Section 4.4** Biological Environment – **Section 4.5**	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***
Discharge of subsea control fluids			✓		✓	✓		A	F	-	-	GP	Broadly Acceptable	**EPO 5**
Discharge of hydrocarbons remaining in subsea pipework and equipment as a result of subsea intervention works (including pigging)			✓		✓	✓			E					
Discharge of chemicals remaining in subsea pipework and equipment or the use of chemicals for subsea IMMR activities			✓		✓	✓			F					
Discharge of minor fugitive hydrocarbons from subsea equipment			✓		✓	✓			F					
Discharge of flexible jumper and subsea installation fluids to the marine environment			✓		✓	✓			E					

Discharge of subsea fluids during well intervention activities			✓		✓	✓			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 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 3.4.15.6**) including:

- discharge of residual hydrocarbons in subsea lines and equipment and small gas releases associated with isolation testing and breaking containment.
- discharge of residual chemicals in subsea lines and equipment, or the use of chemicals, intermittently and in small volumes; small quantities of chemicals may remain in the flushed infrastructure, which may be released to the environment after disconnection.
- discharge of hydrocarbons associated with pigging activities required as shown in **Table 3-10**
- discharge of approximately 100 to 150 L of preservation fluids from flowlines following flushing when the flowlines are cut and plugs installed in either end of the cut section; **Section 3.4.15.8**.

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, SDU)
- discharges from flexible jumper, 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 LDA-02 well prior to Xmas tree installation (e.g., weeps/seeps/bubbles).

Flexible Jumper Fluids

The flexible jumper and subsea distribution unit will be installed filled with a chemically treated mixture of up to 55 wt% MEG/water. The MEG concentration must be fibre-grade (99.9 wt%) before mixing with water. The flexible jumper 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 jumper to the manifold and Xmas tree may result in small quantities of fluids within the jumper being released to the environment. These volumes are expected to be small (1 m^3 per tie in point) as the pressure within the jumper is equal to the hydrostatic pressure and the jumper 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 jumpers, which may result in ~ 1 to 2 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 tubing head spool (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 jumper. 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 Angel facility and be handled by the systems onboard the platform, in accordance with **Sections 3.4.7** and **3.4.9**. All non-hydrocarbon fluids will be discharged overboard with the produced water.

Should well unloading fluids not be directed to the Angel 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

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 to ensure the potential impacts are acceptable, ALARP and meet Woodside's expectation for environmental performance, outlined in **Section 7.2.1**. 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 tie-back activities. However, planned discharges of hydrocarbons and chemicals are minor and are minimised as far as practicable via flushing of the lines during IMMR 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 AEP to 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 (indicative discharge volumes associated with pigging the AEP are provided for in **Table 3-14**).

During tie-back activities, leak testing and tie in of new infrastructure may result in 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, as described in **Section 6.7.2**. 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. The only areas of hard substrate expected in the vicinity are artificial habitat associated with subsea infrastructure. 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. A detailed assessment of the impacts to these receptors is provided in **Section 6.7** and **Section 6.8.1**. Impacts include:

- acute toxic effects to planktonic organisms near the release location from soluble hydrocarbons
- temporary displacement of pelagic fishes.

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.

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 discharges cease).

KEFs

Two KEFs overlap the PAA; the Ancient Coastline at 125 m Depth Contour and Glomar Shoals KEF. Glomar Shoals itself is more than 10 km from the PAA; therefore, planned routine and non-routine subsea releases will not impact on the KEF. 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.

Cumulative Impacts

Given that only localised, short term and negligible impacts are predicted to water quality and marine biota, cumulative impacts affecting marine biota from the discharge of subsea installation fluids including MEG and hydrocarbons are considered unlikely.

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.				

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)***	***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**
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.	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**

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
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**
Chemical reviews will be performed on all previously approved chemicals to confirm potential chemical impacts are reduced to ALARP.	F: Yes. CS: Minimal cost. Standard practice.	Reviews will ensure chemicals selected remain ALARP.	Benefits outweigh cost/sacrifice.	Yes **C 5.5**
ROV inspection during leak test.	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 flexible jumper 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 jumper 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**
Flexible jumper installation procedure (DP alarm system, tensioner alarms, touch down position monitoring).	F: Yes. CS: Minimal cost. Standard practice.	A procedure for subsea installation will reduce likelihood of impacts.	Benefits outweigh cost/sacrifice.	Yes **C 5.9**
Subsea isolations conform to the relevant internal Woodside standards which include: • using a double block isolation. If it is not practicable to establish a double block isolation, then: • one effective, proven and monitored barrier (single block isolation) shall be in	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 outweighs	Yes **C 5.10**

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
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 appropriately, including provision for closing tree isolation valves.			cost. Benefit outweighs cost.	
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 jumper 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.	Poppetted connections minimise discharge to marine environment in pressurised hydraulic lines.	Benefits outweigh cost/sacrifice.	Yes **C 5.11**
Chemical control lines fitted with isolation valves within UTA (to minimise release of chemicals).	F: Yes. CS: Minimal cost. Standard practice.	Isolated valve connections minimise discharge to the marine environment in chemical control lines.	Benefits outweigh cost/sacrifice.	Yes **C 5.12**

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Angel subsea infrastructure flushed/pigged during isolation activities to reduce volume/ concentration of hydrocarbons released to the environment during decommissioning.	F: Yes. Subsea infrastructure has been designed such that much of the hydrocarbon containing elements can be flushed. 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 5.13**
Subsea isolations conform to the relevant internal Woodside standards which include: • well isolations in place are tested and proved following pigging/flushing activities.	F: Yes. CS: Minimal cost. Standard practice.	Tested and proven well isolation barriers in place reduces the likelihood of hydrocarbon migration from the wells in the environment during preservation period, prior to permanent plug and abandonment.	Benefit outweighs cost/sacrifice.	Yes **C 5.14**
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

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
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 opportunities to reduce the impacts have been investigated above. Fluid discharges from the subsea system during operations, IMMR activities, flexible jumper 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.				

EPOs, EPSs and MC for Angel Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 5 Limit adverse water quality impacts to Slight (E)[50] short-term effects from hydrocarbons and chemicals used in subsea activities	**C 5.1** Chemical Selection and Assessment Environment Guideline: • Where Gold/Silver/E/D OCNS rating (and no OCNS substitution or	**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	**MC 5.1.1** Records demonstrate the chemical selection, assessment and approval process for operational chemicals is followed.

50 Defined as 'slight, short-term impact (<1 year) on species, habitat (but not affecting ecosystem function), physical or biological attribute' as in **Table 2-3**, **Section 2.6.3.**

EPOs, EPSs and MC for Angel Facility Operations			
during the Petroleum Activities Program.	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 Guideline (described in **Section 3.8**) to ensure the impacts associated with use are ALARP and acceptable.	
	C 5.2 Subsea infrastructure flushed where practicable during IMMR disconnection activities to reduce volume/ concentration of hydrocarbons released to the environment.	**PS 5.2** Producing subsea infrastructure containing hydrocarbons (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 where practicable.
	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.	**PS 5.3** Subsea control fluid use monitored and, where losses are unexplained, 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 5.13 Angel subsea infrastructure flushed/pigged during isolation activities to reduce volume/ concentration of hydrocarbons released to the environment during decommissioning.	**PS 5.13** Flushing/pigging Angel subsea infrastructure containing hydrocarbons to a hydrocarbon concentration where further dilution provides disproportionate cost to environmental benefit, prior to isolation.	**MC 5.13.1** Records demonstrate Angel subsea infrastructure flushed/pigged prior to isolation.
	C 5.14 Subsea isolations conform to the relevant internal Woodside standards which include: well isolations in place are tested and proved following pigging/flushing activities.	**PS 5.14** Well isolations are in place, tested and proven in compliance with relevant internal Woodside standards.	**MC 5.14.1** Records demonstrate that there is a tested and proven isolation in place for each well that meets internal Woodside standards.

EPOs, EPSs and MC for Drilling and Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 5 Limit adverse water quality impacts to Slight (E)[51] short-term effects from hydrocarbons and chemicals used in subsea activities during the Petroleum Activities Program.	**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 3.8**) 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 Six monthly chemical reviews 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 implemented.
	C 5.6 ROV inspection during leak test.	**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 jumper tie-in.	**PS 5.7** Valve testing undertaken prior to flexible jumper tie-in.	**MC 5.7.1** Records demonstrate testing of isolation valves is completed.
	C 5.8 Pre-commissioning and flexible jumper subsea installation procedures developed.	**PS 5.8** Flexible jumper is installed in accordance with the pre-commissioning and flexible jumper installation procedure to reduce the likelihood of discharges during installation.	**MC 5.8.1** Records demonstrate flexible jumper installed in accordance with procedures.
	C 5.9 Flexible jumper installation procedure (DP alarm system, tensioner alarms, touch down position monitoring).	**PS 5.9** Flexible jumper is installed in accordance with the Flexible jumper installation procedure to reduce the likelihood of discharges during installation.	**MC 5.9.1** Records demonstrate flexible jumper installed in accordance with procedures.

51 Defined as 'slight, short-term impact (<1 year) on species, habitat (but not affecting ecosystem function), physical or biological attribute' as in **Table 2-3**, **Section 2.6.3.**

EPOs, EPSs and MC for Drilling and Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	C 5.10 Subsea isolations conform to the relevant internal Woodside standards which include: • using a double block isolation. 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 5.10** Subsea isolations 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 5.10.1** Records demonstrate isolations are implemented and compliant with the relevant internal Woodside standards. **MC 5.10.2** Where a single isolation was used records demonstrate that during testing of valves the pass rate was ≤0.05 kg/s.
	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.
	C 5.12 Chemical control lines fitted with isolation valves on within UTA (to minimise release of chemicals).	**PS 5.12** Chemical control lines are fitted with isolation valves on within UTA.	**MC 5.12.1** Records demonstrate chemical control lines are fitted with isolation valves on within UTA.

6.6.6 Routine and Non-routine Marine Wastewater Discharges: Utility Systems, Drains and Project Vessels

Context		
Drainage Systems – **Section 3.4.10** Utilities Systems – **Section 3.4.12** Project Vessels – **Section 3.5**	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***						
	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 facility, MODU and project vessels to the marine environment			✓					A	F	-	-	LCS GP PJ	Broadly acceptable	**EPO 6**
Discharge of deck, bilge and drain water from the facility, MODU and project vessels to the marine environment			✓					A	F	-	-			
Discharge brine and cooling water from MODU and project vessels to the marine environment			✓					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 staffed, sewage from the ablutions is macerated then disposed to the marine environment via the sewage caisson (3 m below LAT). Putrescible waste (principally food scraps) is either ground to less than 25 mm diameter and disposed overboard as per above or bagged and transported to shore for disposal as domestic waste.

The volume of sewage and grey water 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 staffed. The actual volume of discharge varies depending on personnel requirements on the facility. Refer to Section **3.4.5.1** for POB estimates under different activities.

Treatment systems on the facility may require routine maintenance or repair during operations, requiring infrequent short periods in which sewage is directly discharged overboard.

Vessels may also discharge sewage, grey water and putrescible wastes within the Operational Area, 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 less persons on board. Discharge of waste may occur within the PAA, but outside of the facility PSZ.

During tie-back activities the facility will be manned 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. The expected duration of cumulative discharges is approximately four weeks (**Section 3.3.1**).

Drain and Bilge Water

Angel'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 a horizontal three-phase separator (gas/liquid/liquid). Recovered oil and/or glycol from the open drains' separator is skimmed and transferred to the transportable waste oil storage tank for onshore disposal. The separated water is discharged directly overboard at +22 m LAT from the water disposal compartment of the open drains' separator.

The non-hazardous open drains system is 'open' to the atmosphere and collects, contains and disposes rain, wash water and waste liquids from non-hazardous areas of the decks and from the helideck. The drainage from this system is routed directly overboard. The HVAC condensed water drains also tie into the service water tank overflow in the non-hazardous area of the facility.

The non-hazardous areas do not include any hydrocarbon containing equipment or process vessels, accordingly there is little potential for hydrocarbon or chemical spills in the non-hazardous area. The non-hazardous open drains are segregated from the hazardous open drains to prevent migration of hydrocarbons from hazardous areas to non-hazardous areas.

MODU and project 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. MODU and project 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 MODU and project vessels during drilling and tie-back activities 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% 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 deoxygenated 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 m³/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 GWA platform. The GWA platform is approximately 22 km west of the PAA, therefore conditions are comparable. Water quality monitoring around the GWA platform (which is a staffed platform) indicates there was no detectable decrease in oxygen saturation, nutrients or

increase in oxygen demand at the GWA 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 tie-back is expected to take up to 12 weeks including mobilisation, demobilisation and contingency with subsea installation and pre-commissioning. MODU and project 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, project 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 project vessels is 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, bilge water or drain water, due to staffing of the facility and the presence of the MODU, installation vessels and other activity support vessels during tie-back activities. Given the minor quantities involved, the expected localised mixing zone and the rapid dilution in the open water environment, the potential for cumulative impacts to water quality would be restricted to within approximately 100 m of the discharge location. Hence, cumulative impacts are expected to be slight and short term (i.e., Environment Impact – E).

No cumulative impacts from similar discharges from support vessels and other production facilities in the vicinity (e.g., NRC) are expected given the distance from the PAA.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[52]***	***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 (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.	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				
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 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.	Woodside's chemical selection process is used to ensure chemicals are selected with the lowest practicable environmental risks while still providing the required technical capability.	Yes **C 5.1**
Facility sewage system macerator maintained.	F: Yes. CS: Minimal cost. Standard practice.	Treating and macerating sewage is standard industry practice, ensuring the substance disperses in the receiving environment with minimal effects to water quality.	Benefits outweigh cost/sacrifice.	Yes **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 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 6.3**

52 Qualitative measure

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[52]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Deck drainage and bilge water discharges will be compliant with Woodside Engineering Standard for Rig Equipment.	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 6.4**
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 unstaffed 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 unstaffed philosophy.	Not considered – control not feasible.	Not considered – control not feasible.	No
Storing, transporting and treating/disposing onshore of sewage, greywater, putrescible 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
Professional Judgement – Substitute				
None identified.				

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[52]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Professional Judgement – Engineered Solution				
Facility open hazardous drain system integrity maintained as far as practicable.	F: Yes. CS: Minimal cost. Standard practice.	The open hazardous drain system is maintained to support appropriate disposal of environmentally hazardous liquids.	Benefits outweigh cost/sacrifice.	Yes **C 6.5**
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 facility, MODU and project 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 facility, MODU and project 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.				

EPOs, EPSs and MC for Angel Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 6 Limit adverse water quality impacts to Slight (E)[53] from routine and non-routine wastewater discharges during the Petroleum Activities Program.	**C 6.1** Contract vessels complying with Marine Orders for safe vessel operations: • Marine Order 91 (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** Records demonstrate vessels are compliant with standard maritime safety procedures (Marine Orders 91, 95 and 96).
	C 5.1 Refer to **Section 6.6.5**.	**PS 5.1** Refer to **Section 6.6.5**.	**MC 5.1.1** Refer to **Section 6.6.5**.
	C 6.2 Facility sewage system macerator maintained.	**PS 6.2** Facility sewage system macerator maintained as far as practicable.	**MC 6.2.1** Facility sewage system maintenance records.

53 Defined as 'slight, short-term impact (<1 year) on species, habitat (but not affecting ecosystem function), physical or biological attribute' as in **Table 2-3**, **Section 2.6.3.**

EPOs, EPSs and MC for Angel Facility Operations			
	C 6.5 Facility open hazardous drain system integrity maintained as far as practicable.	**PS 6.5** Integrity will be managed in accordance with SCE Management Procedure (**Section 7.2.6**) and SCE Technical Performance Standard(s) to prevent environment risk related damage to SCEs for: F22 – Open Hazardous 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 1.13.1** Refer to **Section 6.6.1**.

EPOs, EPSs and MC for Drilling and Tie-back Activities			
EPO 6 Limit adverse water quality impacts to Slight (E)[54] from routine and non-routine wastewater discharges during the Petroleum Activities Program.	**C 6.1** Contract vessels complying with Marine Orders for safe vessel operations: • Marine Order 91 (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 5.1 Refer to **Section 6.6.5**.	**PS 5.1** Refer to **Section 6.6.5**.	**MC 5.1.1** Refer to **Section 6.6.5**.
	C 6.3 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.	**PS 6.3** Contaminated drainage contained, treated and/or separated prior to discharge.	**MC 6.3.1** Environmental inspection records demonstrate MODU has a functioning bilge/oily water management system.

54 Defined as 'slight, short-term impact (<1 year) on species, habitat (but not affecting ecosystem function), physical or biological attribute' as in **Table 2-3**, **Section 2.6.3.**

EPOs, EPSs and MC for Drilling and Tie-back Activities			
	C 6.4 Deck drainage and bilge water discharges will be compliant with Woodside Engineering Standard for Rig Equipment.	**PS 6.4** Deck drainage and bilge water discharges compliant with Woodside Engineering Standard for Rig Equipment.	**MC 6.4.1** Environmental inspection records demonstrate deck drainage and bilge water discharges is compliant with Woodside Engineering Standard for Rig Equipment.

6.6.7 Routine and Non-routine Discharges: Produced Water

Context		
Produced Water System – **Section 3.4.8** Well Start-up and Commissioning – **Section 3.5.4** Platform Well Management and Maintenance Activities – **Section 3.4.5.4**	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***						
	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.		✓	✓		✓			B	E	-	-	LCS GP PJ RB A	Acceptable if ALARP	**EP O 7**

Description of Source of Impact

Produced water (PW) is condensed water (water vapour present 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 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 on a non-routine basis). A description of the PW system has been provided in **Section 3.4.9**.

In 2022 discharge rates ranged from 0 to 123 m^3/day PW discharge rates are expected to increase once wells cut water until such time the facility will batch discharge. The maximum daily discharge is 4800 m^3.

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 Commonwealth ANZG for fresh and Marine water quality have been implemented and are consistent with the principles of the National Water Quality Management Strategy.

Environmental values are defined as particular values or uses of the environment that are important for a healthy ecosystem or for public benefit, welfare, safety or health and that require protection from the effects of pollution, waste discharges and deposits (ANZG, 2018). The relevant environmental values considered are:

- ecosystem integrity – maintaining ecosystem processes (primary production, food chains) and the quality of water, biota and sediment.
- cultural and spiritual – in the absence of any specific environmental quality requirements for protection of this value, it is assumed that if water quality is managed to protect ecosystem integrity, this value is achieved in line with the guideline. The link between environmental protection and cultural heritage protection is described further in **Section 4.9.1.5**.

The relationship between key elements of ecosystem integrity, indicators and relevant monitoring activities undertaken on a routine and non-routine basis are shown in **Figure 6-1**. As per the State *waters Technical Guidance: Protecting*

the quality of Western Australia's marine environment (EPA, 2016)[55] key elements to maintain ecosystem integrity have been identified as water quality, sediment quality and biological indicators (biota). By limiting the changes to these key elements to acceptable levels there is high confidence ecosystem integrity is maintained. 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 change is standard industry practice in Commonwealth and State waters. The relevant indicators to understand changes in key elements and therefore potential for impact to ecosystem integrity are physio-chemical stressors, toxicants in water and biological indicators. Trigger values for each indicator have been defined and are monitored to detect changes. Trigger values serve as an early warning that potential changes may occur.

The approved mixing zone, protects 95% of species, as calculated using the ANZG (2018) statistical distribution methodology on the results of direct toxicity assessment using sub-lethal chronic endpoints. The protection of 95% of species guidelines have been adopted for a slightly to-moderately disturbed system at the approved mixing zone boundary given the discharge location (as per ANZG, 2018).

Formation and condensed water have historically been discharged from the platform. Although currently the Lambert Deep reservoir has not cut water (predicted ~2025) a dual zone well was provided so that the zone producing water can be shut off when water cut is too high for the topsides to process. A single zone well is proposed for Lambert West which is also expected to produce water at some time in the well life. However, when Lambert West starts producing water the well is expected to discontinue flowing. The approved mixing zone boundary is 500 m. The justification for these limits of change being 'acceptable' is provided in the impact assessment section below.

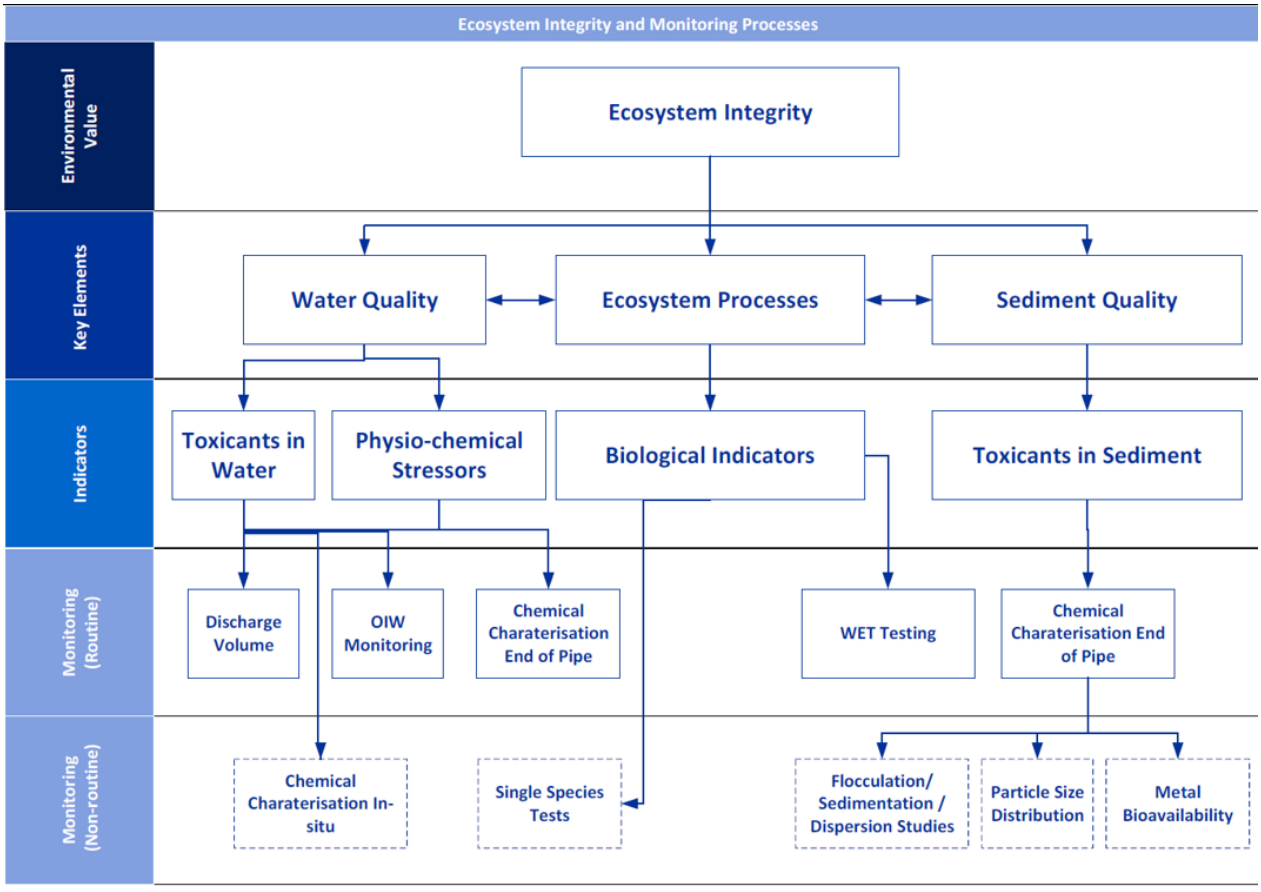


Figure 6-1: Ecosystem integrity and monitoring process

Operational Monitoring

OIW is monitored during routine operations via an online analyser. Online analyser information is sent via transmitter and reported to the NRC control system (DCS) and is also captured within the process historian database (PHD). The DCS facilitates visibility in the NRC control room, for manual or automated process control changes to be made, and/or alarms enunciated (e.g., high OIW specification). PHD information is available onshore for analysis and trending. During each intervention visit approximately 8-weekly basis, or five times per year, operators manually

55 In the absence of any Commonwealth guidelines, the State waters Technical Guidance: Protecting the quality of Western Australia's marine environment (EPA, 2016) has been considered and is consistent with the principles of the National Water Quality Management Strategy.

sample PW and send onshore via helicopter at the start of the visit for analyser QC checks at the onshore lab. The results are sent back to the operator to allow calibration of both analysers during the visit.

Loss of Signal Management

If there is a loss of signal from both OIW analysers, operators attempt to reset analysers remotely and monitor process stability for changes with the potential to result in an increase in the OIW concentration. If analysers cannot be restored, there are no observable changes to a stable operating process, and proof of reliable results below 30 mg/L, the next intervention visit will include restart of the analyser if the next planned intervention is within seven days. If the next planned intervention is greater than seven days away, a 'react' visit is undertaken.

If there is a lack of certainty around results risking OIW measurements exceeding 30 mg/L for more than six consecutive hours, and a risk of OIW exceedance (24-hour rolling average) is anticipated, the asset may undertake a 'react' visit to verify results.

High Oil in Water Management

If the analyser is online and the OIW measurement exceeds 30 mg/L for more than six consecutive hours, and risk of OIW exceedance (24-hour rolling average) is anticipated, the asset may undertake a 'react' visit to verify results. In either case, a helicopter is deployed to the platform for the react visit within 12 hours, weather and time-of-day permitting.

Routine Monitoring

PW is monitored and managed in accordance with the Offshore Marine Discharges Adaptive Management Plan (OMDAMP). The OMDAMP details routine monitoring, trigger values as per **Table 6-13**, analytical methods, assessment against trigger values, 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 to ecosystem integrity. The 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). Routine monitoring applicable to the facility, is undertaken to compare against trigger values (described in **Table 6-13**). Unacceptable changes in water quality and raw PW toxicity can be detected early and can indicate the potential for an impact to biota and sediment prior to it occurring. WET testing confirms if there is a potential for impact on biota. It is not appropriate to monitor for changes in species composition, diversity, etc, as there are limited receptors in the direct impact zone (a surface buoyant plume), and such changes may be detected after an impact occurs, and therefore are not considered appropriate for early detection. PW samples should represent normal operations and be undertaken during periods of normal production at the facility. Where practicable, samples are taken soon after new wells are brought online or after wells cut water.

The WET tests are undertaken on a broad range of taxa of ecological relevance for which accepted standard test protocols are well-established. WET tests are mainly focused on the early life stages of test organisms, when organisms are typically at their most sensitive to contaminants are designed to represent local trophic level receptors. Mainly tropical 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 95% of species, is calculated using the Warne et al. (2018) methodology.

Table 6-13: Trigger values and frequency of routine monitoring

Parameter	***Trigger value***	***Frequency***
Review of continuous operational OIW monitoring results	Increase in the average monthly OIW concentration by 5 mg/L over a six-month period or by 10 mg/L over a two month period	Monthly
Chemical characterisation: end of pipe sample – physio chemical and toxicants	Results that are predicted to be higher than the 95% species protection trigger value at the approved mixing zone boundary and are above the results from the earlier toxicity year OR above the toxicity year when no guideline is available	Annually timed to consider if sample is representative
WET testing	The 95% species protection safe dilutions derived from the WET testing species sensitivity distributions are not predicted to be achieved at the boundary of the approved mixing zone and are higher than previous years	Three yearly Conducted in parallel with annual chemical characterisation where feasible

Note: earlier toxicity year means the year in which the most recent WET test occurred.

*If a trigger value is exceeded, there is uncertainty around whether the environmental value is being protected and further investigation is required (**Figure 6-2**).*

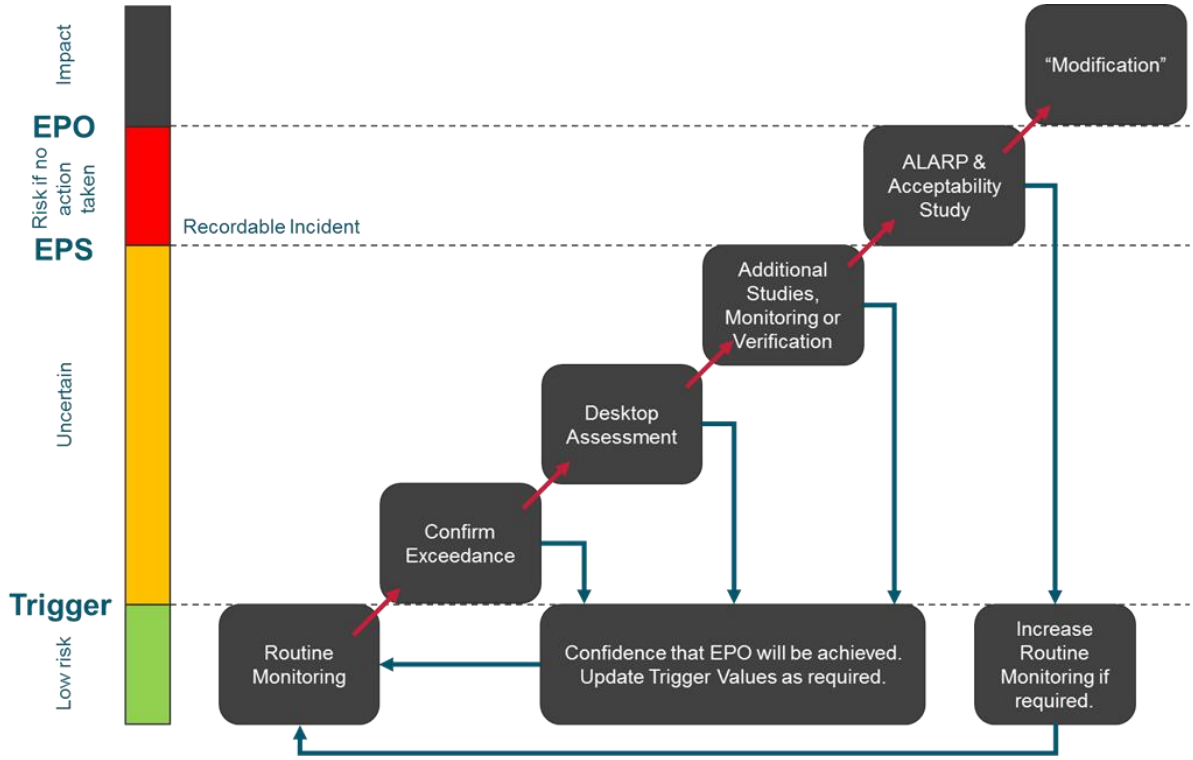


Figure 6-2: Routine monitoring and adaptive management framework for produced water

Further Investigations

Detectable exceedances in trigger values may occur without impacting ecosystem integrity. To provide confidence that ecosystem integrity has been achieved, further investigation would be required in the form of a desktop study to initially assess the exceedance in context of available data (multiple lines of evidence) and confirm if there is potential for impact to the environmental value. A desktop assessment is necessary before undertaking additional 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 are 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 EPS has been achieved, if a trigger value has been exceeded. The key investigation steps are described below:

1. **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.
2. **Desktop assessment to understand whether the EPS 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 and ecological integrity is not at risk (EPS not breached). If the desktop assessment determines that the existing body of evidence is insufficient, it shall outline what additional monitoring or studies are required. The desktop assessment is needed before undertaking any additional infield monitoring. It ensures monitoring programs are designed and implemented to provide robust findings based on good survey design. 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.

3. **Conduct additional studies to confirm the EPS is not at risk** – Monitoring results provide additional lines of evidence to determine whether there is a risk to ecosystem integrity due to unacceptable changes in water quality 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 ecological integrity 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 ecological integrity is maintained.

If environmental impact is deemed to be within acceptable limits of change the desktop assessment may consider a review of trigger values to ensure they are appropriate If the environmental impact is deemed to be outside of the acceptable limits of change, an ALARP/Acceptability study is required to determine what additional controls can be implemented to ensure the impacts are acceptable. An EPS breach is a Recordable Incident, which is reported and managed as outlined in **Section 7.11.5**.

Impact Assessment – Routine PW Discharge

Potential impacts of PW discharge include:

- changes to water quality
- toxicity to biota
- changes to sediment quality.

To understand potential impacts from PW discharges, Woodside has undertaken a suite of comprehensive in-situ testing and sampling representing long-term operational periods from its offshore production facilities. The details of this testing and resultant understanding of potential environmental impacts are outlined below.

Potential Impacts to Water Quality

PW is discharged from the platform directly overboard above the sea surface (8 m above LAT). The plume initially plunges and then rises to the surface as positively buoyant plume. Potential impacts to water quality have been assessed through chemical characterisation of PW and potential discharge volumes.

Chemical Characterisation of PW (Physio-chemical Parameters and Toxicants in Water)

Monitoring indicates the approved mixing zone has not been exceeded historically and provides high confidence that impacts from PW discharge are highly localised and pose negligible effects to environmental receptors. Samples of undiluted PW were collected annually from the end of pipe between 2011 to 2020 prior to shutdown and in 2022 following tie-back of Lambert Deep and restart of operations. The samples were analysed for key physio-chemical parameters and toxicants. In most cases, results are below trigger values, or similar to the results of chemical characterisation when the previous year's WET testing was undertaken (i.e., previous toxicity year).

Since restart two metals (nickel and cobalt), benzene, toluene, ethylbenzene and xylenes (BTEX), phenol and polycyclic aromatic hydrocarbons (PAHs) were present at levels above the ANZG (2018) guideline values at the end of the pipe. To achieve the 99% species protection guideline values, the highest dilution required was 82 for phenol. Modelling predicts 2853 and 14,526 dilutions were achieved 500 m from discharge point at 4800 m^3/day and 962 m^3/day respectively. Routine chemical characterisation has indicated condensed water since tie-back is higher in BTEX, napthalene and phenol than condensed water previously sampled in 2015 and 2016. No non-routine monitoring was triggered as routine WET testing was conducted in 2022.

There is potential for slight, localised decrease in water quality at the discharge location within the mixing zone and adverse effects on marine biota. Within the approved mixing zone impacts to pelagic fish are expected to be limited to avoidance of the localised area of the plume and short-term, localised decline in planktonic organisms in the immediate vicinity of the discharge plume.

Discharge Volumes

The max daily volume of PW discharged from the facility in 2022 (see **Figure 6-3**) is lower than the maximum capacity of the PW system (4800 m^3/day). Future discharges are expected to increase due to the Lambert West tie-back and as wells cut water.

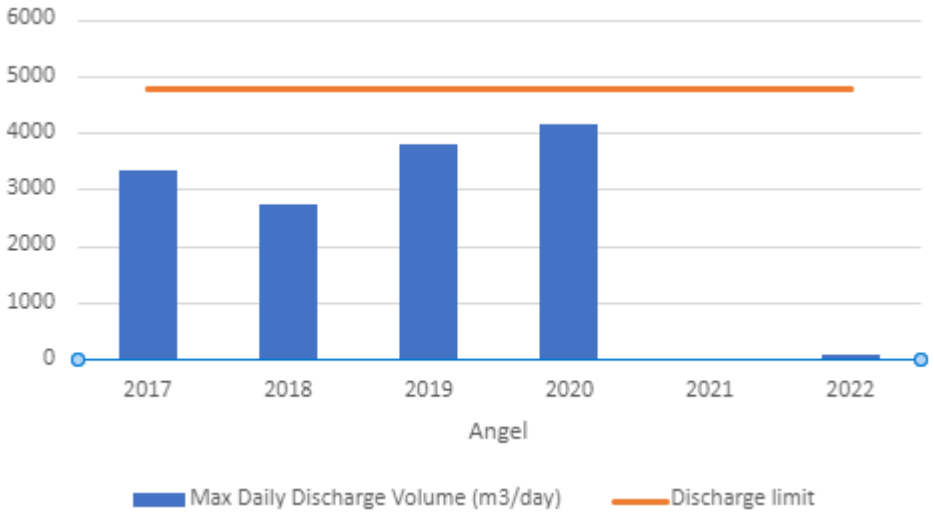


Figure 6-3: Historical maximum daily discharge rates of produced water from Angel facility

Potential Impacts to Biological Indicators

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 does, in part, depend on the total concentration and range of bioavailable hydrocarbons (Neff, 2002). Potential impacts of PW to biological indicators have historically been assessed through WET testing and dilution modelling to verify the approved mixing zone is achieved.

WET Testing

WET testing is undertaken to allow for interactions between toxicants and to consider toxicants that cannot readily be measured or are not known to be present in the sample. Routine WET testing was completed in 2022 and historically in 2011, 2014 and 2017 (**Table 6-14**). The number of dilutions required to achieve 95% species protection safe dilutions since restart is within the bounds of historic discharges. Noting historical discharges are not directly comparable (different reservoirs, separation process and test species).

Table 6-14: PC99 and PC95 concentrations and safe dilutions

Species Protection Level	***Predicted No Effect Concentration***				
PCx	***2011***	***2014***	***2017***	***2020***	***2022***
PC99 (50)	0.38 (1 in 260)	0.053 (1 in 1900)	0.61 (1 in 164)	0.090 (1 in 1111)	0.24 (1 in 417)
PC95 (50)	0.53 (1 in 190)	0.35 (1 in 290)	0.86 (1 in 116)	0.26 (1 in 385)	0.36 (1 in 278)

Determination of Approved Mixing Zone

To determine the potential impact of the PW to the marine environment, modelling has been conducted to predict the distance at which 95% species protection safe dilutions are achieved, using the most recent WET testing results available at the time to reflect the current potential toxicity (**Table 6-14**). The latest modelling study was carried out in 2018 and informs this impact assessment (Jacobs, 2018). Model simulations were undertaken for the three main seasons prevalent on the NWS, based on measured current and wind data supplied by Woodside. Ocean current data was collected at multiple depths through the water column at NRC. Conditions at NRC are considered representative of Angel due to their proximity to each other (approximately 49 km) and open ocean conditions. As the modelling of ocean current speed and direction varies substantially within each season, the full current records were analysed to select periods typical of the three seasons on the NWS but erring on the side of low current speeds to give conservative model results (Jacobs, 2018).

Further to these hydrodynamic inputs, the PW discharge model was validated in 2006 using the results from a dye dispersion study (Oceanic Field Services, 2006) undertaken from the North Rankin A platform. The predicted plume dilutions reasonably matched those measured.

The results from the WET testing undertaken in 2017 were used to develop predicted no-effect concentration (PNEC) values that were inputs to the model. The four-day predicted effects concentration (PEC) value is used to determine the PEC/PNEC ratios and the distances from the discharge point at which 95% species protection safe dilutions (PC95) are achieved. Based on the 2017 average discharge rate (962 m^3/day) and maximum discharge rate

(4800 m^3/day). The modelling shows a surface buoyant plume that is readily diluted to 95% species protection safe dilution within 20 m of the discharge location under worst-case conditions at actual and maximum discharge rates.

Remodelling was not undertaken as discharge is within the parameters modelled in 2018. Although discharge rates since restart have been significantly lower it is not proposed to reduce the approved mixing zone further as discharge rates are predicted to increase and future monitoring and management should consider potential historic contamination.

Impacts to Australian Marine Parks, KEFs and Biologically Important Areas

There is potential for slight, localised decrease in water quality at the discharge location and within the surface water with potential adverse effects on marine biota in the surface water. Potential impacts to pelagic fish are expected to be limited to avoidance of the localised area of the plume and short-term, localised decline in planktonic organisms in the immediate vicinity of the discharge plume. Therefore, while the discharge location of PW overlaps with a small proportion the foraging BIA for whale sharks, given the localised area of impact and that whale sharks are transitory, no impacts are expected to the whale sharks' ability to forage.

During PW discharge these impacts are anticipated to be within the approved mixing zone (500 m). At lower discharge rates, dilution levels are expected to be achieved closer to the discharge point resulting in a reduced loading to the environment.

The facility (and PW discharge point) is ~2.8 km from the nearest KEF, Glomar Shoal, which modelling predicts is outside of the approved mixing zone (500 m). Given PW forms a buoyant plume and the distance from the discharge source, no impacts to the KEF are anticipated.

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 (Pow), 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.

Bioaccumulation of BTEX compounds found in PW has been observed to occur in the laboratory, at concentrations far in excess of that discharged from facilities on the NWS and the worst case data used as analogues for the Angel PW discharge (**Table 6-13**) (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 Angel facility.

In contrast to BTEX compounds, PAH compounds also found in PW have high Pow values indicative of the potential for bioaccumulation (Vik et al, 1996). Neff and Sauer (1996) reviewed the 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 indicate that the highest bioaccumulation factor was in the tissues of bivalve molluscs and the lowest in the muscle tissue of fish (Neff and Saur, 1996).

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 Angel discharges are estimated to be up to ~1300 m^3/day). The target chemicals identified by USEPA included five metals (As, Cd, Hg, 226Ra and 228Ra), 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 and colleagues 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).

Bioaccumulation is therefore unlikely to result in increased levels of BTEX in biota surrounding Angel; however, there may be an elevation in PAH levels). 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 and in the sediments, is considered to be very low, and limited to a potential localised effect on a small number of non-threatened species in waters immediately surrounding the facility as described below.

Potential health risks are unlikely as a result of negligible exposure: the PSV prohibits fishing from or near the platform as there is very little or no activity within the Operational Area. Given the similarity of the chemical characterisation of PW discharges from the facility and other nearby platforms to those elsewhere in the world, including those in the Gulf of Mexico (Jacobs, 2017), 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.

Field studies completed in 2015 at GWA (BMT Oceanica, 2015) confirmed potential environmental impact associated with bioaccumulation of PW constituents in the water is considered to be very low and limited to a potential localised effect on a small number of non-threated species in waters immediately surrounding each facility.

Given the nature of the PW discharge from the riser platform, the potential for bioaccumulation of PW contaminants (in particular, BTEX) is considered to be minor and restricted to sessile organisms growing on the legs of the riser platform.

The potential environmental impact associated with bioaccumulation of PW constituents in the water column is considered to be very low and limited to a potential localised effect on a small number of non-threatened species in waters immediately surrounding the facility. Given the nature of the PW discharge from the riser platform, the potential for bioaccumulation of PW contaminants (in particular, BTEX) is considered to be slight, localised, short term.

Potential Impacts to Sediment Quality

Potential impacts to sediment quality were assessed through sediment surveys and supported by the results of flocculation studies and potential impacts to water quality.

Toxicants in Sediments

Accumulation of PW contaminants in sediments depends primarily on the volume/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. As described above, the potential for PW to impact sediment, based on chemical characterisation, is unlikely due to the concentrations observed.

Studies into potential sediment accumulation from PW discharge found that the PW at all facilities had very small amounts of solid material, with very little potential of settling or flocculation due to small particle sizes (Jacobs, 2016; BMT, 2021). 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 (>5000 m) or in areas where hydrodynamic conditions were very weak and did not continuously resuspend the particles (SKM, 2013).

Sediment sampling undertaken in 2020 verified that concentrations of contaminants were below their respective ANZG (2018) DGVs inside and outside the approved mixing zone. Although measurable concentrations of hydrocarbons were found in the raw PW (BMT, 2021), all hydrocarbon concentrations in surface (top 2 cm) samples were below their LoR, suggesting that there has been no accumulation of hydrocarbons in these sediments following the discharge of PW. The survey demonstrated compliance with approved criteria at the approved PW mixing zone boundary indicating no adverse impacts to sediments are expected from PW discharge outside of the approved mixing zone.

Due to the relatively short duration of field life, low volumes of PW discharge and similar characteristics of PW since tie-back of Lambert Deep it is not proposed to conduct ongoing routine sediment sampling. Instead, sediment sampling would be triggered under the OMDAMP if required.

Management and Impact Assessment – Non-Routine Activities

Management During Commissioning (Initial Start-up) of Lambert West and Restart

Commissioning of the Lambert West field 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 to 10 days of sequentially commissioning the reservoir, the process will allow for effective OIW separation with OIW concentrations reflective of steady-state conditions. During restarts OIW may be elevated due to the low volumes for up to 3 days.

The complexities involved in commissioning this process are the limited knowledge of PW chemistry, the pressure drops across the process and impact on separation across each PW treatment stages, and the chemical interactions and effectiveness. In order to provide the required flexibility during commissioning the following OIW levels are required:

- initial commissioning: 100 mg/L 24-hr rolling average.
- restart 100 mg/L 24-hour rolling average.

During commissioning, well jumper preservation fluids in the 500 m long 8" well jumper to LD manifold containing MEG and residual drilling and completion fluids will be produced back to the Angel facility, potentially impacting OIW concentrations in PW discharges. Preservation fluid volumes are low, however, the primary cause of potential higher OIW concentrations is from residual well completions fluids and condensed water potentially containing fines coated in condensate being produced to the facility. Unloading to the Angel facility is the preferred option; however, if well unload fluids cannot be directed to the facility, the well test water treatment package onboard the MODU will be used to treat produced/reservoir water before discharging as per **Section 3.5.2.10**. Upon start-up, the production process requires heating to temperatures which promote effective OIW separation. During the initial commissioning period, defined by the requirement to discharge produced water overboard, manual sampling for OIW will be required until such time the online OIW analysers have been calibrated and proven to be operating in line with their functional requirement. A temporary polishing skid will be run during this initial commissioning period to reduce the OIW concentration and load during this period and maintaining flexibility for optimisation.

Impact Assessment

The PW discharge modelling was based on the system design maximum possible flow rate of 4,800 m^3 per day. The maximum design rate is based on a few wells producing water, the rate during commissioning is expected to be significantly less due to no wells having cut water. The OSPAR (2014) dispersed oil concentration of 70 µg/L was used as the PNEC rather than the ANZECC/ARMCANZ (2000) guideline value (low reliability) of 7 µg/L. The PNEC of 70 µg/L derived by Smit et al (2009) is considered more appropriate than the Tsvetnenko (1998) derived 7 µg/L as all tests used in the Species Sensitivity Distribution (SSD) were chronic as opposed to acute converted to chronic values with an acute chronic ratio (ACR) of 25 as used by Tsvetnenko (1998).

Modelling considered minimum dilutions achieved across all months of the year. According to the modelling results, the distance from the discharge location in which the PNEC of 70 µg/l is achieved (1429 dilutions required) is within the 500 m mixing zone. No approved mixing zone is proposed during commissioning. The commissioning discharge will be of short duration and expected to be of slight short-term impact. use of the polishing skid during the initial commissioning period will minimise the OIW concentrations being discharged to the environment. Further justification that the environmental impact is both ALARP and acceptable have been incorporated into the Demonstration of ALARP and Demonstration of Acceptability sections below.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[56]***	***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/D OCNS rating (and no OCNS	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.	Benefits outweigh cost/sacrifice.	Yes **C 5.1**

56 Qualitative measure

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[56]***	***Benefit in Impact/ Risk Reduction***	***Proportionality***	***Control Adopted***
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 procedure prior to use.				
Monitoring of OIW concentrations in accordance with PARCOM 1997/16 Annex 3 methodology: • During routine operations limit average PW OIW to less than 30 mg/L 24 hr rolling average. • During non-routine commissioning (initial start-up) activities, limit PW OIW to less than 100 mg/L 24 hr rolling average, for the first 7 days from initial start-up of each zone (two reservoir zones). • During non-routine production restart activities, limit PW OIW to less than 100 mg/L 24 hr rolling average, for up to 3 days for the restart of the wells and a 30 mg/L monthly rolling average.	F: Yes. CS: Monitoring and implementation costs. Standard practice. The 30 mg/L 24-hour rolling average limit proposed 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. Based on benchmarking against other Australian operations 100 mg/L rolling 24-hour averages have been used for periods of between 33 and 60 days during initial commissioning periods.	Limiting OIW concentrations within PW reduces impacts to the environment.	Benefits outweigh cost/sacrifice. The adoption of a limit allows for PW OIW to be controlled. A separate limit for non-routine activities provides a proportional approach to enable startup of wells, assist in ongoing OIW management while facilitating impacts are of short duration, localised and temporary.	Yes **C 7.1**
Monitoring routine and implementation of the Adaptive Monitoring and Management Framework for PW discharges including:	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,	Woodside has developed the OMDAMP based on operational experience from relevant offshore assets. The OMDAMP considers risk-based	Yes **C 7.2**

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[56]***	***Benefit in Impact/ Risk Reduction***	***Proportionality***	***Control Adopted***
• monitoring of PW discharge volume • chemical characterisation • WET testing • timing of annual/ triennial sampling to be representative aiming to detect change, considering when the reservoir cuts formation water.		chemical characterisation) that may cause an increased impact or risk to the marine environment. Monitoring is designed to detect if 95% species protection is achieved at the approved mixing zone boundary. Through the implementation of the OMDAMP, potential risks to the environment are reduced.	adaptive management measures.	
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 analyser 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 7.3**
During commissioning activities, when OIW > 30 mg/L, conduct: • manual sampling (1-hourly to 6-hourly, dependant on OIW concentrations, as described in the relevant commissioning procedure) • calibration of the online OIW analyser (frequency of calibration is dependent upon delta between manual sample	F: Yes. CS: Monitoring and implementation costs. Standard practice.	Monitoring of OIW concentrations when online analyser unavailable when safe and practicable to do so. Horiba sampling provides additional verification of OIW concentrations. Increased confidence that OIW analyser is able to measure accurately above its normal calibration range.	Additional cost to resource manual sampling during commissioning activities is considered proportionate to additional verification of OIW concentrations.	Yes **C 7.4**

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[56]***	***Benefit in Impact/ Risk Reduction***	***Proportionality***	***Control Adopted***
and OIW analyser).				
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 7.5**
Professional Judgement – Eliminate				
Reinjecting PW into reservoirs.	As part of the 2015 PW study into treatment, Woodside examined the potential for reinjection of PW at similar NWS facilities. Woodside has not identified a suitable reservoir, and such an option would likely require additional drilling activities to be undertaken. Angel is not capable of supporting platform-based drilling. Reinjection is not feasible unless a suitable reservoir is identified. It is not feasible to reinject into a shut-in Angel subsea well because the wells continue to have high reservoir pressure, which would require significant facility modifications to overcome. Drilling and subsea work activities to establish a reliable PW reinjection well and subsea infrastructure also introduce significant complexity, risk and cost. Retrofitting PW topsides reinjection equipment to Angel introduces significant modifications which pose safety risks on an operational gas facility. There is also very little deck space available at Angel for any such equipment. Together, the significant retrofit risks, associated environmental impact (drilling and subsea construction, greenhouse gas emissions associated with 7 to 15 MW based on known 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. 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 currently reinject PW. At Nganhurra (NGA), for example, water reinjection was required to maintain reservoir pressure for production and was a key part of the Field Development Plan to optimise overall field recovery. As PW alone is not sufficient to maintain reservoir pressure, seawater is used to make up the balance. Therefore, given the significant economic benefits associated with reinjection at NGA, the ALARP outcome was different from NGA to Angel. 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 capability for the Angel facility, implementation risks and environmental impacts (greenhouse gas, chemical use), the costs are grossly disproportionate to the potential environmental benefit gained.			No
Professional Judgement – Substitute				
None identified.				

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[56]***	***Benefit in Impact/ Risk Reduction***	***Proportionality***	***Control Adopted***
Professional Judgement – Engineered Solution				
Chemical injection of water clarifier to reduce OIW concentration.	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.	The discharge of clarifying agent with the PW stream may result in additional toxic effects. Ongoing chemical consumption would also incur Operational expenditure (OPEX). Given the nature and scale of impacts forming the current PW discharge, the cost of developing a chemical injection is disproportional to the environmental benefit.	No
Adoption of a permanent tertiary treatment stage to reduce OIW concentration.	F: Potentially feasible. Large deck space would be needed which is not currently available. CS: Significant cost. Deck reinforcement or cantilevers required, as well as high cost associated with these maintenance intensive technologies.	Potential minor reduction in OIW concentration; however, does not reduce the overall consequence rating. Further, there is very little deck space available at Angel for additional treatment equipment.	Centrifuges and macro porous polymer extraction (MPPE) are large and heavy, requiring deck reinforcement or cantilevers. They are also maintenance intensive, which is incompatible with the Angel NNM philosophy. This introduces significant costs and additional risk from exposure of personnel. Additionally, these options tend to have high power consumption. The adoption of secondary treatment is not currently considered ALARP because the additional costs and risks associated with this option are considered disproportionate to the OIW benefit for a field with relatively low condensed water rates and relatively short duration of formation water that is expected to be yielded.	No
Temporary OIW polishing skid (secondary treatment) during initial	F: Yes. CS: Equipment hire costs, mobilisation costs, labour,	Increased ability to treat higher oil in water concentrations from the initial well	Additional labour and temporary operating procedures associated with initial start-up of Lambert West are	Yes **C 7.6**

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[56]***	***Benefit in Impact/ Risk Reduction***	***Proportionality***	***Control Adopted***
commissioning activities.	management of change, operational requirements.	commissioning activities. Greater operational flexibility and higher likelihood of being able to meet OIW discharge requirements while maintaining production during Lambert West commissioning (initial start-up) activities.	proportional to manage the risk of high OIW. Facility has deck space and suitable tie-in points for an OIW polishing skid, i.e., minimal modifications required to connect temporary skid. There is also proven application of this technology during previous tie-back start-ups; therefore, the benefits of adopting this control outweigh the costs.	
Temporary demulsifier skid during initial commissioning activities.	F: Potentially yes if emulsion testing finds emulsion forms. CS: Equipment hire costs, mobilisation costs, labour, management of change, operational requirements.	Increased ability to treat higher oil in water concentrations from the initial well commissioning activities if emulsions form.	Additional labour and temporary operating procedures associated with initial start-up of Lambert West are not proportional to manage the risk of emulsions. Facility has deck space and suitable tie-in points skid, i.e., minimal modifications required to connect temporary skid. There is also proven application of this technology although in some applications OIW has been adversely influenced in the longer term. Emulsions are not expected; therefore, the costs of adopting this control outweigh the benefits.	No
Professional Judgement – Procedures and Administration				
Routine in situ monitoring beyond the requirements of Woodside's OMDAMP for an existing asset.	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	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	Long term monitoring of water and sediment) characteristics at the facility 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	No

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[56]***	***Benefit in Impact/ Risk Reduction***	***Proportionality***	***Control Adopted***
	and service provider costs.	sacrifice with regard to execution risks and costs for limited gain.	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 increasing the frequency of in situ monitoring. The execution risks and cost of implementing this control is grossly disproportionate to the environmental benefit.	
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 Compass. As detailed above, the Petroleum Activities Program is 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 Petroleum Activities Program (**Section 5** and **Appendix F**); no specific concerns around PW discharge were identified through this process.				

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[56]***	***Benefit in Impact/ Risk Reduction***	***Proportionality***	***Control Adopted***

ALARP Statement:

On the basis of the environmental impact and 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 completed additional PW treatment studies, treatment trials, use of a temporary polishing skid for tie-back commissioning, OIW and discharge volume monitoring, 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 which includes annual and triennial end of pipe monitoring. The outcomes of both the modelling studies and long-term monitoring have been considered in determining the ALARP position. In-situ water quality and sediment sampling has demonstrated no impact outside of the approved mixing zone.

As no reasonable additional/alternative controls are currently identified that would further reduce the impacts 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 ESD, 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) 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) 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 500 m, there can be high confidence that potential impacts can be detected and managed via the OMDAMP.

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.

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.

Internal Context

The Petroleum Activities Program 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 **(Appendix A)**
- Woodside Environmental Performance Procedure (that 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 Petroleum Activities Program and feedback was incorporated into this EP where appropriate. There was no feedback from stakeholders relevant to PW.

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.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/ Sacrifice (CS)[56]***	***Benefit in Impact/ Risk Reduction***	***Proportionality***	***Control Adopted***
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 ecosystem/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 Angel Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 7 No impact to ecosystem integrity from produced water outside of the Approved Mixing Zone boundary.	**C 5.1** Refer to **Section 6.6.5**.	**PS 5.1** Refer to **Section 6.6.5**.	**MC 5.1.1** Refer to **Section 6.6.5**.
	C 7.1 Monitoring of OIW concentrations in accordance with PARCOM 1997/16 Annex 3 methodology. • During routine operations limit average PW OIW to less than 30 mg/L 24 hr rolling average. • During non-routine commissioning (initial start-up) activities, limit PW OIW to less than 100 mg/L 24 hr rolling average, for the first 7 days from initial start-up of each zone (two reservoir zones). • During non-routine production restart activities, limit PW OIW to less than 100 mg/L 24 hr rolling average, for up to 3 days for the restart of the wells and a 30 mg/L monthly rolling average.	**PS 7.1** For routine operations, OIW is limited to a 30 mg/L 24 hr rolling average. For non-routine commissioning (initial start-up) activities, OIW is limited to 100 mg/L 24 hr rolling average, for the first 10 days from initial start-up. For non-routine production restart activities, OIW is limited to 100 mg/L 24 hr rolling average, for the 3 days at 30 mg/L monthly rolling average.	**MC 7.1.1** Records demonstrate during routine activities and non-routine activities OIW rolling average limits are not exceeded.

EPOs, EPSs and MCs For Angel Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	C 7.2 Implementation of the Adaptive Monitoring and Management Framework for Produced Water.	**PS 7.2** No potential to impact ecosystem integrity from PW outside of acceptable limits of change. The acceptable limit of change is no impacts from PW beyond the approved mixing zone.	**MC 7.2.1** Records show routine monitoring has been conducted as per **Table 6-13**. Further investigations have identified no potential to impact ecosystem integrity from PW outside of acceptable limit.
	C 7.3 Online monitoring and/or procedural controls in place to monitor and control PW discharge volume, OIW concentration, and prevent discharge of PW with high OIW concentration through OIW analyser, or off spec/outage procedures. Process performance monitored by OIW concentration analyser or manual sampling, and volume meter(s) available.	**PS 7.3.1** Instrumentation integrity will be managed in accordance with SCE Management Procedure (**Section 7.2.6**) and SCE Technical Performance Standard(s) P31 – Environmental Emissions Monitoring and Controls, which: • provides means of detecting environmental releases, emissions and discharges to prevent MEEs from manifesting over time, and/or assure compliance monitoring and reporting equipment as required. • ensures monitoring data is available to control PW discharge volume and OIW concentrations; to prevent discharge of PW with high OIW concentrations.	**MC 1.13.1** Refer to **Section 6.6.1**.
		PS 7.3.2 Online monitoring and/or procedural controls in place to monitor and control PW discharge volume, OIW concentration, and prevent discharge of PW with high OIW concentration by implementing the Angel Contaminated Water off-Spec Produced Water OIW Readings - Loss of Signal to OIW Analysers – Operating Procedure, which includes response measures in the event of: • increasing or off-spec PW OIW readings • loss of signal for two OIW analysers.	**MC 7.3.2** Records demonstrate compliance with off spec/ outage procedures.
	C 7.4 During commissioning activities, when OIW >30 mg/L, conduct:	**PS 7.4** During commissioning a competent technician/operator will be available on the facility to conduct:	**MC 7.4.1** Records demonstrate manual sampling and calibration undertaken during

EPOs, EPSs and MCs For Angel Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	• manual sampling (1-hourly to 6-hourly, dependant on OIW concentrations, as described in the relevant commissioning documentation • calibration of the online OIW analyser.	• manual sampling (1-hourly to 6-hourly), dependant on OIW concentrations, as described in the relevant commissioning document. • calibration of the online OIW analyser (frequency of calibration is dependent upon delta between manual sample and OIW analyser) to ensure the OIW analyser is able to measure accurately.	commissioning activities as appropriate.
	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.	**PS 7.5** Complete calibrations of online analyser and manual OIW sampling equipment in accordance with Offshore Laboratory Determination of Oil in Water Standard Operating Procedure.	Refer to **MC 7.4.1**.
	C 7.6 Temporary polishing skid used during commissioning (initial start-up).	**PS 7.6** Temporary polishing skid available and utilised during commissioning (initial start-up).	**MC 7.6.1** Records demonstrate a temporary polishing skid used during commissioning (initial start-up).

6.6.8 Routine and Non-Routine Discharges: Drill Cuttings, Drilling Fluids and Well Removal Fluids

Context		
Drilling Activities – **Section 3.5.2** Contingent Activities – **Section 3.5.5**	Habitats and Biological Communities – **Section 4.5** 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*
Routine discharge of WBM drill cuttings to the seabed and the marine environment	✓	✓		✓		✓	A	E	-	-	GP PJ	Broadly Acceptable	**EPO 8**
Routine discharge of drilling muds (WBM) to the seabed and the marine environment	✓	✓		✓		✓							
Routine discharge of treated NWBM drill cuttings to the marine environment	✓	✓		✓		✓							
Non-routine discharge of wash water from mud pits and vessel tank wash fluids	✓	✓		✓		✓							
Routine discharge of well clean-out fluids	✓	✓		✓		✓							
Non-routine discharge of well annular fluids	✓	✓		✓		✓							
Non-routine discharge of WBM, swarf 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	✓	✓		✓		✓							

Description of Source of Impact

Drilling Operations

The Petroleum Activities Program will involve the drilling of the LDA-02 well, drilled over a period of approximately 50 to 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 3.5.2**. The well will be drilled as a series of sections, as detailed in **Section 3.5.2**. 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 (SCE) 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 Petroleum Activities Program 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.
  - NWBMs refers to drill fluids that are hydrocarbon rather than water-based fluid. NWBM may contain a range of synthetic hydrocarbons, such as paraffins and olefins; however, such additives are designed to be low in toxicity and biodegradable, as well as not being readily bioavailable or likely to bioaccumulate, particularly in deeper water areas. No bulk discharge of NWBMs will occur offshore, only NWBMs retained on cuttings can be discharged from the MODU. If a NWBM system is required to drill a well section, the cuttings from the NWBM drilling fluid system will pass through the SCE (centrifuge and dryers) to reduce the average residual oil on cuttings (OOC). An OOC discharge limit of 6.9% wt/wt or less on wet cuttings will be averaged over well sections drilled with NWBM for the well. It is noted that microbial biodegradation can result in oxygen reduction within sediments; however, Nedwed et al. (2006) found that depth is an important factor for residual concentrations of NWBF once they reach the seabed, suggesting that loss of base fluid during settling acted to significantly reduce chemical effects from discharges. It is also noted that NWBM cuttings tend to clump and settle to the seabed rapidly adding to the cuttings pile in proximity to the well site.

For the purposes of this impact assessment, the indicative dimensions, discharge locations and approximate drill cuttings and drilling fluid volumes provided in **Table 6-15** represent the estimated discharges for the tie-back activities.

Table 6-15: Estimated discharge of cuttings and volumes of drilling fluids used for tie-back activities.

	Well section width (inches)	*Cuttings ~volume (m^3)*	*Drilling fluid type*	*Drilling fluid ~ volume (m^3)*	*Hole section*	*Discharge point*
	42	64	Seawater[1] with pre-hydrated bentonite (PHB) sweeps/XC polymer	469	Top hole	Seabed
	26	44	Seawater[1] with pre-hydrated bentonite (PHB) sweeps/XC polymer	626		
	17.5	304	WBM	1908	Production hole #1	Surface
	13.5 or 12.25	163	WBM	1590	Production hole #2	
	9.875	15	WBM	954	Reservoir section	
Total planned activities		***591 m^3***		***5573 m^3***		
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	412	Seawater[1] 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 to 13.5" section	163	WBM	1590	Production hole #2	Surface
	~12.25 to 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 (mono-ethylene 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 to ensure 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 m^3.

Contingent Drilling Activities

Respud

It is unlikely that 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 as per **Table 6-15** 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 Petroleum Activities Program 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 6.6.9** 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 6-16**.

Table 6-16: 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	0	0	2 (swarf) 3 (cement)	5

		formation rock			3.5 (formation rock)	
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 6-16**. 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. Impacts of cement and cementing fluids are outlined further in **Section 6.6.9**.

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 m^3), drilled cement cuttings (~3 m^3) and formation rock (~3.5 m^3) 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 m^3 (per 100 m milled interval).

Removal (Cutting) of Well Infrastructure (Contingency)

The planned cutting depth for removal of the wellhead is approximately 3 to 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 predominantly 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 following impacts:

- 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 in the PAA (70 to 130 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 predominantly 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 to 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 LDA-02 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 predominantly 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 110 m^3 of top hole cuttings; **Table 6-15**) 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 3.5.2.11** 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 480 m^3; **Table 6-15**) 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 up to of several hundreds of metres, with associated ecological effects within this area and the fines (predominantly 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.

KEFs

The Lambert West Operational Area overlaps the Ancient Coastline at 125 m depth contour KEF. There is potential for interaction with drill cuttings within the KEF. However, as described above, the sediment deposition from the discharge of drill cuttings and drilling fluids will be highly localised around the well location. 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 Lambert West 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.

Cultural Heritage

As described in **Section 4.9.1** the PAA overlaps the Ancient Coastline at 125 m depth contour KEF and, therefore, there is the potential that Indigenous Cultural features may exist and these may potentially be impacted by the discharge of drill cuttings and drilling fluids. While no cultural features have been identified in the PAA, further archaeological studies will be undertaken prior to the activity commencing to understand any potential cultural features (refer **C 4.1**).

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 of the PAA (70 to 130 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 m³. 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 to 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 predominantly 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.

Summary of Potential Impacts to Environmental Values(s)

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)[57]***	***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**

57 Qualitative measure

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[57]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Chemical reviews will be performed on all previously approved chemicals to confirm potential chemical impacts are reduced to ALARP.	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 the release on the environment is reduced. Although no change in likelihood is provided, the decrease in consequence results in an environmental benefit.	Benefits outweigh cost/sacrifice.	Yes **C 8.3**
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**

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[57]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Displacement, brine, workover or intervention fluids contaminated with hydrocarbons will be treated prior to discharge or containment. If discharge specification is 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**
SCE 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				
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 SCE 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,	Benefits outweigh cost/sacrifice.	Yes **C 8.10**

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[57]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
		thereby reducing the consequence of cuttings discharges during the Petroleum Activities Programme.		
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
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 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).	F: Yes. CS: Primary cost/sacrifice of this option is the additional handling required in 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 of cuttings onshore is required to	Compared to adopted control, return riser in place cuttings would achieve a reduction in cuttings/mud 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.	Disproportionate. Given the adopted controls and low current risk rating, the 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	No

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[57]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
	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 may also be 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 (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.		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)[57]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Reduce total drill cuttings by implementing slim well design.	F: No. Slim well design is not considered feasible based on the following factors: • 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/ equipment/ personnel).	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 outweighs benefit to be gained in the context of existing environment (deepwater, 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 appropriate outcome.	No
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	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)[57]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
	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: • it is estimated that 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 • 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 photo-sensitive benthic communities in the vicinity of the well to rationalise phased/ timed discharge.	No

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[57]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Selection of smaller core size to reduce volume of drilling cuttings.	F: No. Cannot undertake the required test. CS: Not considered – control not feasible.	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 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.				

EPOs, EPSs and MC for Drilling and Tie-back Activities			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
EPO 8 No impact to water quality or marine biota greater than a consequence level of E[58] from discharging drilling cuttings or fluids during the Petroleum Activities Program.	**C 5.1** Refer to **Section 6.6.5**.	**PS 5.1** Refer to **Section 6.6.5**.	**MC 5.1.1** Refer to **Section 6.6.5**.
	C 5.5 Refer to **Section 6.6.5**.	**PS 5.5** Refer to **Section 6.6.5**.	**MC 5.5.1** Refer to **Section 6.6.5**.
	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.

58 Defined as "Slight, short-term impact (<1 year) on species, habitat (but not affecting ecosystems function), physical or biological attributes." as in **Table 2-3**.

EPOs, EPSs and MC for Drilling and Tie-back Activities			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
	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 SCE 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 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.	**PS 8.7** The decision whether to repair SCE or drill ahead has considered the estimated time for repairs and the amount of drilling until next planned trip out of hole, to ensure the OOC limit is not exceeded.	**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 soon as safe to do so. Evidence of assessment to drill ahead with failed SCE 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) demonstrate 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 SCE equipment).	**PS 8.9** WBM drill cuttings that are returned to the MODU processed using SCE equipment allowing reuse of mud prior to discharge.	**MC 8.9.1** Daily drilling reports demonstrate that operational SCE is in use.

EPOs, EPSs and MC for Drilling and Tie-back Activities			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
	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.

6.6.9 Routine and Non-Routine Discharges: Cement, Cementing Fluids, Subsea Well Fluids, and Subsea Chemicals from Drilling and Tie-back Activities.

Context		
Tie-back Activities – **Section 3.5**	Habitats and Biological Communities – **Section 4.5** 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***
Routine discharge of cement and cementing fluids, to the seabed and the marine environment	✓	✓		✓		✓	A	E	-	-	GP PJ	Broadly Acceptable	**EPO 9**
Routine discharge of subsea well fluids (inc. BOP and well construction activity control fluids)	✓	✓		✓		✓	A	E	-	-			
Produced/reservoir water disposal	✓	✓		✓		✓	A	E	-	-			
Non-routine discharge of unused bulk products	✓	✓		✓		✓	A	E	-	-			

Description of Source of Impact

Cement, Cementing Fluids, Grout, Subsea Well Fluids

Cementing Fluids, Cement and Grout

Cementing fluids, including cementing mix water, may require discharge to the marine environment under various scenarios during drilling activities for the LDA-02 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 to ensure 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.

Excess dry bulks, after well operations are completed will be retained at the end of this drilling program and are planned for use during subsequent Woodside campaigns, currently anticipated to take place on this MODU immediately following the conclusion of Lambert West drilling.

Dry bulk materials generally pose little or no risk to the environment (PLONOR)[59], but 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.

As described in **Section 3.5.3**, 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 m³ (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 3.5.2.3**. 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.

Impact Assessment

Potential Impacts to Environmental Values

Pelagic and benthic habitats and communities in the PAA 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 and Ancient Coastline at 125 m depth contour KEF overlaps the PAA, (**Section 4.7**); however, impacts to values and sensitivities of these KEF are not expected due to the 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).

59 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

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 to 50 m) will be permanently altered (Terrens et.al., 1998). The potential disturbance area is an estimated 0.007 km². 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.

KEFs

The Lambert West Operational Area overlaps the Ancient Coastline at 125 m depth contour KEF. There is potential for interaction with a surface release of cement within the 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 benthic infauna, epifauna and 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 Lambert West 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.

Cultural Heritage

As described in **Section 4.9.1**, the PAA overlaps the Ancient Coastline at 125 m depth contour KEF and therefore there is the potential that Indigenous Cultural features may exist and these may potentially be impacted by the surface release of cement or seabed release of grout. While no cultural features have been identified in the PAA, further archaeological studies will be undertaken prior to the activity commencing to understand any potential cultural features (refer **C 4.1**).

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 Petroleum Activities Program 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(s)

The overall impact significance level for routine and non-routine discharges of cement, cementing fluids, and subsea well fluids 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)[60]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Legislation, Codes and Standards				
No additional controls identified.				

60 Qualitative measure

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[60]***	***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**
Chemical reviews will be performed on all previously approved chemicals to confirm potential chemical impacts are reduced to ALARP.	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 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 contained. If discharge specification is 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**
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
Return bulk cement, barite and bentonite for onshore disposal.	F: No. The technical requirements to be able to undertake this safely are unresolved due to:	Not considered, control not feasible.	Not considered, control not feasible.	No

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[60]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
	significant health and safety risks with tank high pressure differentials to transfer material onshore. high health and safety risk with the vessel to waste truck transfer due to tank corrosion concerns and pressure relief valve issues. CS: Not considered. Control not feasible.			
Excess dry bulks retained on MODU.	F: Yes. Contract in place for subsequent offshore operations therefore dry bulk retained onboard. CS: Minor.	Retaining excess dry bulks onboard for subsequent works would eliminate the bulk discharge to the marine environment and eliminate the consequence of impacts from such activities.	Benefits outweigh cost/sacrifice.	Yes **C 9.1**
Sampling/analysis of stock barite to ensure acceptable levels of heavy metals (cadmium and mercury).	F: Yes. CS: Minimal cost. Standard practice.	Barite may contain heavy metals, such as cadmium and mercury, depending on their 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 9.2**
Unused MEG/brine will be transferred for future use or returned to port/staging point for disposal where possible.	F: Yes. CS: Minor.	Transfer of excess MEG/brine package for alternate project use or onshore disposal would eliminate the bulk discharge to the marine environment and eliminate the likelihood and consequence of impacts from such activities.	Benefits outweigh cost/sacrifice.	Yes **C 9.3**

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[60]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
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, and subsea well 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 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.

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.

Table 6-17: Consideration of control measures outlined in Article 9(5) of the Minamata Convention

Measures in Article 9(5) of the Minamata Convention	***Justification for Implementation or Rejection***
Release limit values to control and, where feasible, reduce releases from relevant sources.	The performance standard limiting the concentration of mercury in barite aligns with API standards and limits the release of mercury to the environment. Woodside will only discharge dry bulk barite if it cannot be used for subsequent drilling activities. In this instance, contracts are in place for subsequent operations and dry bulks will be retained onboard.
The use of best available techniques and best environmental practices to control releases from relevant sources.	Woodside has reviewed the *Guidance on Best Available Techniques and Best Environmental Practices - Minamata Convention on Mercury* (United Nations Environment Program, 2019). The best available techniques described in this document only apply to facilities listed in Annex D[61] of the Minamata Convention, which excludes offshore oil and gas drilling facilities; none of the best available techniques are applicable to the waste generation activity. Using best available techniques is intended to prevent or limit the release of mercury to the environment. This intent is met by the performance standard limiting the concentration of mercury in barite.
A multi-pollutant control strategy that would deliver co-benefits for control of mercury releases.	Woodside has identified a subsequent contract at the conclusion of this drilling activity and will retain dry bulk onboard. This eliminates dry bulk discharges of barite to the environment from this campaign. Woodside's performance standard limiting mercury concentrations in barite also limits the concentration of cadmium, which is also a recognized toxicant. This performance standard hence is a multi-pollutant strategy.
Alternative measures to reduce releases from relevant sources.	No other opportunities to reduce releases of mercury were identified.

61 Facilities listed in Annex D of the Minamata Convention comprise coal-fired power plants, coal-fired industrial boilers, smelting, and roasting processes used in the production of non-ferrous metals, waste incineration facilities, and cement clinker production facilities.

EPOs, EPSs and MC for Drilling and Tie-back Activities			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
EPO 9 No impact to water quality or marine biota greater than a consequence level of E[62] from discharging cement, cementing fluids, subsea well fluids and unused bulk products during the Petroleum Activities Program.	**C 5.1** Refer to **Section 6.6.5**.	**PS 5.1** **Refer to Section 6.6.5**.	**MC 5.1.1** **Refer to Section 6.6.5**.
	C 5.5 Refer to **Section 6.6.5**.	**PS 5.5** Refer to **Section 6.6.5**.	**MC 5.5.1** Refer to **Section 6.6.5**.
	C 8.4 Refer to **Section 6.6.8**.	**PS 8.4** **Refer to Section 6.6.8**.	**MC 8.4.1** **Refer to Section 6.6.8**.
	C 8.5 Refer to **Section 6.6.8**.	**PS 8.5** Refer to **Section 6.6.8**.	**MC 8.5.1** Refer to **Section 6.6.8**.
	C 9.1 Excess dry bulks retained on MODU.	**PS 9.1** Excess dry bulks retained onboard for use during subsequent drilling campaign. .	**MC 9.1.1** Records demonstrate that, excess dry bulk cement, bentonite or barite were retained at conclusion of drilling activity.
	C 9.2 Sampling/analysis of stock barite to ensure acceptable levels of heavy metals (cadmium and mercury).	**PS 9.2** Sampling/analysis of stock barite to ensure that heavy metals of concern 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 (<3 ppm) dry weight in stock barite.	**MC 9.2.1** Records demonstrate that concentrations of heavy metals within stock barite used during the activity are within acceptable levels.
			MC 9.2.2 Heavy metal analysis records demonstrate individual barite stocks used during the activity are within limits prescribed by API standards for mercury and cadmium.

62 Defined as “Slight, short-term impact (<1 year) on species, habitat (but not affecting ecosystems function), physical or biological attributes.” as in **Table 2-3**.

EPOs, EPSs and MC for Drilling and Tie-back Activities			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
	C 9.3 Unused MEG/brine will be returned to port/staging point for disposal where possible.	**PS 9.3** Return all unused MEG/Brine for onshore disposal where possible.	**MC 9.3.1** Records demonstrate all unused MEG/brine returned to shore for disposal where possible.

6.6.10 Routine and Non-routine Atmospheric and Greenhouse Gas Emissions: Fuel Combustion, Flaring and Fugitives

Context		
Operational Flaring – **Section 3.4.7** Utility Systems – **Section 3.4.12** Project Vessels – **Section 3.5**	Physical Environment – **Section 4.4**	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***
Operational flaring, exhaust emissions from fuel combustion, fugitive emissions from the Angel facility				✓				A	F	-	-	LCS GP PJ	Broadly Acceptable	**EPO 10** **EPO 11**
Exhaust emissions from fuel combustion and incinerators on the MODU, 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)				✓										
Emissions associated with energy generation at NRC, onshore processing of Angel gas, third party transportation, regassification and combustion by end users				✓				B						

Description of Source of Impact

Atmospheric emissions generated during the Petroleum Activities Program 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 (NO_x), sulphur dioxide (SO_2), particulate matter less than 10 microns (PM10), non-methane volatile organic compounds (VOCs), BTEX (benzene, toluene, ethylbenzene and xylenes), which are specific VOCs of interest.
- Greenhouse gas (GHG) emissions refer to gases that trap heat within the atmosphere through the adsorption of longwave radiation reflected from the earth's surface. The main gases associated with this effect include carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). Other greenhouse gases include perfluorocarbons (PFCs), hydrofluorocarbons (HFCs) and sulphur hexafluoride (SF_6). There are considered to be both direct and indirect GHG emissions (**Table 3-5**).

In this section greenhouse gases are estimated using the National Greenhouse and Energy Reporting (NGER) Measurement Determination 2008 (as amended including 100-year Global Warming Potential).

Direct Atmospheric and Greenhouse Gas Emissions

Direct atmospheric emissions from the Angel facility during the Petroleum Activities Program include emissions from equipment and generators, flares, 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 in **Table 6-18**, **Table 6-19**, **Table 6-20** and **Table 6-21** are derived from data collected during the 2022/23 financial year and adjusted for the next 5-year period. They are considered representative of the next 5-year period of the Angel Operations EP, approximately 2024 up to 2029[63]. The 2022/23 year using Lambert Deep is considered an appropriate baseline year because it included the startup of Lambert Deep, and as the decline in Lambert Deep occurs, will be replaced with production from Lambert West and therefore, the overall production and emissions rates are expected to be within that of 2022/23. Variance within the period may occur, for example, reduced hydrocarbon throughput from field decline is expected to proportionally decrease the emissions from flaring. Alternatively, increased platform visitation could increase emissions.

Fuel Emissions

No fuel gas is used on the Angel facility for the generation of power, since electricity is supplied from NRC. During staffed operations, diesel is used on the riser platform for the operation of the crane and survival craft.

Diesel use on the facility (excluding support vessels) in 2022/23 was 8 m³, the combustion of which equated to the emission of ~22 tonnes of CO_2 equivalent. It is estimated that up to 15 m³ of diesel will be combusted per year over the EP period and until EOFL. Diesel use during extended, continuously crewed periods may result in up to 75 m³ per annum.

The forecast annual emissions from fuel combustion on the facility has been estimated using emissions factors (as per National Pollutant Inventory (NPI) Emission Estimation Techniques (EET)) and are presented in **Table 6-18**.

Table 6-18: Estimated annual emissions from diesel combustion at the facility under steady state operations (excluding support vessels)

Emission type	***Estimated annual CO_2 eq. emissions from diesel combustion (tonnes)[1]***
CO_2	40.5
CH_4	0.06
N_2O	0.12
Total CO_2 eq	40.6
NOx	0.80
SOx	0

[1] Based on combustion of 15m³ of diesel per year.

Flaring

During normal operations, hydrocarbon gas is flared from the Angel facility via the HP and LP flare systems. Gas flaring emits gases to atmosphere and consumes natural gas, a non-renewable resource. Emissions and combustion products include CO_2, NO_x, SO_2, methane, particulates, and VOCs. Incomplete combustion under certain scenarios may also generate dark smoke.

The release of hydrocarbon gas to atmosphere by flaring is an essential practice, primarily for safety requirements. Operational flaring is comprised of two elements, being:

- normal operational flaring associated with flare system purge and pilot, process flows and glycol regeneration.
- non-routine flaring that may result from activities such as planned shutdowns and emergency shutdown testing, and unplanned shutdowns and emergency shutdowns, production restarts, equipment outage/failures, subsea flowline depressurisation and commissioning activities (**Section 3.5.4**).

During flaring, the burnt gas generates mainly water vapour and CO_2. Based on 2022/2023 flaring from production of Lambert Deep, it is estimated that up to 9000 t of gas is flared per year including water vapour, inert gas and hydrocarbon gas in routine and non-routine activities, such as planned shutdowns or production trips could be flared from Angel Facility once Lambert West is tied in. Flaring volumes vary as a result of production rates and non-routine activities. HP flaring may occur periodically during suspension, with reduced LP flaring. The forecast annual atmospheric emissions from flaring were estimated using the NPI EET (**Table 6-19**). The Lambert West start up is expected to have no planned impact to flaring.

Table 6-19: Estimated annual emissions from flaring at the facility.

Component	Estimated flaring emissions (tonnes CO_{2eq})
Flared gas quantity	9000
CO_2	24,300
CH_4	1197
N_2O	234
Total CO_{2eq}	25,731
NO_x	13.5
SO_x	0
CO	78.3

Reference: NGER Measurement Determination 2008 and NPI EET Manual for Oil and Gas v2.0 2013, Table 8.

Note: SO_x emissions have not been estimated, as the estimation technique from the NPI EET does not account for SO_x. Additionally, the diesel used at Angel is very low in total sulphur and therefore SO_x is not a contaminant of concern in the regional airshed.

Non-routine Venting of Process Hydrocarbons via Flare System

In the unlikely event the flares are extinguished (for example during a cyclone) or unavailable (such as after a major shutdown prior to system ramp-up), the hydrocarbon gas discharged via the flare system may initially not be combusted during the period required to purge the flare and re-establish flare ignition. This may result in the short-term (days) low-rate release of methane to atmosphere. The flare is monitored via CCTV from NRC CCR. As a contingency, the flare can be manually ignited (in the event the pilots are extinguished) to minimise cold venting. However, the flare is not known to have unintentionally extinguished during the asset life (since 2008). Intermittent venting from the facility represents 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, emitted by infrequent operational activities, or can be caused by unintentional equipment leaks. Sources can include valves, flanges, pump seals, relief valves, vents, sampling connections, process drains, open-ended lines, casing, tanks and other potential leak sources from pressurised equipment. Fugitive emissions are, by their nature difficult to quantify. An approach specified by the National Greenhouse and Energy Reporting Scheme (NGERS), is to indirectly estimate the amount of emissions based on platform type (i.e., shallow water or deep water).

As much of the safe operation of the facility relies on the effective containment of hydrocarbons, the volumes of routine and non-routine fugitive emissions are considered to be small (refer to **Section 6.7.3** for potential atmospheric unplanned hydrocarbon releases associated with accidents, incidents and emergency situations). The National Greenhouse and Energy Reporting (Measurement) Determination 2008 estimates fugitive emissions from shallow water offshore platforms (e.g. Angel platform) to be 1,747.1 t CO_2e p.a. of methane and 7.1 t CO_2e p.a. of carbon dioxide.

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 greenhouse gases or ozone depleting substances.

Indirect Emissions

Tie-back Activities

MODU, Vessel and Helicopter Operations

Atmospheric emissions during tie-back activities are generated by project vessels from internal combustion engines (including all equipment and generators) and incineration activities (including onboard incinerators) during the Petroleum Activities Program for standard operations, excluding drilling waste.

Atmospheric emissions generated during these operations will include SO_x, NO_x, particulates and VOCs. SO_x 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 Azerbajan, 2013). NO_2 was the focus of the modelling, on account of the larger predicted emission

63 End of field life is estimated to be 2027, however is dependent on reservoir performance, therefore up to five years of operations is included.

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/m^3 (0.001 ppm) within 10 km of the source and 0.1 µg/m^3 (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/m^3 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 DP or hybrid DP MODU may be used due to the depth of the PAA or in the event of adverse weather conditions. Other vessels required for the Petroleum Activities Program (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 DP MODU will consume approximately 44 t/d when compared to similar scenarios. Based on the information available it is expected that up to approximately 13,060 tonnes of fuel may be used from MODU activities (70 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 10,418t CO_2-e (**Table 6-20**).

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 2814 t CO_2-e for drilling activities, subsea installation and contingent well intervention activities. Helicopter operations during drilling activities may consume up to 286t CO_2-e, based on ~1.5 t/day. The potential for multiple helicopter runs has been considered in greenhouse gas summations (**Table 6-20**).

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 greenhouse gases 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 volume of GHG emissions from well kicks and venting is estimated to be approximately 378t CO_2-e (**Table 6-20**).

Well Flowback (Flaring) and Contingency Activities (Venting)

The preferred well unloading method for the tie-back activities is to direct all fluids to the Angel 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. Approximately 48 hours ~1.5 mmscf of gas, 534 bbl condensate may be flared, or 529t CO_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.

Cold 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 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 3 to 5 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 6-20: Greenhouse gas emissions and sources from tie-back activities

Source	*GHG Emissions (CO2-e t)*
MODU Activities	
MODU operations	8330
4 support vessel operations	1908

Helicopter operations	286
Well kick - drilling operations (60bbl Cold vent)	0.5
Subsea Installation and Commissioning	
4 support vessels	763
Primary installation vessel	763
Intervention/Contingency Scenarios	
Intervention Vessel	858
2 support vessel operations	143
Contingent flaring	3.5
Well kick and flowback	529
Vented per well	378
Cold venting – riser disconnect (~1800PSI)	176
Cold venting – tool change (5 changes)	<1
Cold venting – surface returns	<1
Cold venting – removal of tree cap	<1
Total GHG Emissions	**13,231**

GHG and Atmospheric emissions from North Rankin Complex

NRC provides power to the Angel Facility via a subsea cable. NRC has three producing trains and 100% compression. For the Angel Facility indirect emissions attributed to NRC include gas/diesel turbines generating power. Flaring, venting and fugitive emissions from NRC are excluded from consideration of Angel indirect emissions, as the main sources of those emissions are from production of gas.

Indicative energy use by the Angel facility when producing between 2022-2023 was 0.8 to 1.2 MW, a reduction from approximately 0.9 to 2 MW over 2016 to 2020. When production is offline and the platform is staffed, the approximate baseload energy consumption of the platform use is 0.2 MW, which is approximately 1.7% of typical NRC generation.

GHG emissions from NRC attributed to Angel based on a percentage of production are listed in **Table 6-21**.

Greenhouse Gas and Atmospheric Emissions from Support Vessels and Helicopters

GHG and atmospheric emissions are generated by vessels and helicopters supporting Angel. Vessel emissions include those from internal combustion engines and fugitives. 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. Vessel Masters control day to day operations that determine support vessel emissions. Woodside has the potential to influence fleet level approach 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:

- 2500 t CO_2-e for support vessels, based on diesel consumption in 2020 (some vessels are dual-fuel and can use LNG, if using LNG as fuel, combustion emissions are expected to be lower)
- 300 t CO_2-e for IMMR vessels, based on diesel consumption.
- 200 t CO_2-e for helicopters, based on Jet A1 fuel consumption in 2022/23

Indirect emissions from these sources are expected to be relatively constant throughout the EP period and until EOFL.

GHG Emissions from Processing and Product End-use associated with Angel

Indirect emissions associated with Angel result from hydrocarbon processing (onshore), third party transport of products, regassification, distribution and combustion by end users. Indirect GHG emissions associated with Angel operations were estimated using historical emissions intensity methods (**Table 6-21**). Key influences impacting indirect GHG from Angel include:

- Total production – indirect emissions are proportional to total production, which varies with shutdown activity, new field tiebacks or gradual reservoir decline.
- Composition of produced gas – onshore emissions are proportional to reservoir CO_2.

- Split of saleable products from KGP – the proportion of hydrocarbons from Angel sold as LNG, condensate, domestic gas and LPG 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.

Indirect emissions associated with annual Lambert Deep and Lambert West production via Angel, including those apportioned at KGP, and from transport and customer combustion, are estimated to be approximately 4.8 Mt CO_2-e per annum, totalling up to 23.8 Mt CO_2-e at expected EOFL. This is based on operational data for production from Lambert Deep and expanded to include production from Lambert West. Emissions associated with power generation from NRC are estimated to be up to 0.010 Mt CO_2-e per annum and 0.051 Mt CO_2-e at full production rates until the estimated EOFL.

Woodside's current forecast is that the reservoir produced via Angel will decline toward EOFL. Overall, the trend of hydrocarbon production and indirect emissions from onshore processing and third-party transport, regasification, distribution, and end use are expected to also decline.

Table 6-21: Indirect and direct greenhouse gas emissions associated with Angel production.

Source of Impact	*Annual estimated emissions (Mt CO_2-e)*	*Total possible emissions for EP period (Mt CO_2-e)*
Direct Emissions		
Fuel, flaring and fugitives	0.028	0.14
Indirect Emissions		
North Rankin Complex (electrical generation)	0.010	0.051
Onshore hydrocarbon processing	0.47[1]	2.37
Vessels and helicopters	0.003	0.015
Third party transport of products, regassification, distribution and end use	4.30[2]	21.48

[1] Based on 2022/2023 maximum monthly production and KGP emissions intensity apportionment calculation.

[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. 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.

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 Angel facility to support our customers' plans to secure their energy needs, while they reduce their emissions.

Impact Assessment

Air Quality

Facility, tie-back activities and vessel routine and non-routine emissions, predominantly routine flaring, have the potential to result in localised, temporary reduction in air quality, generation of dark smoke and contribution to greenhouse gas 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.

There is a foraging BIA for the wedge-tailed shearwater overlapping the PAA; as such, wedge-tailed shearwaters 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 the nearest populated area (Dampier).

The flare and potential black smoke resulting from emissions may impact visual amenity. The offshore location of the Petroleum Activities Program is not directly visible from the nearest landfall (Dampier Archipelago, 94 km south of the

PAA at the closest point). Hence, no impacts to visual amenity for residential communities are expected. Visual amenity impairment to tourism activities is not expected.

Greenhouse Gas Emissions – Habitat and Biological Communities, Protected Species, Key Ecological Features, Protected Places, Socioeconomic and Cultural Environment

This impact assessment considers the potential impacts of climate change on sensitive receptors, including MNES within Australian jurisdictions. Climate change impacts cannot be attributed to any one activity or one project, including the Angel Facility or tie-back of LDA-02, 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. There is no direct link between greenhouse gas emissions from the Angel facility, Angel project or NRC and climate change impacts.

Climate change impacts upon Australian receptors cannot be linked to the Angel facility but are instead the result of the accumulation of net greenhouse gas emissions in the atmosphere. The accumulation of net greenhouse gas emissions in the atmosphere is, in turn, influenced by global energy demand and the composition of the global energy mix. Although the Angel facility cannot be linked to climate change impacts; the following contextual evaluation is provided.

Greenhouse gas emissions associated with Angel are estimated to be ~24.06 Mt CO2-e till EOFL, which ~3.23 Mt CO2-e may originate in Australia. For the purposes of comparison, assuming this total was split evenly across operational years (2024 to 2029; up to 5 years) the ~0.8 Mtpa CO2-e would represent ~0.17% of national Australian emissions (463.9 Mt CO2-e during 2022) (DCCEEW, 2023f). These emissions will not materially or substantially contribute to either Australia's GHG emissions or global GHG emissions.

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 (Woodside, 2023a).

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-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.

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 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*)[64]

64 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).

- 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 report identified nine key climate risks for the Australasian region:

- 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, snowgum 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).

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 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.

Emissions associated with Angel are not predicted to contribute materially or substantially to Australia's total GHG emissions, and there is no link between indirect greenhouse gas emissions associated with the Angel facility and climate change impacts upon Australian receptors.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[65]***	***Benefit in Impact Reduction***	***Proportionality***	***Control Adopted***
Legislation, Codes and Standards				
Vessel operations comply 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 reduces air pollution from vessels.	Control based on legislative requirements – must be adopted.	Yes **C 10.1**
National Greenhouse and Energy Reporting Scheme (NGERS) and National Pollutant Inventory (NPI) reporting – estimation of greenhouse gas,	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, greenhouse gas emissions, greenhouse gas projects,	Control based on legislative requirements – must be adopted.	Yes **C 10.2**

65 Qualitative measure

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[65]***	***Benefit in Impact Reduction***	***Proportionality***	***Control Adopted***
energy and criteria pollutants.		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.		
Apply for and manage net direct and indirect NWS 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.	Control based on legislative requirements – must be adopted.	Yes **C 10.3**
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-	F: Yes. CS: Minimal cost. Standard practice.	The 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)[65]***	***Benefit in Impact Reduction***	***Proportionality***	***Control Adopted***
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 appropriatenes s 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				

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[65]***	***Benefit in Impact Reduction***	***Proportionality***	***Control Adopted***
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.				
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**
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	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)[65]***	***Benefit in Impact Reduction***	***Proportionality***	***Control Adopted***
• independent power systems.				
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 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**
Well control bridging document (WCBD) for alignment of Woodside and the MODU Contractor in order to manage the equipment and procedures for	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**

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[65]***	***Benefit in Impact Reduction***	***Proportionality***	***Control Adopted***
preventing and handling a well kick.				
Good Practice				
Implement a program to monitor market developments related to the contribution of natural gas in the energy transition: • Working with the natural gas value chain to reduce methane emissions in third party systems (e.g., regasification and distribution). • Promoting the role of LNG in displacing higher carbon intensity fuels. • Supporting the development of new technologies to reduce higher carbon intensive energy sources. • Advocating for stable policy frameworks that reduce carbon emissions. • Monitoring the global energy outlook including the demand for lower carbon intensive energy such as LNG and displacing higher carbon intensive fuels.	F: Yes. CS: Moderate cost. Standard practice.	Implementing a program to monitor market developments will support the transitioning to a lower carbon future. This is aligned with global agreement to limit climate change to well below 2°C.	Benefits outweigh cost/sacrifice.	Yes **C 11.1**
Forecast, measure, monitor and or estimate facility	F: Yes.	Minimises environmental impact of emissions through planning, ongoing review,	Control is WMS requirement –	Yes **10.9**

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[65]***	***Benefit in Impact Reduction***	***Proportionality***	***Control Adopted***
GHG emissions (in accordance with NGERS/NPI) to inform optimisation management practices and minimise environmental impact of direct Angel and indirect NRC and KGP emissions.	CS: Minimal cost. Standard practice.	governance and optimisation. It combines with good operating practice to maximise production and reduce flaring emissions (Angel) and fuel emissions at NRC and KGP, which improves energy intensity (e.g., cleaner production), optimising emissions from the NWS. 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 Angel to date this has been limited to reduced flaring (e.g., flare purge rates); however, NRC opportunities are also considered in this process. Annual flare target setting and monthly review of performance is completed for Angel. NRC and KGP also apply fuel and flare target setting and tracking for indirect emissions management. Daily production meetings allow for optimisation of NWS as an integrated production system, considering impacts of variables such as maintenance activities and temperature influence on production rates.	must be adopted.	
Implement relevant methane management at Angel.	F: Yes. CS: Some cost associated with implementation of commitments. Can be managed by proving technology application and process at onshore facilities and applying, where appropriate, to Angel.	Methane management activities are aligned with environment, social and governance expectations, and Woodside's approach to methane emissions management and are consistent with OGMP 2.0 and Near-Zero, consistent with industry recognised practice. Angel methane management practices include: • CCTV monitoring of the flare ignition from NRC CCR to reduce	Control is committed – will be adopted.	Yes **C 10.10**

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[65]***	***Benefit in Impact Reduction***	***Proportionality***	***Control Adopted***
		incomplete combustion in flaring. • Regular visitation (every 8-10 weeks) to facilitate inspection and maintenance, which may include methane reduction work. • Angel methane inventory developed by 2025 to identify, evaluate methane sources in accordance with Woodside's Production Optimisation and Opportunity Management Procedure (POOMP) (Section 7.2.4.7) and current OGMP framework. This framework requires reduction priority according to the materiality of the emissions across Woodside's portfolio of methane emissions. • Safety-driven LDAR - start-up leak checks reduce methane emissions. • Operational gas detection fixed and mobile, to identify hydrocarbon leak sources, predominantly methane. These management measures at Angel, align with Woodside's corporate approach to methane emissions management as appropriate including current OGMP and Near-Zero requirements to deliver appropriate and proportional identification and reduction effort of methane for a platform of this nature and scale.		
Maintaining CCTV monitoring systems to prevent/respond to unplanned venting.	F: Yes. CS: Standard practice.	Minimises environmental impact through the reduction of unplanned venting. Monitoring of the flare is conducted via CCTV from the NRC CCR. In the event the flare is extinguished the	Benefits potentially outweigh cost/ sacrifice.	Yes **C 10.14**

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[65]***	***Benefit in Impact Reduction***	***Proportionality***	***Control Adopted***
		flare can be manually reignited via the reignition panel. A platform visit would be required and can be performed outside of regular visitation to reduce the duration of venting and restore blowdown safety. Note: Since commissioning, the Angel flare has not extinguished unintentionally.		
Leak Detection and Repair (LDAR) activities	F: Yes. CS: 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 handheld equipment or top-down / remote sensing, e.g., via drone, is feasible. There is cost associated with additional personnel and specialist vendors, transport, helicopters, technology qualification and extended visitation impacts for LDAR work for NNC facilities like Angel. LDAR targeting small leaks may be cost effective on a portfolio approach, or at larger facilities with more repeatability and fewer constraints.	Continuous fixed gas detection and operator inspections upon platform arrival, detect and enable repair of material methane emissions. Post-shutdown start-up infrared and portable gas detection identify leaks for evaluation and repair. Benefits likely outweigh minor cost/sacrifice. LDAR campaigns during operations targeting fugitive emissions may identify opportunities for repair, resulting in emissions reduction.	Process safety-driven gas detection is good industry practice. Implemented in design and operation. Cost/sacrifice of executing LDAR campaigns during operations likely outweighs benefits of emissions reduction at Angel. However, may be adopted to achieve portfolio materiality approaches of methane emissions management and current OGMP and Near-Zero frameworks.	Yes **C 10.10**
Contracting strategy and evaluation for hire of support vessels includes consideration of vessel emissions parameters and low carbon/alternate fuels.	F: Yes. CS: Fuel cost over the five year contract is considered in the evaluation of responses, allowing for competitive consideration of low carbon alternatives.	Minimises costs and emissions through eco-efficiency approach recognising cost of fuel and carbon emissions over the contract term.	Control effectively allocates a cost to emissions to recognise that higher emitting fuel sources with other lower operating costs do not represent	Yes **C 10.11**

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[65]***	***Benefit in Impact Reduction***	***Proportionality***	***Control Adopted***
			overall best value.	
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 10.12**
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 Angel 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 for some or all wells. In this case the wells are instead flowed back to the eventual host facility (the Angel Facility), resulting in a small increase to expected bean-up flaring for the well but resulting in a net overall flaring decrease. The decision on whether to unload to the host will be based on the outcome of ongoing studies and operational data gathered during the drilling activity.	Benefits potentially outweigh cost/ sacrifice.	Yes **C 10.13**
Professional Judgement – Elimination				
Eliminating 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
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 Angel Field Development Plan, which seeks to optimize	Not assessed, control not feasible.	Not assessed, control not feasible	No

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[65]***	***Benefit in Impact Reduction***	***Proportionality***	***Control Adopted***
	hydrocarbon recovery while fulfilling NWS gas supply commitments. As such, gas reinjection would not meet concept screening criteria to warrant option evaluation. CS: Not assessed, control not feasible.			
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 NRC 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 on NRC, with diesel as back up fuel used when gas production is shut down. CS: Cost effective.	Gas turbines reduce CO_2 emissions for a given unit of power and reduce spill risk associated with diesel bunkering activities.	Cost effective. Minimises fuel bunkering risks.	Yes. Solution permanently implemented.
Professional Judgement – Engineered Solution				
Maintaining flare to maximise efficiency of combustion and minimise venting, incomplete combustion waste products and smoke emissions.	F: Yes. CS: Minimal cost. Standard practice.	Flare tip integrity and ignition system functionality minimises potential for venting, incomplete combustion waste products and smoke emissions.	Benefits potentially outweigh cost/ sacrifice.	Yes **C 10.15**
Manage vessel speed to reduce fuel combustion.	F: Yes. CS: Standard practice.	Reducing fuel combustion reduces atmospheric emissions.	Benefits outweigh cost/sacrifice.	Yes **C 10.16**
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	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 variations). Furthermore, required retrofitting of	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	No

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[65]***	***Benefit in Impact Reduction***	***Proportionality***	***Control Adopted***
	rotating equipment also poses significant production sacrifice and potential domestic gas supply impacts due to the initial design layout and space safety constraints.	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 of gas compression would also increase platform safety risks.	systems is considered grossly disproportionate to the environmental benefit it would provide.	
Upgrade flare equipment to allow remote (uncrewed) reignition of flare in the case the flare is extinguished.	A remote flare ignition system is feasible. A brownfield modification of this nature would incur cost and risk the operational performance of the flare ignition system. Operation and maintenance of this system is also additional cost.	A remote flare ignition system could reduce methane venting from flare in the event the flare is extinguished. Benefits would be minor, given the Angel flare is not known to have unintentionally extinguished since commissioning. Methane reduction from remote flare ignition upgrade would be offset by the commissioning and operational testing requirement to extinguish the flare and re-light. This would vent hydrocarbons.	Cost of a remote flare ignition upgrade and operation would outweigh the irregular and minor emissions reduction.	No

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[65]***	***Benefit in Impact Reduction***	***Proportionality***	***Control Adopted***

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 Angel 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 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 emissions sources from NWS assets as an integrated system, including Angel, e.g., flaring reduction was implemented, resulting in reduction of flared gas of 140 tpa (395 tCO2e). Further opportunities are implemented at KGP and NRC to reduce indirect emissions associated with production of Angel and combined emissions from the NWS assets.

Societal Values

Consultation was undertaken for this program to identify the views and concerns of relevant persons, as described in **Section 5**. No specific concerns around air emissions, resulting in changes to air quality and greenhouse gas emissions, were identified through this process.

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 Angel facility and indirect emissions sources that Woodside can practicably influence, including support vessels, during the 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 Angel, NRC and KGP.

National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015.

Indirect GHG emissions from onshore processing at KGP are managed under Ministerial Statement 536. As part of the North West Shelf Project Extension approvals process (currently under assessment) a draft Greenhouse Gas Management Plan has been submitted to the EPA that includes an emissions limit.

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: 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 Angel facility, in an unpopulated area approximately 94 km from the nearest community receptor. The adopted controls are considered good oil-field practice/industry best practice and meet requirements of Australia Marine Orders and National Pollutant Inventory reporting.

The predicted GHG emissions associated with Angel are considered negligible and as such, below acceptable levels and will not materially or substantially contribute to Australia's net GHG emissions or net global emissions levels.

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.

Acceptability Statement: GHG emissions

Principles of Ecologically Sustainable Development

Giving consideration to economic development that safeguards the welfare of future generations, Angel is considered to align with the following core objectives of ESD by:

Responding to the global energy transition, providing a clean and reliable energy source as gas is expected to play a key role in the future energy mix (e.g., partner with renewables). In addition, gas has 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.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[65]***	***Benefit in Impact Reduction***	***Proportionality***	***Control Adopted***

Committing to management and mitigation measures for GHG emissions within operational control of the facility, given the uncertainty about future climate change trajectories.

Committing to mitigation measures for GHG emissions that are controlled or influenced by Operator and associated with the operations of the Angel facility.

Providing gas to customers within countries that have ratified the Paris agreement, where each country is responsible for accounting for, reporting and reducing emissions that physically occur in its jurisdiction.

Internal Context

The Petroleum Activities Program 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)**

For more information, please see Woodside's Climate Transition Action Plan and 2023 Progress Report (Woodside 2023a).

WMS requirements such as the GHG emissions and Energy Management Procedure, Production Optimisation and Opportunity Management Procedure and Woodside's corporate approach to methane emissions management (**Section 7.2**), which require continuous improvement and demonstration of ALARP in the context of the asset. This is achieved by implementing tools to identify, evaluate, implement and review emissions reductions projects and develop, govern and report on plans to reduce methane fugitive emissions.

External Context

Woodside recognises that our 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. GHG emissions are a global concern, and as such Woodside has undertaken an impact assessment of GHG associated with the Angel 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.[66]

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[67]:

> "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, recognizing that 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.[68] 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.[69] It

66 Export from the 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-emissions-tool.pdf
67 Paris Agreement: https://unfccc.int/files/meetings/paris_nov_2015/application/pdf/paris_agreement_english_.pdf
68 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)
69 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))

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[65]***	***Benefit in Impact Reduction***	***Proportionality***	***Control Adopted***

also recognises that transitional fuels can play a role in facilitating the energy transition while ensuring energy security[70].

The Paris Agreement establishes a framework where countries make Nationally Determined Contributions (NDCs) 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 43% below 2005 levels by 2030 and to reach net zero emissions by 2050 (DISER, 2022a). Australia's emissions projections demonstrate that it is on track to reduce emissions by up to 43% below 2005 levels by 2030 (DCCEEW, 2022; DISER, 2022a).

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 robust 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 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.

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 that a stable energy transition will be one in which energy is affordable and reliable, as well as lower carbon. The Angel facility, together with the new well at Lambert West (LDA-02), will provide an incremental volume of hydrocarbons to Australian and international markets during its estimated remaining field life (to 2027). Woodside considers that this development is aligned with their goals for supporting the energy transition and is compatible with the Paris Agreement goal to limit global warming to below 2°C. Further, field life of the reservoirs comprising the Angel facility shall not extend beyond estimated field life (estimated as 2027, and up to 2028 to allow for uncertainty in reservoir performance), which contributes to global emissions reductions from beyond this point in time.

Woodside is a signatory to several global initiatives which are complementary to our corporate approach to methane emissions management, which include OGMP (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. Woodside will pursue compliance with these commitments at the Angel facility in line with the control measures (C.10.10) (refer to Internal Context above, and key control measure.

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.

70 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)

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[65]***	***Benefit in Impact Reduction***	***Proportionality***	***Control Adopted***
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 Emission intensity for reservoir carbon from new gas fields		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 *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. Conservation Management Plan for the Southern Right Whale 2011–2021 *Management action A4.1*: Continue to meet Australia's international commitments to reduce greenhouse gas emissions and regulate the krill fishery in Antarctica. 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		As described above, the predicted atmospheric and GHG emissions from the Angel facility are considered negligible, with no link to climate change impacts on Australian or International receptors. Therefore, the Angel 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 Advice for Fin Whale (TSSC, 2015b), Conservation Management Plan for the Southern Right Whale (DSEWPaC, 2012a), or the 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.		N/A.		

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[65]***	***Benefit in Impact Reduction***	***Proportionality***	***Control Adopted***
North-west Marine Parks Network Management Plan No specific zone rules identified				

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).

Indirect GHG emissions associated with the Angel 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. The adopted controls are considered good oil-field practice/industry best practice and are consistent with Woodside's internal requirements. The potential impacts are considered acceptable if ALARP is demonstrated. As described above, the predicted GHG emissions associated with the Angel facility are considered negligible and as such, below the acceptable levels and will not materially or substantially contribute to Australia's net GHG emissions or net Global GHG emissions levels.

EPOs, EPSs and MC for Angel Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 10a Angel facility GHG emissions shall assist in NWS Project achieving GHG reductions under reformed Safe Guard Mechanism (inclusive of legislated net zero emissions by 2050). No impact to air quality greater than a consequence level of F[71] from atmospheric emissions during the Petroleum Activities Program.	**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.
	C 10.2 NGERS and NPI reporting – estimation of greenhouse gas, energy and criteria pollutants.	**PS 10.2** NWS 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 NWS 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 NWS GHG emissions to within the accepted baseline, under the National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015.	**MC 10.3.1** Records demonstrate implementation.

71 Defined as 'no lasting effect (<1 Month); localised impact not significant to environmental receptors' as in **Table 2-3** (**Section 2.6.3**).

EPOs, EPSs and MC for Angel Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	C 10.9 Forecast, measure, monitor and or estimate facility fuel and flare emissions (in accordance with NGERS/NPI and WMS procedures named in **Section 7.2.4.8**) to inform optimisation management practices and minimise environmental impact of emissions.	**PS 10.9.1** Integrity will be managed in accordance with SCE Management Procedure (**Section 7.2.6**) 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.	**MC 1.13.1** Refer to **Section 6.6.10**.
		PS 10.9.2 Fuel and flare targets tracked, as required by WMS procedures named in **Section 7.2.4.8**.	**MC 10.9.1** Records demonstrate performance against annual fuel and flare targets.
		PS 10.9.3 Implement Production Optimisation and Opportunity Management Procedure for the Angel facility as a component of NWS operations.	**MC 10.9.2** Records demonstrate annual process is applied.
		PS 10.9.4 Direct emissions from the operation of Angel facility are limited to 26 ktCO_2e p.a[72].	**MC 10.9.3** Records demonstrate emissions do not exceed this total.

72 The 26 ktCO2e p.a. is derived from the summation of annual fuel (**Table 6-18),** flare (**Table 6-19**) and fugitive emissions, rounded up to nearest thousand.

EPOs, EPSs and MC for Angel Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	C 10.10 Implement relevant methane management measures at Angel.	**PS 10.10** Implement relevant methane management measures including: • Regular visitation (currently every 8-10 weeks) to maintain equipment, which may include methane reduction work. • Angel methane inventory by 2025 to identify and evaluate methane sources in accordance with Woodside's POOMP and OGMP framework. • Safety-driven LDAR - start-up leak checks. • Operational gas detection fixed and mobile, to identify methane sources. • LDAR campaigns according to portfolio materiality approach.	**MC 10.10.1** Records demonstrate relevant methane management measures are identified, assessed and implemented.
	C 10.11 Contracting strategy and evaluation for hire of support vessels includes consideration of vessel emissions parameters and low carbon/alternative fuels.	**PS 10.11** Evaluation of tenders for support vessels considers emissions parameters.	**MC 10.11.1** Records demonstrate that emissions were considered in tender evaluations.
	C 10.14 Maintaining CCTV monitoring systems to prevent/respond to unplanned venting.	**PS 10.14** Instrumentation integrity will be managed in accordance with SCE Management Procedure (Section 7.2.6) and SCE Technical Performance Standard(s) P31 – Environmental Emissions Monitoring and Controls, which: • provides means of detecting environmental releases, emissions and discharges to prevent MEEs from manifesting over time, and/or assure compliance monitoring and reporting equipment as required. • ensures data is available to monitor gas flared. • Describes function and maintenance requirement of flare re-ignition panel.	**MC 1.13.1** Refer to **Section 6.6.10**

EPOs, EPSs and MC for Angel Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	C 10.15 Maintaining flare to maximise efficiency of combustion and minimise venting, incomplete combustion waste products and smoke emissions.	**PS 10.15** Refer to **PS 10.9.1**.	**MC 10.15.1** Refer to **MC 10.9.1**.
EPO 11 Actively support the global transition to a lower carbon future by compliance with relevant Corporate Woodside policies, including those designed to monitor market developments related to natural gas in the energy transition, and to support customers and suppliers to reduce their GHG emissions.	**C 11.1** Implement a program to monitor market developments related to the contribution of natural gas in the energy transition: • Working with the natural gas value chain to reduce methane emissions in third party systems (e.g., regasification and distribution), such as through the adoption of the Methane Guiding Principles. • Promoting the role of LNG in displacing higher carbon intensity fuels. • Supporting the development of new technologies to reduce higher carbon intensive energy sources. • Advocating for stable policy frameworks that reduce carbon emissions. • Monitoring the global energy outlook including the demand for lower carbon intensive energy such as LNG and displacing higher carbon intensive fuels.	**PS 11.1** A program designed to support customers and suppliers reduce their emissions, monitor market developments, related to natural gas in the energy transition, and to support customers and suppliers to reduce their GHG emissions, is implemented.	**MC 11.1.1** Progress of the program will be reported in climate-related disclosures, to industry standard, for example TCFD or equivalent.

EPOs, EPSs and MC for Drilling and Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 10b No impact to air quality greater than a consequence level of F[73] from atmospheric and GHG emissions during the Petroleum Activities Program.	**C 10.1** Vessel operations comply 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 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	**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.

73 Defined as 'no lasting effect (<1 Month); localised impact not significant to environmental receptors' as in **Table 2-3** (**Section 2.6.3**)

EPOs, EPSs and MC for Drilling and Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	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.		
	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 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.
	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 i^{nt}ernational requirements (API Standard 53 5th Edition) as agreed by Woodside and MODU contractor.	**MC 10.6.1** Records demonstrate composition and weight of drilling fluids were applicable to down hole conditions.

EPOs, EPSs and MC for Drilling and Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	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 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 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 Contracting strategy and evaluation for hire of support vessels includes consideration of vessel emissions parameters and low carbon/alternative fuels.	**PS 10.11** Evaluation of tenders for support vessels considers emissions parameters.	**MC 10.11.1** Records demonstrate that emissions were considered in tender evaluations.
	C 10.12 Well unloading acceptance criteria that define the well objectives will be established.	**PS 10.12** Flaring restricted to a duration necessary to achieve the well objectives.	**MS 10.12.1** Records demonstrate flaring was restricted to a duration necessary to achieve the well objectives.

EPOs, EPSs and MC for Drilling and Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	C 10.13 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 10.13** Study assessing unloading to MODU vs Angel undertaken.	**MC 10.13.1** Records demonstrate study on unloading to MODU vs Angel undertaken.
		PS 10.13 No well unloading to the MODU, where considered technically feasible and ALARP.	**MC 10.13** Records demonstrate no well unloading to the MODU, where considered feasible and ALARP.
	C 10.16 Manage vessel speed to reduce fuel combustion.	**PS 10.16** Vessel speed will be managed to reduce fuel consumption where practicable.	**MC 10.16.1** Records demonstrate speed of support vessels managed.

6.6.11 Routine Light Emissions: Light Emissions from the Facility, Mobile Offshore Drilling Unit and Project Vessels

Context		
Platform Lighting – **Section 3.4.12.1** Operational Flaring – **Section 3.4.7** Project Vessels – **Section 3.5** Tie-back Activities – **Section 3.5**	Habitats and Biological Communities – **Section 4.5**	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***
Light emissions from the facility, MODU and project vessels						✓		A	F	-	-	GP PJ	Broadly Acceptable	**EPO 12**
Light emissions during flaring						✓		A	F	-	-			

Description of Source of Impact

Operations

When staffed (about 14 days/eight times a year for planned maintenance visits; and more constantly at start-up of LDA-02 (see **Section 3.4.5.1**), appropriate lighting is used to ensure a safe working environment at night as well as to communicate the presence of the facility and vessels to other marine users (i.e., navigation lights). Lighting is required for safe operation and cannot reasonably be eliminated. When unstaffed, minimum lighting is maintained on the facility for navigational and safety requirements.

External lighting is located over the entire facility, as well as vessels, with external lighting directed towards working areas such as the production deck of the facility, or the back deck of support vessels. This limits light spill to the marine environment. The production deck is approximately 25 m above sea level, with the highest point of the facility (the top of the flare tower) reaching approximately 115 m above sea level.

During IMMR activities, underwater light is generated over short periods of time while ROVs are in use, as well as from deck lighting. Given the typical intensity of ROV lights and the attenuation of light in seawater, light from ROVs is localised to the vicinity of the ROV and vessels.

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 which are not recovered to the process. There is no planned venting of hydrocarbons from the facility during normal operations. Intermittent flaring may occur via the HP flare during emergency, manual depressurisation, and subsea flowline depressurisation.

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).

While 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 project vessels are expected to be below 1.00 Lux within 300 m from the source.

Cumulative Light Sources

Cumulative impacts from light sources will occur during the tie-back activities and commissioning/maintenance visits where the facility will be staffed and there will be additional lighting for safe operations and the MODU and project vessels present in these periods. These scenarios will be short term (facility staffed during commissioning – 4 weeks; MODU – 50 to 60 day duration).

Light impacts are also likely to occur from flaring, IMMR activities and project vessel lighting from the nearby Okha FPSO, North Rankin Complex, and GWA Platform (collectively ~ 10 to 72 km from the Angel Platform) which may result in slightly elevated ambient light levels.

Impact Assessment

Lighting from the facility, MODU and project 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 the PAA 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).

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.

The marine fauna within the PAA are predominantly pelagic fish and zooplankton, with a low abundance of species such as turtles and large whales transiting through the area. Additionally, there is no known critical habitat within the PAA for EPBC listed species, although there are BIAs listed in **Section 4.6** that overlap the PAA. The PAA overlaps with the whale shark foraging BIA so individuals are likely to transit the area.

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). The PAA may be occasionally visited by seabirds and migratory shorebirds. There is no emergent land that could be used for roosting or nesting habitat in the PAA or close proximity; however, the Angel facility is known to be used seasonally as a resting place for birds (occasionally in large numbers), especially when unstaffed. The nearest landfall is the Dampier Archipelago, which is 94 km south of the PAA at the closest point and the Montebello Islands, 106 km to the south west. One BIA for wedge-tailed shearwater breeding overlaps the PAA with the breeding period occurring from August to April (**Section 4.6.5**). 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. Foraging wedge-tailed shearwaters may be attracted to sources of light emissions to feed on fish drawn to the light, however, the species feeds predominantly during the day (Catry et al., 2009). Migratory shorebirds may be present in or fly through the region 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; Telfer et al., 1987). 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 PAA is 106 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 Angel facility. Artificial light from the Petroleum Activities Program is not predicted to disrupt critical breeding behaviours within important nesting habitat or displace seabirds from nesting habitat.

Marine Turtles

Hatchlings

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).

The PAA does not contain any known Habitat Critical for the Survival of the Species for any species of marine turtle with the nearest location at Montebello Islands (34 km south for flatback turtles). No BIAs overlap the PAA; however, several overlap the EMBA. The closest are internesting buffers for flatback turtles, green turtles, hawksbill turtles and loggerhead turtles (15 km south, 78 km south-west, 84 km south-west and 92 km south-south-west respectively).

The production deck is approximately 25 m above sea level, with the highest point of the facility (the top of the flare tower) reaching approximately 115 m above sea level. The distance to visible horizon is ~39 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 significant misorientation or disorientation would occur.

The maximum likely height for a derrick on a MODU contracted for the Petroleum Activities Program is 50 m, so will have a far smaller visible reach than the facility flare tower. In turn, external lighting on vessels is typically lower than the facility lights, with vessel lighting usually reduced to improve night vision of bridge crew.

Since the PAA is located ~106 km from turtle nesting beaches in the Montebello Islands, the risk of significant numbers of dispersing hatchlings becoming attracted to direct light or sky glow from MODU and project vessels is not considered credible. This is supported by the findings of a desktop lighting impact assessment for the Scarborough Project, demonstrating that at a range of 50 km, the density of dispersing hatchlings is expected to be low and very few individuals will be at risk of attraction (PENV, 2020). For any isolated individuals potentially attracted to light spill

from MODU and project vessels, following sunrise, any effect of these light sources on hatchlings will be eliminated allowing dispersal behaviour to resume.

As such, light emissions from the facility, MODU and project vessels are unlikely to result in behavioural changes to individuals in this life stage.

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. As the PAA does not overlap any marine turtle BIAs or Habitat Critical, it is unlikely to affect nesting adults. Given the water depth of the PAA (70 to 130 m), turtles are unlikely to be foraging. It is acknowledged that marine turtles may be present transiting the PAA in low densities, however light cues aren't used to guide this behaviour.

Fish

Lighting from the presence of the facility, MODU or project 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. However, given that a large proportion of the diet comprises krill and other planktonic larvae, it is unlikely that 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.

Cultural Values and Heritage

Through consultation and review of available literature (**Section 4.9.1**), Woodside understands that marine fauna that may be affected by light emissions, such as turtles and plankton, are culturally important to Traditional Custodians. Traditional Custodians value these species both tangibly as well intangibly as they can be considered a resource or linked to songlines and dreaming stories. Traditional Custodians also have connection to many marine species through kinship and totemic systems; an individual may have obligation to care for a species to which they are kin. Traditional Custodians may also have a cultural obligation to care for the environmental values of Sea Country.

For example, activities that impact turtle populations and their marine environment may have an indirect impact on some Indigenous communities if they deplete hunting areas and 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 above, potential impacts to marine fauna are predicted to be at an individual level, which are not considered to be ecologically significant at a population level. Impacts are not expected to occur to 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.

Cumulative Impacts

There is potential for overlap when the Angel 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 (facility staffed during commissioning – 4 weeks; MODU – 50 to 60 day duration). 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.

Furthermore, cumulative light impacts have the potential to occur from flaring, IMMR activities and project vessel lighting from the nearby Okha FPSO, North Rankin Complex, and GWA Platform (collectively ~ 10 to 72 km from the Angel Platform). However, negligible detrimental impact to biological communities is expected.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[74]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Legislation, Codes and Standards				
None identified.				

74 Qualitative measure

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[74]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
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).	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 will be 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 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 NRC. CS: Not considered – control not feasible.	Not considered – control not feasible.	Not considered – control not feasible.	No

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[74]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
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 impacts 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: • 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 onboard the facilities.	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, as outlined in the NLPG.	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. While not a routine activity, the ability to flare hydrocarbons is a safety critical requirement on-board the facility. Note, Woodside is committed to reducing flaring, and has developed annual internal facility flare targets against which progress is monitored (see **Section 6.6.10**). 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				
None identified.				

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[74]***	***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 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 the Angel facility, MODU and project vessels represent a localised impact /disturbance to marine fauna within the PAA. BIAs for whale shark foraging and wedge-tailed shearwater breeding areas overlap the PAA. Conservation advice and the NLPG were taken into consideration during the impact evaluation. The Petroleum Activities Program 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.				

EPOs, EPSs and MC for Angel Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 12 No impact to protected species greater than a consequence level of F[75] from artificial light emissions during the Petroleum Activities Program.	**C 12.1** Implement a Seabird Management Plan.	**PS 12.1** Implementation of 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).	**MC 12.1.1** Records demonstrate Seabird Management Plan implemented.
	C 12.2 Lighting will be 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.

75 Defined as ' no lasting effect (< 1 month); localised impact not significant to environmental receptors' as in **Table 2-3**, **Section 2.6.4.1.1** .

EPOs, EPSs and MC for Drilling and Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 12 No impact to protected species greater than a consequence level of F[76] from artificial light emissions during the Petroleum Activities Program.	**C 12.1** Implement a Seabird Management Plan.	**PS 12.1** Implementation of 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).	**MC 12.1.1** Records demonstrate Seabird Management Plan implemented.
	C 12.2 Lighting will be 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 10.12 **Section 6.6.10**.	**PS 10.12** See **Section 6.6.10**.	**MC 10.12.1** See **Section 6.6.10**.

76 Defined as 'no lasting effect (< 1 month); localised impact not significant to environmental receptors' as in **Table 2-3**, **Section 2.6.4.1.1**.

6.7 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 to ensure sufficient controls for operational activities are in place for risks with potential Level B and above 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 Petroleum Activities Program that have been classified as MEE's are summarised in **Section 6.7.1** 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 6.7.2**. Credible hydrocarbon spills that have not been classified as MEE's are 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 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 high 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.

6.7.1 Major Environmental Events Overview

Section 2.7 outlines the process for additional analysis and evaluation of MEEs. **Sections 6.7.3** to **6.7.8** present the bowtie output for each MEE identified (**Table 6-22**).

Table 6-22: Major environmental events for the Angel facility

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
MEE-05	Hydrocarbons in wells, 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 6.7.8 presents the generic SCE Failure and generic 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 in **Table 6-23**.

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 **Appendix D**.

Table 6-23: 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 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.
Mitigation (Administration)		

6.7.2 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 Petroleum Activities Program. Scenarios that have been classified as MEEs are assessed in **Sections 6.7.3** to **6.7.8**. Scenarios that are not classified as MEEs (as explained in **Section 6.7.1**) are assessed in **Section 6.8**.

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.

6.7.2.1 Hydrocarbon Characteristics

A summary of the characteristics of the hydrocarbons used as the basis for the modelling studies and subsequently used to inform the assessment of credible hydrocarbon spills is provided in **Table 6-24**.

Additional detail on the characteristics of these hydrocarbons is also provided below.

Table 6-24: Characteristics of the hydrocarbon types used for modelling and ecotoxicological studies

Hydrocarbon Type	Density (g/cm^3) at 25°C	Viscosity (cP) at 25°C	Component	Volatile (%)	Semi-volatile (%)	Low volatility (%)	Residual (%)	Aromatics (%)
			Boiling point (°C)	<180	180-265	265-380	>380	Of whole oil <380
Angel Condensate	0.733	0.205	% of total	67.0	23.8	5.4	3.8	8.3
			% aromatics	5.8	2.0	0.5	-	-
Lambert Deep Rich Fluid	0.736	2.952	% of total	52.9	41.8	4.3	0.9	13.3
			% aromatics	7.1	5.6	0.6	-	-
Lambert Deep Condensate	0.819*	1.76**	% of total	41.8	24.6	23.8	9.9	26.1
			% aromatics	10.5	7.8	7.8	-	-
Marine Diesel	0.829	4.0	% of total	6	34.6	54.4	5	3
			% aromatics	1.8	1.0	0.2	-	-

** at 15°C*

*** at 20°C*

6.7.2.2 Angel Condensate

Angel condensate is a mixture of volatile and persistent hydrocarbons with high proportions of volatile and semi-volatile components. In favourable evaporation conditions, about 67.0% of the oil mass should evaporate within the first 12 hours, a further 23.8% should evaporate within the first 24 hours, and a further 5.4% should evaporate over several days. Only about 3.8% of the oil is shown to be persistent (RPS, 2021).

The whole oil has a low asphaltene content (< 0.5%), indicating a low propensity for the mixture to take up water to form water-in-oil emulsion over the weathering cycle.

Soluble, aromatic, hydrocarbons contribute approximately 8.3% by mass of the whole oil. Around 5.8% by mass is highly soluble and highly volatile. A further 2.5% by mass has semi-to-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, 2021).

The mass balance forecast for the constant-wind case (see **Figure 6-4** for Angel Condensate) shows that approximately 90.8% of the oil is predicted to 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, 2021).

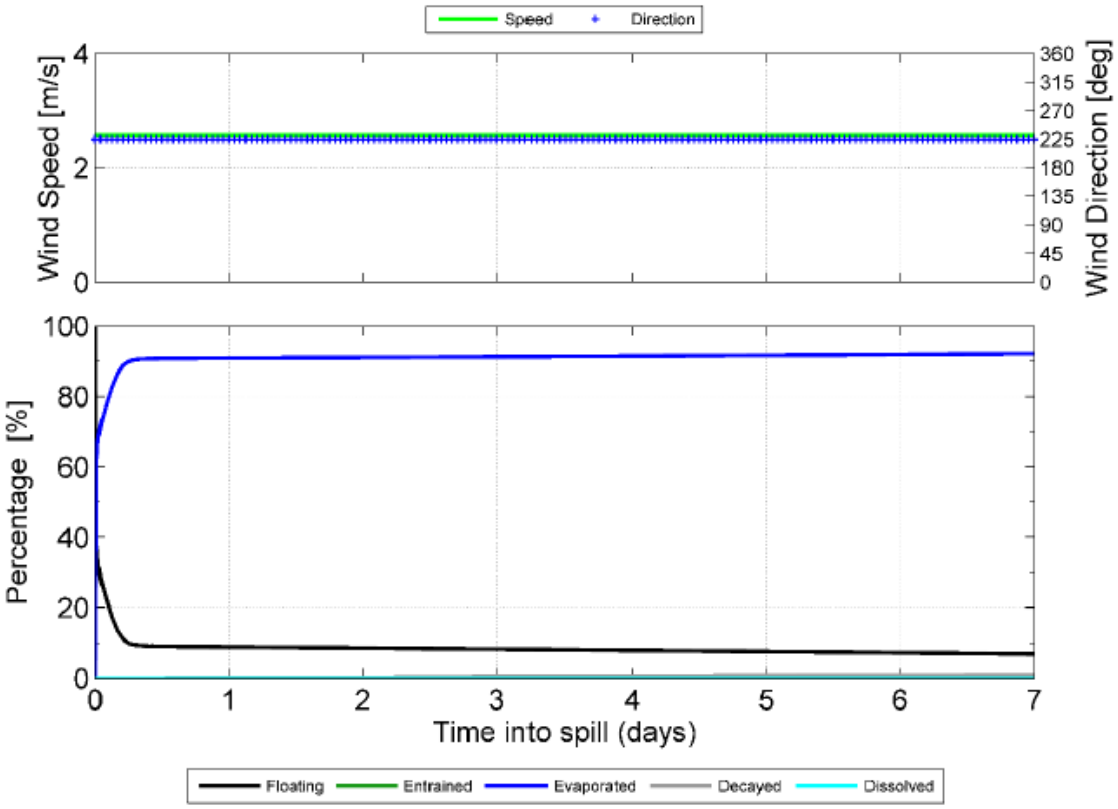


Figure 6-4: Proportional mass balance plot representing the weathering of Angel Condensate spilled onto the water surface as a one-off instantaneous release and subject to a constant 5 kn (2.6 m/s) wind at 27°C water temperature and 25°C air temperature

Under the variable-wind case (see **Figure 6-5**), where the winds are of greater strength on average, entrainment of Angel condensate into the water column is predicted to increase. Approximately 24 hours after the spill, around 14.5% of the oil mass is forecast to have entrained and a further 83.5% is forecast to have evaporated, leaving only a small proportion of the 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, 2021).

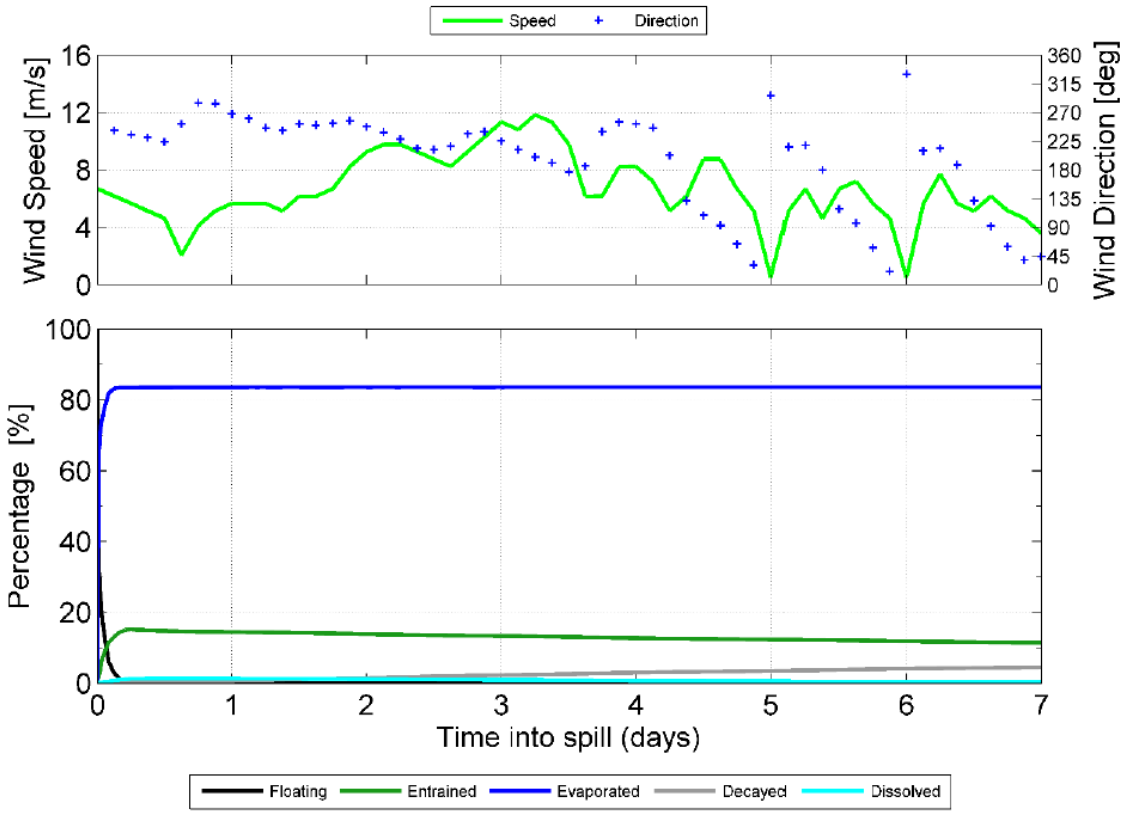


Figure 6-5: Proportional mass balance plot representing the weathering of Angel condensate spilled onto the water surface as a one-off instantaneous release and subject to variable wind at 27°C water temperature and 25°C air temperature.

6.7.2.3 Lambert Deep Rich Fluid

Lambert Deep rich fluid is a mixture of volatile and persistent hydrocarbons with high proportions of volatile and semi-volatile components. In favourable evaporation conditions, about 52.9% of the oil mass should evaporate within the first 12 hours, a further 41.8% should evaporate within the first 24 hours, and a further 4.3% should evaporate over several days. Only about 0.9% of the oil is shown to be persistent (RPS, 2021).

The whole oil has no asphaltenes, indicating no propensity for the mixture to take up water to form water-in-oil emulsion over the weathering cycle.

Soluble, aromatic, hydrocarbons contribute approximately 13.3% by mass of the whole oil. Around 7.1% by mass is highly soluble and highly volatile. A further 5.6% by mass has semi-to-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, 2021).

The mass balance forecast for the constant-wind case (see **Figure 6-6**) for Lambert Deep rich fluid shows that approximately 94.8% of the oil is predicted to 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, 2021).

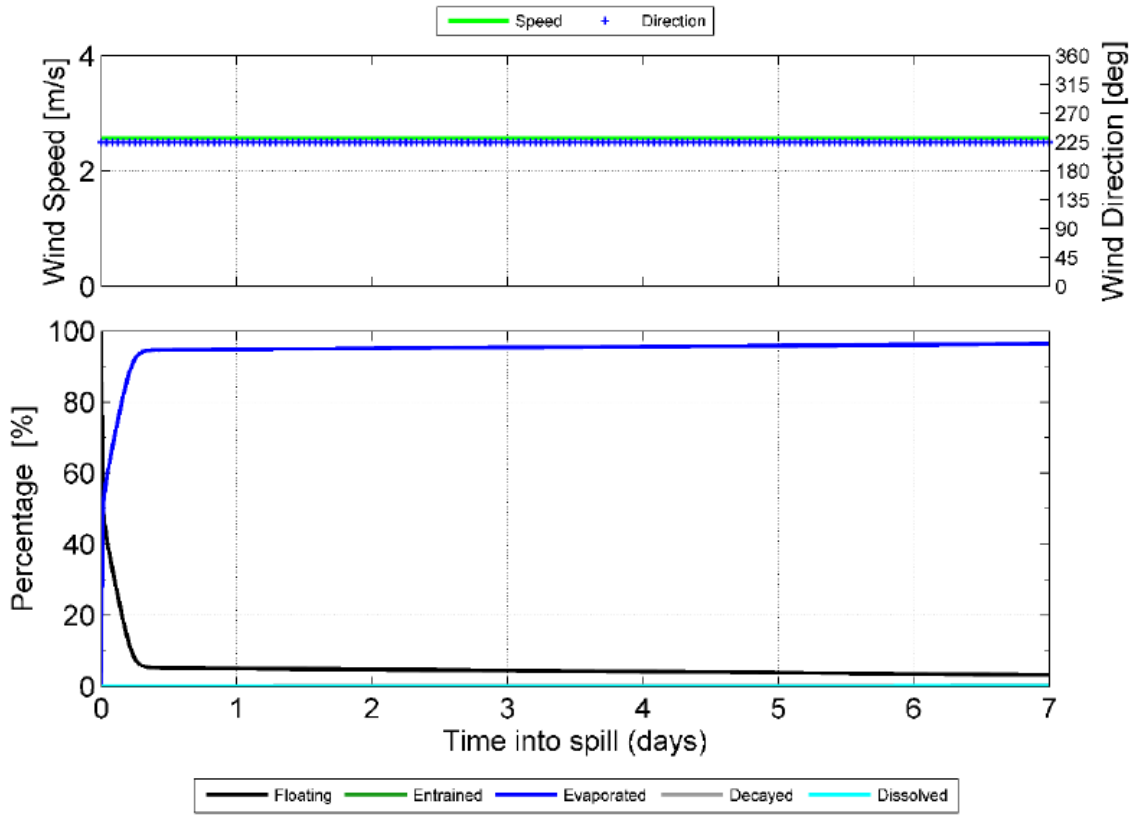


Figure 6-6: Proportional mass balance plot representing the weathering of Lambert Deep rich fluid spilled onto the water surface as a one-off instantaneous release and subject to a constant 5 kn (2.6 m/s) wind at 27°C water temperature and 25°C air temperature

Under the variable-wind case (see **Figure 6-7**), where the winds are of greater strength on average, entrainment of Lambert Deep rich fluid into the water column is predicted to increase. Approximately 24 hours after the spill, around 14.3% of the oil mass is forecast to have entrained and a further 81.8% is forecast to have evaporated, leaving only a small proportion of the 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, 2021).

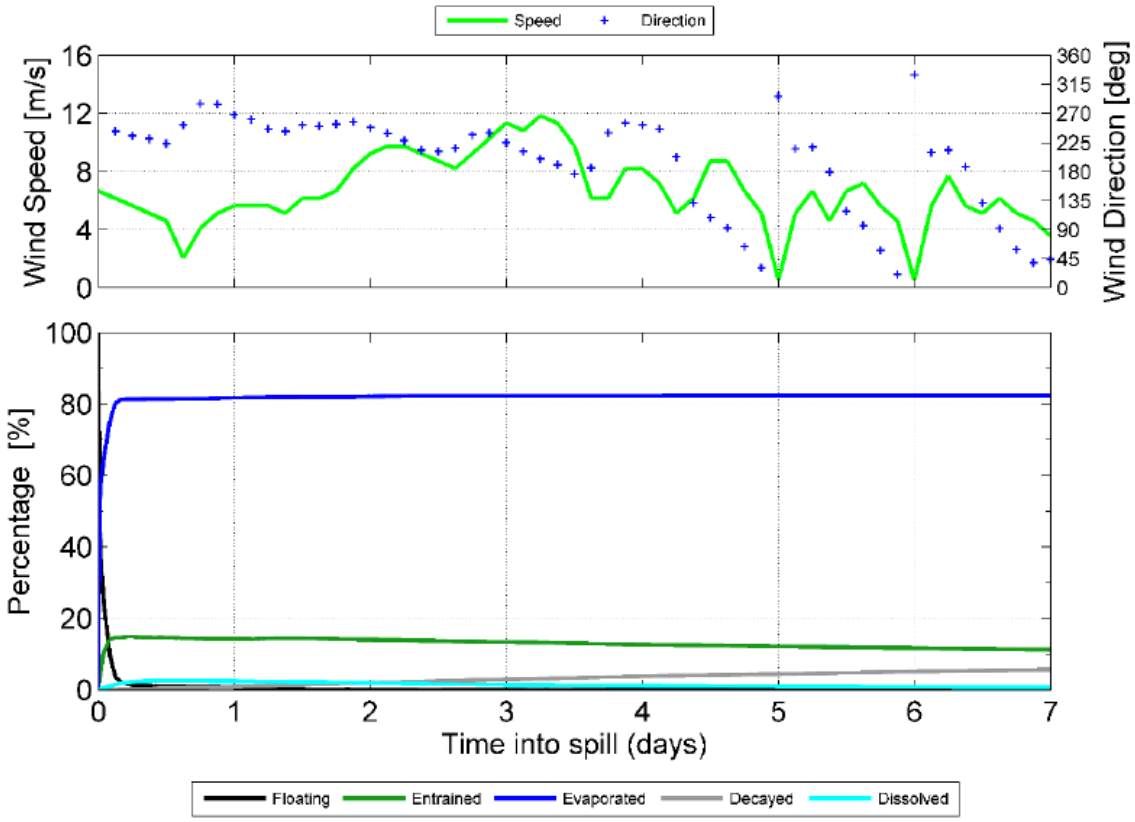


Figure 6-7: Proportional mass balance plot representing the weathering of Lambert Deep rich fluid spilled onto the water surface as a one-off instantaneous release and subject to variable wind at 27°C water temperature and 25°C air temperature

6.7.2.4 Lambert Deep Condensate

Lambert Deep condensate is a mixture of volatile and persistent hydrocarbons with high proportions of volatile and semi-volatile components. In favourable evaporation conditions, about 41.8% of the oil mass should evaporate within the first 12 hours (BP < 180°C); up to a further 24.6% could evaporate within the first 24 hours (BP 180°C to 265°C); and a further 23.8% should evaporate over several days (BP 265°C to 380°C). Approximately 9.9% of the oil is shown to be persistent.

The whole oil has a low asphaltene content (< 0.1%), indicating a low propensity for the mixture to take up water to form water-in-oil emulsion over the weathering cycle.

Soluble, aromatic hydrocarbons contribute approximately 26.1% by mass of the whole oil. 10.5% by mass is highly soluble and highly volatile. A further 15.6% by mass has semi-to-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.

The mass balance forecast for the constant-wind case for Lambert Deep Condensate shows that approximately 64.3% of the oil is predicted to evaporate within 12 hours. Under these 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.

Under the variable-wind case, where the winds are of greater strength, entrainment of Lambert Deep Condensate into the water column is indicated to be significant. Approximately 12 hours after the

spill, around 35.8% of the oil mass is forecast to have entrained and a further 53.2% is forecast to have evaporated, leaving only a small proportion of the 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).

The increased level of entrainment in the variable-wind case (**Figure 6-8**) will result in a higher percentage of biological and photochemical degradation, where the decay of the floating slicks and oil droplets in the water column occurs at an approximate rate of 2.3% per day with an accumulated total of ~14.9% after seven days, in comparison to a rate of ~0.24% per day and an accumulated total of 1.7% after seven days in the constant-wind case. Given the considerable 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. This long weathering duration will extend the area of potential effect, requiring the break-up and dispersion of the slicks and droplets to reduce concentrations below the thresholds considered in this study.

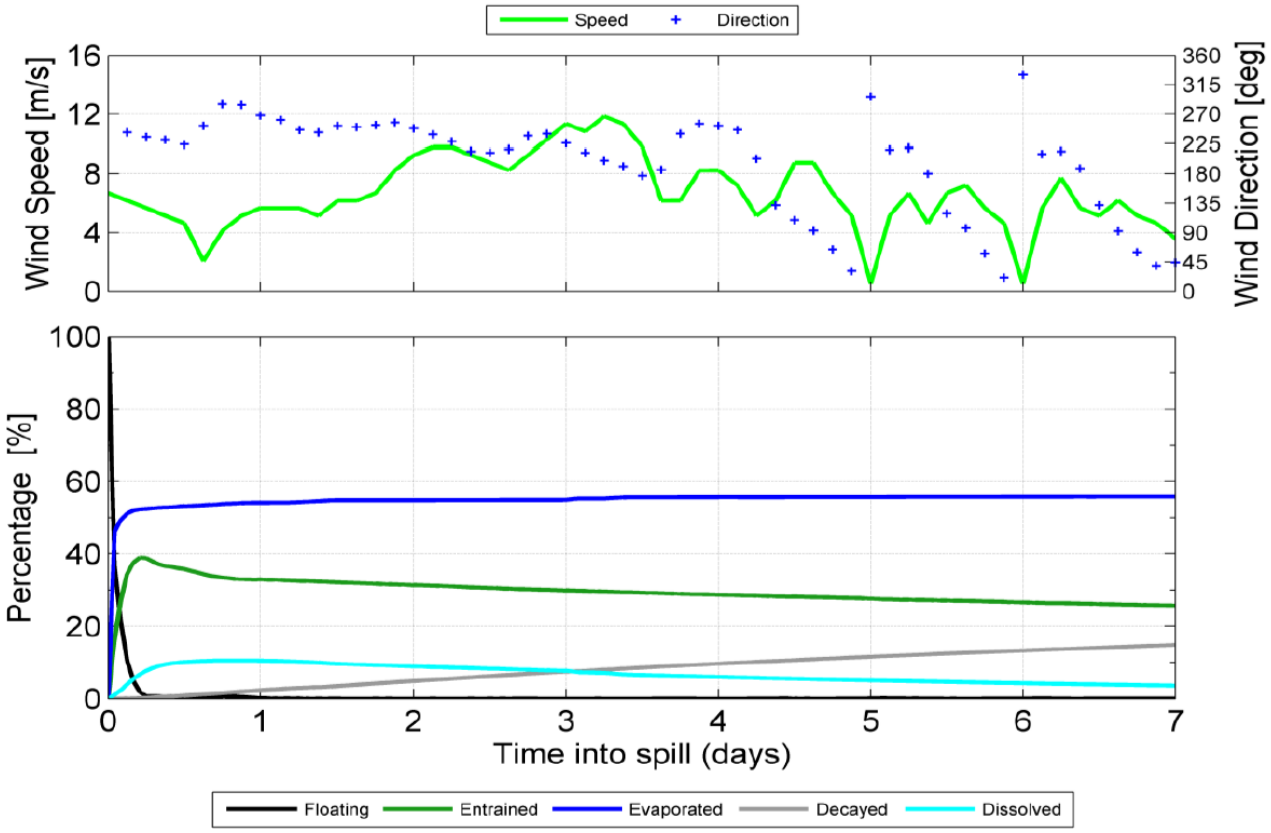


Figure 6-8: Proportional mass balance plot representing the weathering of Lambert Deep condensate spilled onto the water surface as a one-off release (50 m^3 over one hour) and subject to variable wind at 27°C water temperature and 25°C air temperature

6.7.2.5 Marine Diesel

Marine diesel is a mixture of volatile and persistent hydrocarbons with low proportions of highly volatile and residual components. In general, about 6% of the oil mass should evaporate within the first 12 hours (boiling point < 180°C); a further 35% should evaporate within the first 24 hours (180°C < boiling point < 265°C); and a further 54% 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, 2019).

The mass balance forecast for the constant-wind case for marine diesel shows that about 41% 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, 2019).

Under the more realistic variable-wind case **Figure 6-9**, where the winds are of greater strength, entrainment of marine diesel into the water column is indicated to be significant. About 24 hours after the spill, around 72% of the oil mass is forecast to have entrained and a further 24% 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, where the decay of the floating slicks and oil droplets in the water column occurs at an approximate rate of 2.4% per day with an accumulated total of ~16% after seven days, in comparison to a rate of ~0.2% per day and an accumulated total of 1.3% after seven days in the constant-wind case. 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, 2019).

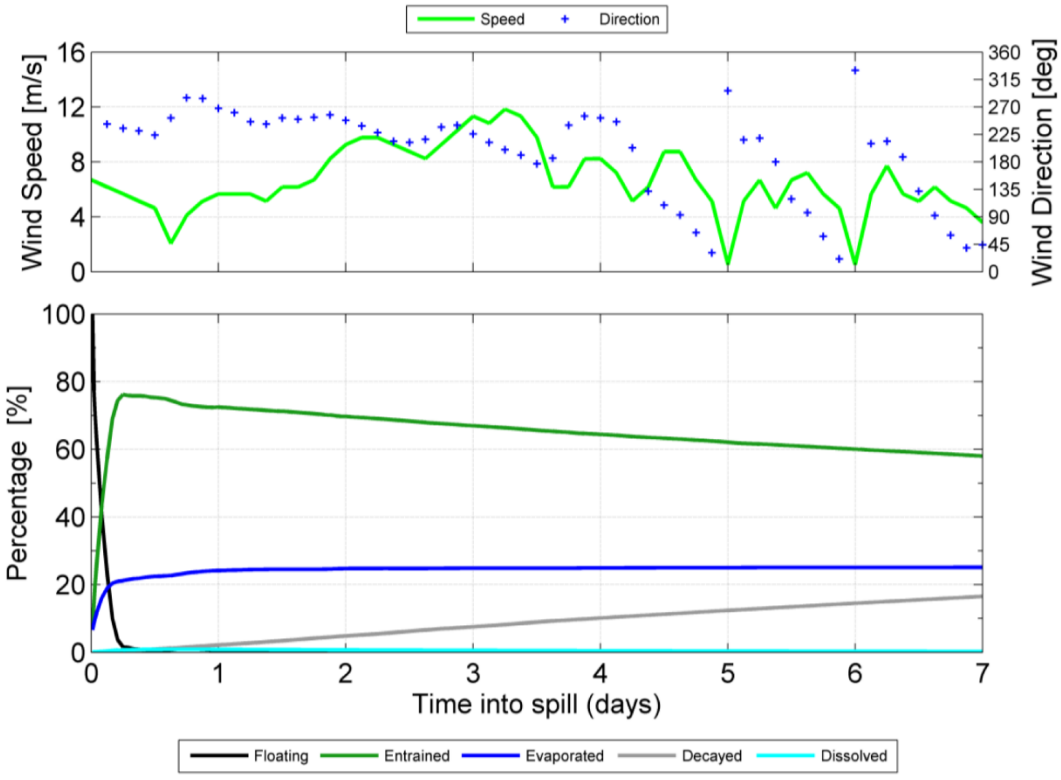


Figure 6-9: Proportional mass balance plot representing the weathering of marine diesel spilled onto the water surface as a one-off release (50 m^3 over one hour) and subject to variable wind at 27°C water temperature and 25°C air temperature

6.7.2.6 Environment that May Be Affected 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 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/m^2), 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/m^2) impacting on the visual amenity of the marine environment. Each of these hydrocarbon thresholds are presented in **Table 6-25** and described in the sub-sections below.

Table 6-25: 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/m^2)	Accumulated / shoreline hydrocarbon (g/m^2)	Surface hydrocarbon (g/m^2)
Condensate	50	100	10	100	1
Marine Diesel	50	100	10	100	1

6.7.2.7 Scientific Monitoring

A planning area for scientific monitoring is also described in **Section 5.7** of the Oil Spill Preparedness and Response Mitigation Assessment (**Appendix D**). 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.

6.7.3 Unplanned Hydrocarbon Release: Loss of Well Containment from Operating Wells (MEE-01)

Context		
Reservoir and Wells – **Section 3.4.3**	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 loss of subsea well containment from operating wells (MEE-01)		✓	✓	✓	✓	✓	✓	B	A	1	H	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 Lambert Deep flowline, from the LDA-01 and LDA-02 wells, as described in **Section 3.4**. The three Angel wells, AP2, AP3 and AP4, have been shut-in due to high water cut, with no further plans to produce hydrocarbons from the field. The surface-controlled sub surface safety valve (SCSSSV) located down each of the three Angel wells has been closed and leak off tested, however; because the wells are not yet plugged and abandoned, loss of containment was considered during risk assessment activities for the Angel facility. Loss of well containment can lead to an uncontrolled release of reservoir hydrocarbons and well fluids to the environment (i.e., well blowout). Woodside has identified a well blowout as the scenario with the worst-case credible environmental outcome as a result of this event. Due to the potential consequences, a loss of well containment during operations is considered to be an MEE (MEE-01).

This MEE scenario applies only after the flowing of well fluids into production infrastructure (as explained in **Section 6.7.1**). The Loss of Well Containment MEE scenario during the drilling and any MODU-based well test of LDA-02 is considered separately in **Section 6.8.1**.

- 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 6.7.6**)
- anchor drag.

A number of common failure causes due to human error and SCQ failures are presented in the generic Human Error and SCE Failure bowties in **Section 6.7.8**.

Loss of Well Control – Credible Scenario

The credible worst-case loss of well containment scenario identified for the Petroleum Activities Program is a well blowout of the AP3 well, chosen because it is the most crestal and recently producing of the Angel wells. A blowout scenario could occur if the SCSSSV fails or is opened and there has been a loss of the Xmas tree or failure of the tree valves (Production Master Valve and Production Wing Valve).

The loss of well containment scenario was assumed to have a release duration of 68 days. This duration is based on the estimated time required to successfully drill an intervention well (refer to **Appendix D** for additional discussion of relief well timing). The relief well drilling time shown in **Table 6-26** is for a rig with pre-lay moorings, however; using rig anchors would reduce drilling time by a further 14 days.

The characteristics of the release scenario are summarised in **Table 6-27**. Refer to **Section 6.7.2** for additional information on modelling methods, environmental impact thresholds and hydrocarbon characteristics.

Table 6-26: Relief well drilling duration

Description	***Time for completion (days)***	
	Moored days – AP3	***Moored days – LDA02***
Rig mobilisation		
Secure and suspend well. Complete Relief well design. Secure relief well materials	8	8
Transit to location based on mobilisation from within the region	2	2
Backload and loadout bulks and equipment, complete internal assurance of relief well design	2	2
Contingency for unforeseen event	9	9
Mooring activities and relief well construction operations		
Mooring activities and relief well construction operations	33	42
Intersection & well kill		
Drill out shoe, conduct formation integrity test and drill towards intersection point	1.5	1.5
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 days	**68**	**77**

Table 6-27: Summary of worst-case loss of well containment hydrocarbon release scenarios

Scenario	Hydrocarbon	Rate (m^3/day)	Duration (days)	Depth (m)	Latitude	Longitude	Total Condensate Release Volume (m^3)
Scenario 2A Well blowout at seabed (AP3)	Angel Condensate	1,585	68	79	19° 3'' 38.51" S	116° 3'' 18.57" E	107,779

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 2.6.3**) and hydrocarbon spill trajectory modelling

(described in **Section 6.7.2**). Company and societal values were also considered in the demonstration of ALARP and acceptability, through peer review, benchmarking and 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 in **Section 6.7.2**. 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 loss of well containment scenarios.

Hydrocarbon Characteristics

Hydrocarbon characteristics of Angel condensate are provided in **Table 6-24** and described in more detail in **Section 6.7.2.1**.

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 (summarised in **Table 6-28**).

Table 6-28: 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 (AP3)	Angel Condensate	66	68	79

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. Review of industry statistics indicates the probability of a loss of well containment for production wells is low (10.6% of blowouts) relative to other activities in other hydrocarbon provinces (Gulf of Mexico and the North Sea), such as exploration drilling (31.5% of blowouts), development drilling (23.6% of blowouts) and well workovers (20.5% of blowouts) (SINTEF, 2017).

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, 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/m^2 ecological threshold could potentially be found, in the form of slicks, up to 382 km (south-west) from the release location. There is minimal surface hydrocarbon contact with receptors for the worst-case scenario; receptors contacted were limited to the Gascoyne AMP (2%), Muiron Islands (1%) and associated Muiron Islands MMA (1%).

Entrained Hydrocarbons

Entrained oil concentrations equal to or greater than the 100 ppb ecological thresholds are predicted to be found up to 442 km (south-west) from the release location. A number of receptors were predicted to be contacted by entrained hydrocarbons (full list provided in **Table 6-29**). The greatest probabilities of contact were at the Gascoyne AMP (14%), Montebello AMP (23%), Ningaloo MP (16%), Muiron Islands (15%), Muiron Islands MMA (17%) and Ningaloo Coast WHA (16%).

Dissolved Hydrocarbons

Dissolved aromatic hydrocarbon concentrations equal to or greater than the 50 ppb ecological threshold are predicted to be found up to about 305 km (south-west) from the release location. Five receptors were predicted to be contacted by dissolved hydrocarbons; Montebello AMP (18%), Montebello Island MP (1%), Glomar Shoals (30%), Rankin Bank (7%) and Tryal Rocks (1%).

Accumulated Hydrocarbons

A number of receptors were predicted to receive shoreline hydrocarbons in the spill modelling. Those receptors with the highest probability of contact at the 100 g/m^2 ecological threshold are the Muiron Islands (26%) (including the Muiron Islands MMA; 26%), Peak Island (14%) and the Southern Pilbara Islands (14%).

Summary of Potential Impacts to Environmental Value(s)

Figure 4-1 presents the full extent of the 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 Petroleum Activities Program. Details of these receptors are outlined in **Section 4**. The potential biological and ecological impacts of an unplanned hydrocarbon release as a result of a loss of well containment during the Petroleum Activities Program are discussed in the following sections.

Table 6-29: Environment that may be affected – key receptor locations and sensitivities potentially contacted above impact thresholds by the loss of well containment scenario with summary hydrocarbon spill contact

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 (%)[77]					
		Physical		*Biological*																					*Socio-economic and cultural*															
		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)*	*Socio-cultural EMBA*		*EMBA*			
																																			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	✓	✓					✓							✓	✓			✓			✓	✓	✓		✓			✓		11		2	14		
	Montebello MP	✓	✓	✓			✓	✓							✓	✓			✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		6			23	18	
	Ningaloo MP	✓	✓	✓	✓	✓	✓	✓		✓					✓	✓			✓		✓	✓	✓	✓	✓	✓	✓		✓	✓		11			16		
Coastlines	Exmouth	✓	✓	✓	✓	✓	✓					✓			✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓			22				
	Middle Pilbara – Islands and Shoreline			✓	✓	✓					✓	✓			✓	✓	✓		✓	✓		✓	✓		✓	✓	✓		✓				2				
	Northern Pilbara – Islands and Shoreline			✓	✓	✓					✓	✓			✓	✓	✓		✓	✓		✓	✓		✓	✓	✓		✓				1				

77 Worst case 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 (%)[77]					
		Physical		*Biological*																						*Socio-economic and cultural*							*Socio-cultural EMBA*		*EMBA*			
		Water quality	*Sediment quality*	*Marine primary producers*			*Other communities/habitats*								*Protected species*											*Other species*		*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)*
		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*												
Islands	Southern Pilbara Islands	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		3	46	1	15		26
	Barrow-Montebello Islands	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	1	26	16	2		9
	Northern Pilbara Islands (Bedout)	✓	✓	✓	✓		✓	✓		✓	✓	✓			✓	✓			✓	✓		✓	✓	✓	✓	✓		✓	✓	✓			6			
	Rowley Shoal Islands (Bedwell)	✓	✓	✓	✓		✓	✓		✓	✓	✓			✓	✓			✓	✓		✓	✓	✓	✓	✓		✓	✓			1				
	Middle Pilbara Islands (Mary Anne Group, Passage)	✓	✓		✓	✓	✓	✓			✓	✓			✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓				2				
Marine Parks	Clerke Reef (Rowley Shoals 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 (%)[77]					
		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 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)
	Barrow Island MMA	✓	✓	✓	✓	✓	✓	✓				✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	1			2		
	Rowley Shoals MP – Imperious Reef	✓	✓	✓	✓		✓	✓		✓	✓	✓				✓			✓	✓		✓	✓	✓	✓	✓	✓		✓	✓			7				2
	Montebello Island MP	✓	✓	✓	✓	✓	✓	✓				✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		2	26		2	1	9
	Muiron Islands MMA	✓	✓	✓	✓		✓	✓		✓		✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓			✓	✓		3	46	1	17		26
	Ningaloo Coast WH	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		11	22		16		
	Ningaloo MP (State)	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		3	22		6		
Reefs, Shoals and Banks	Glomar Shoal	✓	✓	✓			✓	✓		✓						✓				✓		✓		✓	✓	✓		✓			23				30	
	Barrow – Montebello Shoals	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		1			7	1	
	Exmouth Reefs and Shoals	✓	✓	✓	✓		✓			✓						✓	✓		✓	✓	✓	✓		✓	✓			✓			2			14		

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 (%)[77]					
		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 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)*
	Pilbara Shoals	✓	✓	✓	✓					✓				✓		✓	✓		✓	✓	✓	✓		✓	✓			✓			2			2		
	Rankin Bank	✓	✓	✓			✓	✓		✓						✓	✓			✓		✓		✓	✓	✓		✓			3				7	

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.

There is potential for human health effects for workers in the immediate vicinity of atmospheric emissions. 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 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 126 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 may be impacted by dissolved and/or entrained hydrocarbons (refer to receptors in **Table 6-29**). Spill modelling indicates that Glomar Shoals KEF and Rankin Bank, for example, would be contacted by dissolved hydrocarbons. These features support benthic communities that may be impacted by these hydrocarbons. Notably, given the depths of Rankin Bank and Glomar Shoals KEF, the potential for impacts to benthic communities is considered to be significantly reduced given hydrocarbons will primarily feature in the upper water column.

Demersal and pelagic fish species are associated with the following offshore features within the PAA and/or EMBA (described in **Appendix C**):

- ancient coastline at the 125 m depth contour KEF– overlaps the PAA
- Glomar Shoals KEF– overlaps the PAA
- continental slope demersal fish communities KEF – 68 km west of the PAA
- Glomar Shoals KEF – about 10 km east of the PAA (and 17 km east of the Angel facility)
- Rankin Bank – about 54 km west of the PAA.

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 Glomar Shoals and Rankin Bank) from hydrocarbons are described herein.

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 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.

Protected Places

Receptors

The Australian Marine Parks (AMPs) listed in **Section 4.8** may be affected by a worst-case spill scenario. The AMPs were predicted to potentially be contacted by surface (Gascoyne Marine Park), entrained (Gascoyne, Montebello and Ningaloo Marine Parks) and dissolved (Montebello Marine Parks) hydrocarbons in the event of a worst-case spill scenario. The Argo-Rowley Terrace Marine Park was also predicted to be contacted by entrained hydrocarbons in spill Scenarios 2 and 3 (MEE-02).

Impacts

The Montebello Marine Park is the closest AMP to the PAA (55 km south) 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 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 125 m 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 Trial 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

Ancient coastline at 125 m depth contour

KEFs located within the EMBA are listed in **Section 4.7** (described in **Appendix C**) and may be impacted by a worst-case hydrocarbon spill.

The Ancient Coastline, Continental Slope Demersal Fish Communities, Exmouth Plateau and Canyons linking the Cuvier Abyssal Plane and the Cape Range Peninsula 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.

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**). The other KEFs are also quite a significant distance from the PAA (68 to 304 km) and given the nature of the hydrocarbon, it is likely to be significantly weathered prior to reaching these receptors.

Glomar Shoals KEF (essentially a buffer applied to Glomar Shoals KEF which has been discussed above) features marine primary producer habitat and site attached fishes, and provides foraging habitat for a number of species, as discussed under the respective sections above. The Commonwealth waters adjacent to Ningaloo Reef are similarly important habitat for these animal groups. Impacts to water quality due to contamination from entrained and dissolved hydrocarbons may cause flow on effects within these ecosystems.

These KEFs cover extensive areas (as listed in **Appendix C**) 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 with the PAA and the EMBA (see **Section 4**). In the event of a loss of well containment; 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, Angel condensate and Lambert Deep rich fluid (see **Section 6.7.2.1**) and the relatively small floating hydrocarbon EMBA (see **Figure 4-1**), 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. Notably, there was minor modelled overlap of surface hydrocarbons (about 295 to 375 km) south-west of the release location, within the humpback whale migration BIA and migration BIA; and the EIO pygmy blue whale foraging (high density) BIA offshore of Ningaloo Reef.

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 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 Pygmy Blue Whale and Humpback Whale

EIO pygmy blue whales and humpback whales are known to migrate seasonally through the EMBA. Notably, the migration BIAs in the NWMR for both species do not overlap the PAA. 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. Both the pygmy blue and humpback whales are baleen whales and are therefore most likely to be significantly impacted by toxic effects when feeding. However, feeding during migrations is typically low level and opportunistic, with most feeding for both species occurring in the Southern Ocean. 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 EMBA at any one time), and as such, a spill from a loss of well integrity (MEE-01) is not considered likely to affect an entire population.

Dugong

There are no BIAs or known areas of aggregation in the offshore waters of the EMBA for the dugong.

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 EMBA, with a number of BIAs and Habitat Critical areas identified within the EMBA (see **Section 4.6.2**).

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 to Survival) for marine turtles within the PAA.

The EMBA overlaps a number of BIAs and some Habitat Critical to Survival areas for marine turtles (see **Section 4.6.2**). 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 loss of well containment, 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.

Seasnakes

A number of seasnake species which are listed Marine under the EPBC Act were identified by the PMST as potentially occurring within the EMBA. No listed Threatened and/or Migratory seasnake species were identified.

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.

In general, seasnakes 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 seasnakes may be present in the PAA and within the EMBA. Their abundance is not expected to be high in the offshore environment, however. Exclusions may apply to the yellow-bellied seasnake which is known to be pelagic.

In summary, a hydrocarbon spill may have a minor disruption to some individuals in the offshore environment. Population level impacts to seasnake 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 EMBA (see **Section 4.6.1**). Two foraging BIAs for one of these, the whale shark, overlap with the EMBA; foraging (northward from Ningaloo along the 200 m isobath; PAA, EMBA) and foraging (high prey density – Ningaloo Marine Park; EMBA). Whale sharks are, therefore, likely to transit the open offshore waters within the EMBA while they migrate to and from Ningaloo Reef between July and November.

Other listed Threatened pelagic species identified in the PMST report as potentially occurring within the 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 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 EMBA (see **Section 4.6.4**), including the wedge-tailed shearwater, fairy tern, lesser crested tern, lesser frigatebird and roseate tern which have BIAs within the EMBA (see **Table 4-13**).

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, with some sporadic surface hydrocarbons near to the Muiron Islands and offshore waters of Ningaloo Reef. 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 Angel 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 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. Other species' BIAs are at least 47 km away and these species are less likely to occur within the PAA.

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)

Marine Sediment Quality

Entrained and dissolved hydrocarbons (at or above the defined thresholds) are predicted to potentially contact shallow, nearshore waters of identified islands and mainland coastlines (see **Table 6-29**). Shoreline hydrocarbons may also reach a number of islands, including the Muiron and Montebello Islands (full list of receptors provided in **Table 6-29**). Such hydrocarbon contact may lead to reduced marine sediment quality by several processes, such as adherence to sediment and deposition shores or seabed habitat.

Protected Species

Cetaceans

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 Ningaloo Coast and at the Muiron Islands, Montebello and Barrow Island groups, and the Pilbara Southern Island Groups. These species may be impacted by entrained and dissolved hydrocarbons exceeding threshold concentrations, as well as sporadic areas of surface hydrocarbons near to Muiron Islands and Ningaloo Reef, in the event of a loss of well containment.

The potential impacts of exposure from hydrocarbons for cetaceans and dugongs are as discussed above. More specifically, nearshore populations of cetaceans and dugongs are known to exhibit site fidelity and are often resident populations. Therefore, avoidance behaviour displayed by cetaceans and dugongs in nearshore areas may have greater impacts to population functioning. Geraci (1988) observed relatively little impacts beyond behavioural disturbance for nearshore species.

Humpback Whale

The humpback whale resting area in the Exmouth Gulf lies just within the EMBA (due to modelled contact by entrained hydrocarbons at 100 ppb); however, it is about 306 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 humpback whale resting BIA, the EMBA just includes a small northern portion of the Exmouth Gulf and it is considered a low likelihood that the dugong BIAs (and associated seagrass meadows) located here 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 the EMBA.

Summary

A hydrocarbon spill 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 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 that may be impacted by a loss of well containment spill scenario (including the Ningaloo Coast, Muiron Islands, Montebello and Barrow Islands, and Pilbara Southern Islands Group).

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 nearshore waters of these marine turtle habitat areas may be exposed to surface, entrained or dissolved hydrocarbons exceeding threshold concentrations. In addition, a number of islands along the WA coastline are predicted to be contacted by accumulated hydrocarbons above the ecological impact threshold; including the Muiron Islands, Thevenard Island, Barrow Island and the Montebello Islands (see **Table 6-29** and **Table 6-33** for full list of receptors).

The potential impacts of exposure are as previously discussed. 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 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).

Therefore, a worst-case hydrocarbon spill scenario has the potential to result in major long-term impacts to sea snakes, with consequence severity dependent on the duration and extent of a spill in relation to the distribution of sea snakes.

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 294 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

In the event of a loss of well containment, there is the potential for seabirds, and resident/non-breeding overwintering shorebirds that use the nearshore waters within the EMBA for foraging and resting, to be exposed to hydrocarbons above ecological impact thresholds. Impacts may include both lethal or sub-lethal effects, as discussed above and in more detail below.

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 hydrocarbon 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).

Notably, no surface hydrocarbon contact with receptors was predicted by spill modelling. As mentioned, predicted surface hydrocarbons are also relatively restricted to the release location and some sporadic surface contact offshore Ningaloo Reef and near to the Muiron Islands. This latter contact may impact birds nesting at the Muiron Islands, where there is also predicated shoreline contact. Shoreline hydrocarbon contact above ecological thresholds may also occur at the Barrow, Montebello and Thevenard Islands, as well as at Imperieuse Reef (part of the Rowley Shoals). All of these islands are known to support seabird colonies (see **Appendix C**). 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 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 Montebello Islands. Shoreline hydrocarbons were modelled to take a minimum of 700 hours to arrive at this location. Hydrocarbons will be significantly 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 EMBA, including Rankin Bank and Glomar Shoals which are located 54 and 10 km from the PAA, respectively (described in **Appendix C**, **Section 4.4**). These 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 Glomar Shoals or Rankin Bank.

Impacts to marine turtles at submerged shoals and banks are as previously 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.

Summarily, marine turtles may be present at shoals and banks within the EMBA and, therefore, may be impacted by entrained and/or dissolved 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.

Seasnakes

It is likely that seasnakes will be present at submerged shoals and banks within the EMBA, such as Rankin Bank and Glomar Shoal. While there are no known areas of aggregation for seasnakes within the EMBA, individual seasnakes may be impacted by shoreline and surface hydrocarbons predicted at and near to the Muiron, Barrow and Montebello Islands due to their habitat preferences.

The potential impacts of exposure to hydrocarbons are as discussed above.

Seasnake 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 (such as Rankin Bank and Glomar Shoal) within the EMBA to feed. 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.

Spill modelling results indicated that Glomar Shoals (located 10 km south-east from the PAA) and Rankin Bank (located 54 km west from the PAA) may be contacted by dissolved hydrocarbons above ecological thresholds. No contact for entrained, surface or shoreline hydrocarbons was predicted for these submerged features. Species which are resident to or exhibit site-fidelity to Glomar Shoals 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 Reefs

Receptors

There are no coral reef habitats located within the PAA. Within the EMBA, coral reef habitats exist at Rankin Bank, Glomar Shoal, Muiron Islands, the Montebello Islands, Barrow Island and numerous receptors associated with Ningaloo Reef, including the reef itself.

As discussed in 'Benthic Fauna', dissolved hydrocarbons are anticipated to contact Rankin Bank and Glomar Shoal. Impacts to coral reef habitat at these features are anticipated to be similar in nature to benthic communities and of similarly low probability due to the water depths they exist at. However, potential biological impacts to sensitive corals could include sub-lethal stress and in some instances total or partial mortality of corals.

Hydrocarbons were modelled to reach Barrow Island (entrained, shoreline); Barrow Island Marine Management Area (entrained); and Boodie and Middle Islands (shoreline). Entrained and dissolved hydrocarbons were also modelled to contact the nearby Montebello Islands (entrained, shoreline), Montebello AMP (entrained, dissolved), Montebello State Marine Park (entrained, shoreline) and Montebello Shoals (entrained).

Hydrocarbons were predicted at the Muiron Islands (surface, entrained, shoreline), including the surrounding State Marine Park (entrained, shoreline) and Marine Management Area (surface, entrained, shoreline). Spill modelling indicated that hydrocarbons would also reach the Ningaloo Reef, Commonwealth and State Ningaloo MPs, as well as the Ningaloo Coast World Heritage Area (entrained hydrocarbons only at these receptors).

Impacts

Exposure to entrained hydrocarbons (≥100 ppb)/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 (with reference to Ningaloo Coast). 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 (e.g., Muiron Islands, Barrow and Montebello Island groups). With reference to Ningaloo Reef, wave-induced water circulation flushes the lagoon and may promote removal of entrained and dissolved hydrocarbons from this particular reef habitat. Under typical conditions, breaking waves on the reef crest induce a rise in water level in the lagoon creating a pressure gradient that drives water in a strong outward flow through channels.

Shoreline Accumulation

As mentioned, shoreline accumulation was modelled to occur at a number of receptors (see **Table 6-29**), including at the Muiron Islands, Thevenard Island, Barrow Island and Montebello Islands.

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 and/or the Ningaloo reef system) will be entirely dependent on actual hydrocarbon concentration, duration of exposure and water depth of the affected communities. Coral live cover, structure and composition may reduce 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).

A hydrocarbon spill may subsequently result in large-scale impacts to coral reefs within the EMBA, particularly at the Montebello and Muiron Islands, with long-term effects (recovery >10 years) likely.

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 filter feeding communities (e.g., Montebello Islands) may occur, depending on the 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 may potentially be impacted by entrained hydrocarbon through lethal/sublethal effects (see discussion for Offshore Filter Feeders). However, 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). Such impacts may result in localised, long-term effects to community structure and habitat.

Seagrass Beds, Macroalgae and Mangroves

Depending on the trajectory of the entrained and dissolved hydrocarbon plume, macroalgal / seagrass communities including those along the Ningaloo Coast (patchy and low cover associated with the shallow limestone lagoonal platforms), Muiron Islands (associated with limestone pavements), the Barrow and Montebello Island groups, the Pilbara Southern Island Group (documented as low and patchy cover) have the potential to be exposed (refer **Table 6-29**).

Seagrass in the subtidal and intertidal zones have different degrees of tolerance to exposure of hydrocarbons. Subtidal seagrass is generally considered much less vulnerable to hydrocarbon spills than intertidal seagrass, primarily because freshly spilled hydrocarbons, including crude oil, float under most circumstances. Dean et al. (1998) found that hydrocarbons mainly affect flowering, therefore, species that are able to spread through apical meristem growth are not as affected (e.g., Zostera, Halodule and Halophila species).

Seagrass and macroalgal beds occurring in the intertidal and subtidal zone may be susceptible to impacts from entrained hydrocarbons. 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.

Minimum time to contact for entrained hydrocarbons with the nearest receptor that may host seagrasses is 677 hours (Montebello Islands). As such, hydrocarbons released in the event of a loss of well containment are expected to be weathered prior to any credible contact with seagrasses. Exposure to entrained hydrocarbons may result in mortality, depending on actual entrained hydrocarbon concentration received and duration of exposure. Physical contact with entrained hydrocarbon droplets could cause sub-lethal stress, causing reduced growth rates and a reduction in tolerance to other stress factors (Zieman et al., 1984). Impacts on seagrass and macroalgal communities are likely to occur in areas where hydrocarbon threshold concentrations are exceeded.

As mentioned, mangrove habitat and associated mud flats and salt marsh at Ningaloo Coast (small habitat areas) and the Montebello Islands have the potential to be exposed to entrained hydrocarbons. Hydrocarbon coating of the prop roots of mangroves can occur when entrained hydrocarbons are deposited on the aerial roots. Hydrocarbons deposited on the aerial roots can block the pores used to breathe or interfere with the trees' salt balance, resulting in sub-lethal and potential lethal effects. Mangroves can also be impacted by entrained/dissolved hydrocarbons that may adhere to the sediment particles. In low energy environments, such as in mangroves, deposited sediment-bound hydrocarbons are unlikely to be removed naturally by wave action and may be deposited in layers by successive tides (National Oceanic and Atmospheric Administration, 2014). Given the non-persistent nature of the hydrocarbons, however, no significant effects to mangrove habitat are expected to occur.

Entrained/dissolved hydrocarbon impacts may include sub-lethal stress and mortality to certain sensitive biota in these habitats, including infauna and epifauna. Larval and juvenile fish, and invertebrates that depend on these shallow subtidal and intertidal habitats as nursery areas, may be indirectly impacted due to the loss of habitats and/or lethal and sub-lethal in-water toxic effects. This may result in mortality or impairment of growth, survival and reproduction (Heintz et al., 2000). In addition, there is the potential for secondary impacts on shorebirds, fish, sea turtles, rays, and crustaceans that utilise these intertidal habitat areas for breeding, feeding and nursery habitat purposes.

Summary of Potential Impacts to Socio-economic Values	
Setting	***Receptor Group***
All Settings	***Cultural Values and Heritage*** Through consultation and review of available literature (**Section 4.9.1**), 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 vessel collision. 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 4.9.1**), with cultural and environmental values intrinsically linked (DCCEEW 2023, MAC 2021 as cited in Woodside 2023b). 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 **4.9.1**). In the event of a worst-case release of hydrocarbon individual fauna may be directly impacted or impacted through temporary degradation of their habitats, however, no population level impacts are 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 EMBA overlaps no Registered Aboriginal Sites and 2 Other Heritage Places. Any oil 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 EMBA overlaps five AMPs under North-West Marine Parks Network Management Plan 2018 and six State Marine Parks. Management Plans for these parks recognise cultural values of Indigenous groups (**Section 4.8**). 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 4.9.2** for a list of the fisheries occurring within the EMBA, and for those considered to have potential for impact with the Petroleum Activities Program. 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 major 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 of time. 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 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). Limited recreational fishing takes place in the offshore waters of the PAA due to the distance from land mass, however; fishing may take place at nearby Rankin Bank and also at Glomar Shoal. Recreational diving within the offshore waters of the EMBA may be impacted through spill exclusion zones should a spill occur and also as a result of perceived health impacts by the community. It is considered that recreational diving is more likely to occur within nearshore waters and in water depths less than 40 m deep, however. Impacts on species that are recreationally fished are described above under 'Commercial Fisheries' and 'Pelagic and Demersal Fish'. A worst-case spill may lead to the exclusion of marine nature-based tourist activities, resulting in a loss of revenue for tour operators. These impacts would not be expected to be long term.
	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. The impact on ongoing operations of regional production facilities would be determined by the nature and scale of the spill and the metocean conditions at the time. Furthermore, decisions on the operation of production facilities in the event of a spill would be based primarily on health and safety considerations. The closest oil and gas operation is the NRC platform (operated by Woodside). Other nearby facilities include the Woodside-operated Okha FPSO, GWA and the Santos operated Reindeer platform (**Section 4.9.6)**. Operation of these facilities is likely to be affected in the event of a worst-case loss of well containment.

Nearshore Island and Mainland Coastal Areas (Nearshore Waters)	***Fisheries – Commercial*** Nearshore fisheries that do not overlap with the EMBA comprising of entrained, dissolved and surface hydrocarbon thresholds but that are predicted to be contacted by shoreline hydrocarbons are the pearling leases (state fisheries) located at the Montebello Islands. There are a number of contact locations within the island group at both ecological and socio-economic shoreline hydrocarbon thresholds. 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.
	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 In the unlikely event of a major spill, the nearshore waters of the Ningaloo Coast (including the Ningaloo Coast State and Commonwealth Marine Park and World Heritage Area) could be contacted by entrained hydrocarbons at ecological thresholds, as well as surface (Ningaloo AMP) and shoreline (Ningaloo Coast WHA and State Marine Park) hydrocarbons at socio-economic thresholds, depending on the prevailing wind and current conditions. The Ningaloo coastal waters offer a number of amenities, such as fishing, swimming, snorkelling, diving and other water-based activities, and utilisation of beaches and surrounds have a recreational value for local residents and visitors (regional, national and international). If a major spill resulted in hydrocarbon contact within this area, there could be restricted access to beaches for a period of days to weeks, until natural weathering or tides and currents remove the hydrocarbons. 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 related 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). Other areas modelled to receive shoreline and/or surface hydrocarbons greater than the socio-economic threshold (≥10 g/m^2 and 1 g/m^2, respectively) which are used for tourism and recreation activities include the Muiron Islands, Southern, Middle and Northern Pilbara Islands, Exmouth Coastline, Barrow Island, Lowendal Islands, Montebello islands and Thevenard Island. Impacts to these receptors would be as discussed above, although less significant due to the lower levels of tourism and recreation activities undertaken at these locations compared with the Ningaloo Coast.

MEE-01 Well Loss of Containment – Risk Analysis
A bowtie risk analysis was undertaken to assess MEE-01; refer to **Figure 6-10**, **Figure 6-11** and **Figure 6-12** for bowtie diagrams which were an output of Woodside's risk analysis process.

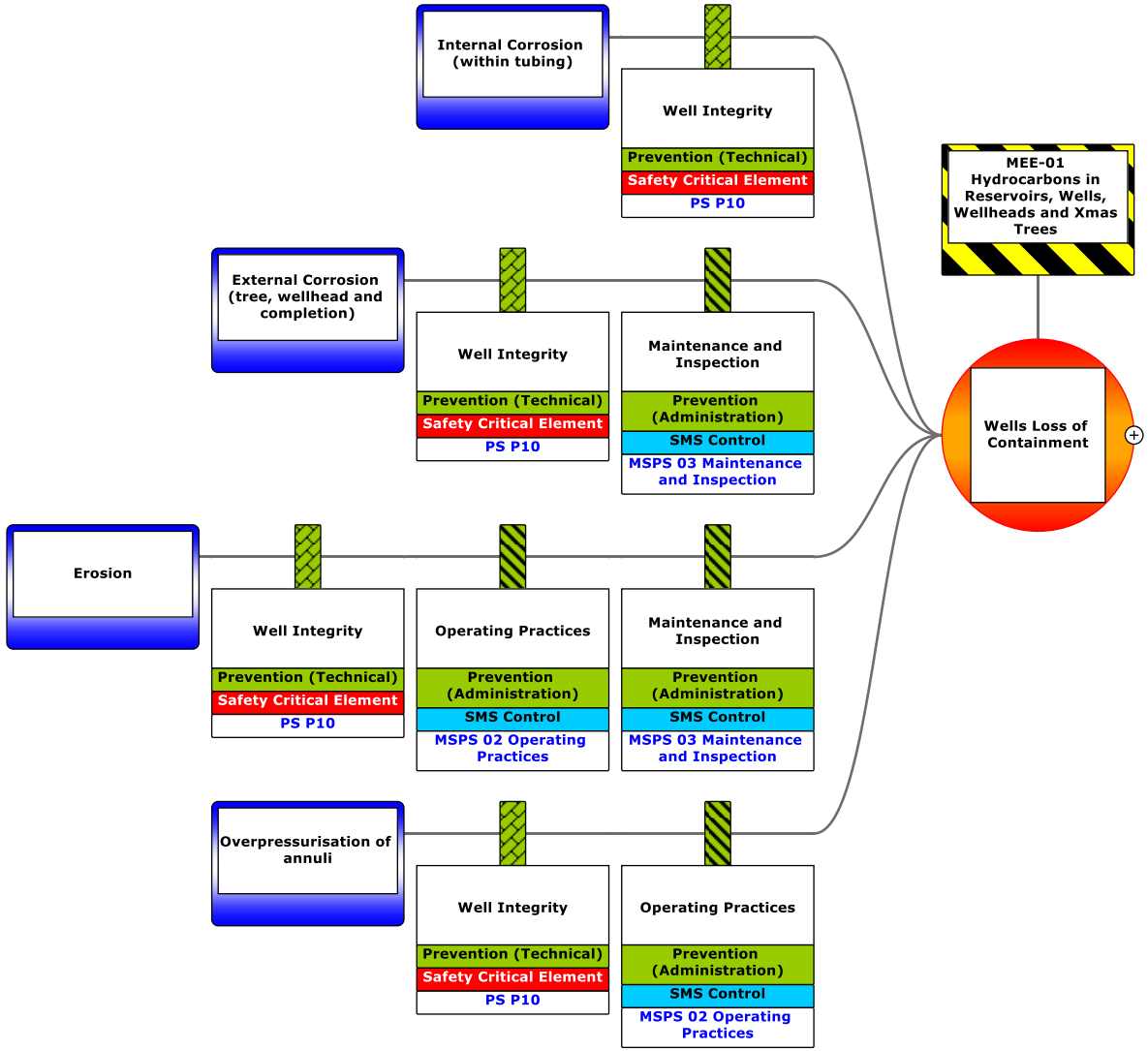


Figure 6-10: MEE-01 wells loss of containment (Causes 1 to 4)

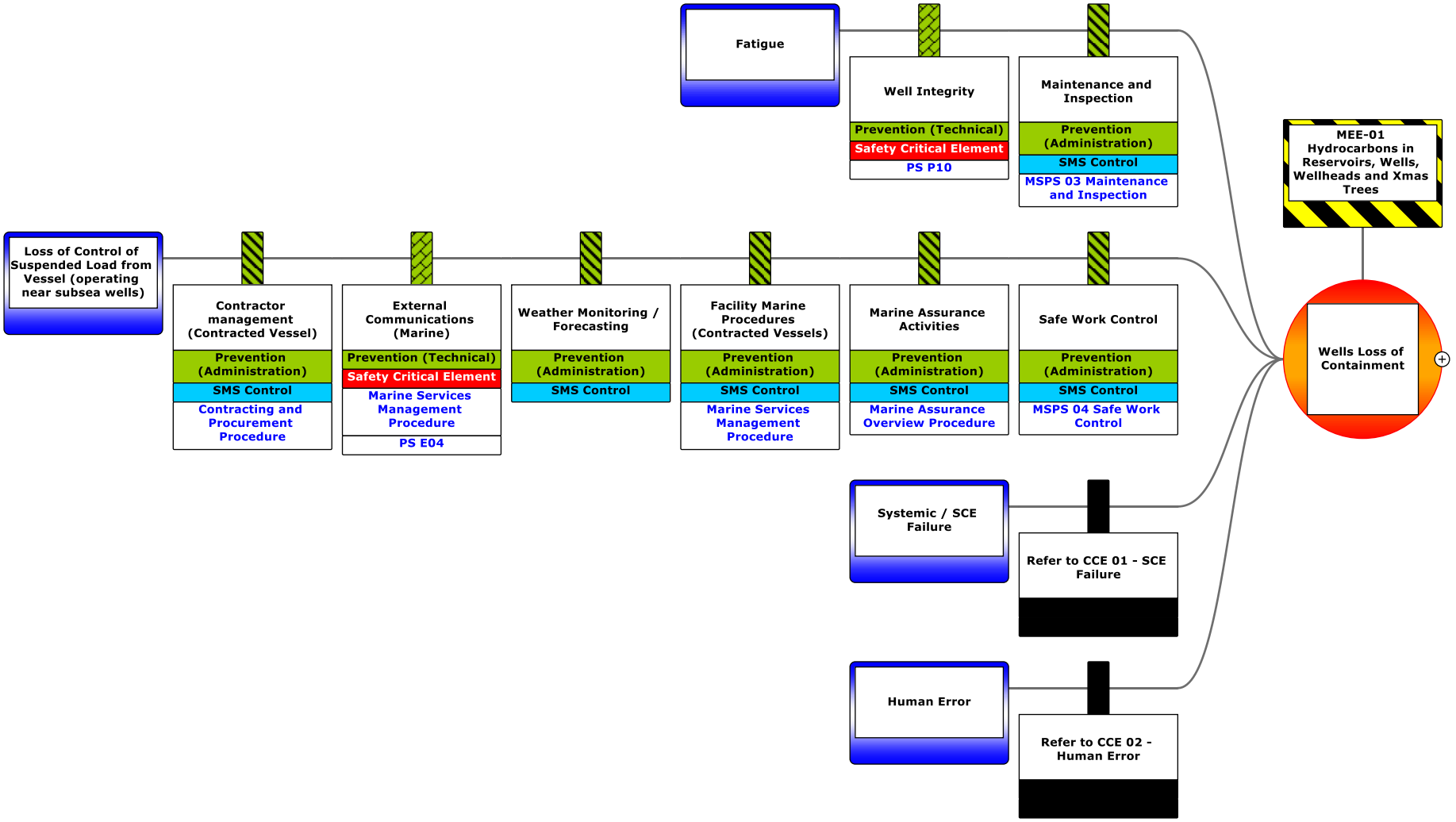


Figure 6-11: MEE-01 wells loss of containment (Causes 5 to 8)

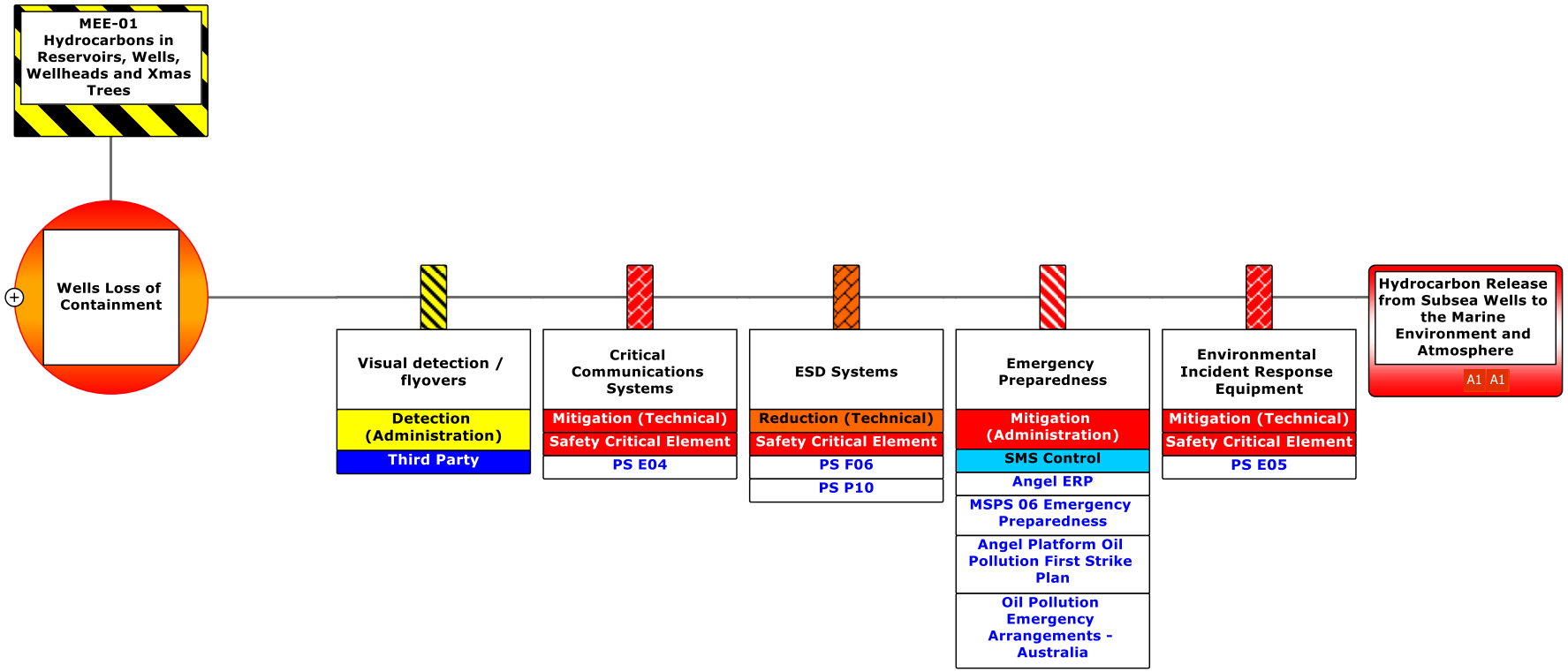


Figure 6-12: MEE-01 wells loss of containment (Outcomes)

MEE-01 Loss of Well Containment – Demonstration of ALARP ALARP Control Measures				
Hierarchy	***Control/barrier***	***SCE/management system reference***	***Type of effect (refer to Table 6-23)***	***Control adopted***
Preventative Barriers – Safety and Environmental Critical Elements				
Elimination Substitution	N/A.	No elimination or substitution controls were identified beyond those incorporated in design		
Engineering Controls	Maintaining well and hydrocarbon-containing infrastructure integrity to contain reservoir fluids within the well envelope to avoid an MEE.	P10 – Wells	Prevention (Technical)	Yes **C 13.1**
Mitigating Barrier – Safety and Environmental Critical Elements				
Engineering Controls	Maintaining availability of critical external and internal communication systems to facilitate prevention and 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 emergency shutdown actions) to 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.	F06 – Safety Instrumented System P10 – Wells	Reduction/ Control (Technical)	Yes **C 13.3**
Emergency Response	Maintaining environmental incident response equipment to implement initial response to enact the Angel Operations Oil Pollution First Strike Plan.	E05 – Environmental Incident Response Equipment	Mitigation (Technical)	Yes **C 13.4**
Legislation Codes and Standards				
Procedures and Administration	OPGGS (Resource Management and Administration) Regulations 2011: Accepted Well Operations Management Plan (WOMP) to demonstrate that the risks to well integrity are managed in accordance with sound engineering principles, standards, specifications, and good oilfield practice. It	NRC Hub WOMP	Prevention/ Mitigation (Administration) Control based on legislative requirements – must be adopted	Yes **C 13.5**

MEE-01 Loss of Well Containment – Demonstration of ALARP ALARP Control Measures				
Hierarchy	***Control/barrier***	***SCE/management system reference***	***Type of effect (refer to Table 6-23)***	***Control adopted***
	describes the systems 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.			
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 standard and regulatory requirements	Yes **C 13.6**
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**
Emergency Response and Contingency Planning	Implementing management systems to maintain: M06 – Emergency Preparedness Angel Emergency Response Plan Angel Operations Oil Pollution First Strike Plan Oil Pollution Emergency Arrangements – Australia.	MSPS M06 – Emergency preparedness Angel Emergency Response Plan Angel Operations Oil Pollution First Strike Plan Oil Pollution Emergency Arrangements – Australia	Mitigation (Administration)	Yes **C 13.7** **C 13.8** Refer to **Section 7** 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 (refer to Table 6-23)***	***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. A quantitative spill risk assessment was undertaken (refer **Section 6.7.2** for details of the method used).				
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 Compass. As detailed above, the Petroleum Activities Program 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., Glomar Shoal, Ningaloo Coast) and the potential extent of the wider EMBA, the loss of well containment 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 Petroleum Activities Program (**Section 5**). Woodside has consulted with AMSA and the WA Department of Transport (DoT) on spill response strategies. In accordance with the MoU between Woodside and AMSA, a copy of the Oil Pollution First Strike Plan was provided to AMSA.				

MEE-01 Loss of Well Containment – Demonstration of ALARP ALARP Control Measures				
Hierarchy	***Control/barrier***	***SCE/management system reference***	***Type of effect (refer to Table 6-23)***	***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 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.

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 'high' (A1) current risk rating. As per **Section 2.6.3**, Woodside considers 'high' (A1) risk ratings as acceptable if ALARP is demonstrated using good industry practice, company and societal values and risk based analysis are considered, 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 Petroleum Activities Program 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 Environment 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. In accordance with the Memorandum of Understanding between Woodside and AMSA, 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 Petroleum Activities Program 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 7.11.5**.

The Petroleum Activities Program 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.

Acceptability Statement:

The impact assessment has determined that an accidental hydrocarbon release as a result of a loss of well integrity represents a high current risk rating and may result in catastrophic, long-term impacts (>50 years) on highly valued ecosystems, species, habitat or physical or biological attributes. A number of BIAs for protected species overlap with the PAA and EMBA. Relevant recovery plans and conservation advice have been considered during the impact assessment, and the Petroleum Activities Program 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 from operating wells 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 6.9** 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.

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 Angel Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 13 Well loss of containment risks to the environment limited to High[78] during Angel Facility Operations.	**C 13.1** Maintaining well and hydrocarbon-containing infrastructure 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 Procedure (**Section 7.2.6**) 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 1.13.1** Refer to **Section 6.6.1**.

78 Defined in **Section 2.6.3**

EPOs, EPSs and MC for Angel Facility Operations			
	C 13.2 Maintaining availability of external and internal communication systems to facilitate response to accidents and emergencies.	**PS 13.2** Integrity will be managed in accordance with SCE Management Procedure (**Section 7.2.6**) 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 1.13.1** Refer to **Section 6.6.1**.
	C 13.3 Maintaining Safety Instrumented System (Safety Instrumented Functions and emergency shutdown actions) 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 Procedure (Section 7.2.6) 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 pre-defined initiating conditions and/or initiate responses that put the process plant, equipment and wells in a safe condition to prevent or mitigate the effects of an MEE.	**MC 1.13.1** Refer to **Section 6.6.1**.
	C 13.4 Maintaining environmental incident response equipment to implement initial response to enact the Angel Operations Oil Pollution First Strike Plan.	**PS 13.4** Integrity will be managed in accordance with SCE Management Procedure (**Section 7.2.6**) and SCE Technical Performance Standard(s) to prevent environment risk related damage to SCEs for: • E05 – Environmental incident response equipment, including: • satellite tracking drifter buoy able to monitor spill movement • sufficient hydrocarbon spill response equipment for control and/or clean-up of liquid hydrocarbon spills to ocean • minimum equipment coverage, to maintain adequate spill response capability.	**MC 1.13.1** Refer to **Section 6.6.1**.

EPOs, EPSs and MC for Angel Facility Operations			
	C 13.5 OPGGS (Resource Management and Administration) Regulations 2011: Accepted WOMP.	**PS 13.5** An accepted WOMP is implemented, and well integrity notification and reporting are undertaken in accordance with the Regulations (as applicable).	**MC 13.5.1** Acceptance letter from NOPSEMA demonstrates acceptance of the WOMP. Records demonstrate applicable NOPSEMA notification and reporting.
	C 13.6 Incident reports are raised for unplanned releases within event reporting system.	**PS 13.6** Incident reports raised for unplanned releases, and Recordable Incidents notified for unplanned liquid releases to sea, of: • 80 L or more of hydrocarbons, or • 1000 L or more of environmentally hazardous[79] chemical in any 48-hour period.	**MC 13.6.1** Records demonstrate incident reports raised for unplanned releases, and applicable Recordable Incident notifications completed.
	C 13.7 In the event of a spill emergency response activities implemented in accordance with the OPEP (per **Appendix D**).	**PS 13.7** In the event of a spill the OPEP (per **Appendix D**) requirements are implemented.	**MC 13.7.1** Completed incident documentation.
	C 13.8 Arrangements supporting the activities in the OPEP (per **Appendix D**) will be tested to ensure the OPEP can be implemented as planned.	**PS 13.8.1** Exercises/tests will be conducted in alignment with the frequency identified in **Section 7.12.6**	**MC 13.8.1** Testing of arrangement records confirm that emergency response capability has been maintained.
		PS 13.8.2 Woodside's procedure demonstrates a minimum level of trained personnel, for core roles in the OPEP (per **Appendix D**), are maintained	**MC 13.8.2** Woodside's procedure demonstrates a minimum level of trained personnel, for core roles in the OPEP (per **Appendix D**), are maintained.

79 Chemicals that are not on the CEFAS OCNS Ranked List of Notified Chemicals or CEFAS OCNS listed chemicals which have a CEFAS OCNS substitution warning, a OCNS product warning or are OCNS Hazard Quotient white, blue, orange, purple, A, B or C.

6.7.4 Unplanned Hydrocarbon Release: Pipeline and Facility Loss of Containment (MEE-02)

Context		
Subsea Infrastructure – **Section 3.4.4** Subsea IMMR Activities – **Section 3.4.15**	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 loss of export pipeline containment (AEP), including 1TL inventory) (MEE-02)		✓	✓	✓	✓	✓	✓	B	B	1	M	LCS GP PJ RBA CV SV	Acceptable if ALARP	**EPO 14**
Release of hydrocarbons resulting from loss of containment of subsea flowlines and infrastructure		✓	✓	✓	✓	✓	✓	A	D	2	M			

Description of Source of Risk

Hydrocarbons are transported from the Lambert Deep and Lambert West wells to the facility via a ~15 km long jumper with associated subsea hardware. Hydrocarbons are exported from the facility to 1TL via the 49 km export pipeline. A loss of containment from the AEP may result in the release of large volumes of hydrocarbon inventory to the environment, through the riser or through the tie-in location at NRC. Due to the potential consequence of a worst-case subsea equipment loss of containment, this risk is considered to be an MEE (MEE-02).

For redundant Angel flowlines, the worst-case subsea condensate loss of containment scenario is an instantaneous release of approximately 15 m^3. This assumes that all of the possible liquid volume in the flowline is released, based on the volume of AP 4, which is the longest flowline. Maximum release volumes of liquid hydrocarbons from AP2 and AP3 would be around 12 m^3 and 8 m^3 respectively.

The potential hazard sources that could instigate a loss of containment from the riser or export pipeline are:

- internal corrosion
- external corrosion
- erosion (for flowlines)
- overpressure

- equipment fatigue (risers and structural supports)
- pipeline stability and freespans
- anchor impact/dragging
- loss of control of suspended load from visiting vessel.

Although anchor impact and dragging are potential hazard sources, the risk of pipeline loss of containment as a result of commercial trawling practice is not considered credible according to design risk based analysis, as structural protection frames are in place for key subsea infrastructure. Maintenance of subsea infrastructure structural protection frames are included in mechanical integrity controls set out for pipeline integrity performance standard P09 – Pipeline system. Escalation from other MEEs can cause subsea equipment loss of containment:

- loss of structural integrity (MEE-03; Section 6.7.5)
- loss of marine vessel separation (MEE-04; Section 6.7.6)
- loss of control of suspended load from facility lifting operations (MEE-05; **Section 6.7.7**).

Subsea/Riser Equipment Loss of Containment – Credible Scenarios

The credible worst-case hydrocarbon release caused by subsea loss of containment is a release from the AEP, including its full inventory as well as backflow of the inventory of 1TL.

The location of a loss of containment of the export pipeline and associated riser will influence the potential environmental consequence. Woodside has evaluated two locations for a pipeline and riser loss of containment:

- The subsea tie-in point of the export pipeline with 1TL located at NRC: this location is the nearest point to a number of sensitive receptors (e.g., Montebello Islands, Barrow Island) and is also deeper (125 m) than the Angel tie-in location (80.6 m) which maximises potential fluid accumulation and subsequent loss volume.
- A surface release of the export pipeline riser: this location would result in a greater portion of floating hydrocarbons as the release point is above the water; a subsea release is likely to result in much of the liquid-phase hydrocarbons becoming entrained in the water column.

The characteristics of the release scenarios are summarised in **Table 6-30**.

Flowline Loss of Containment – Credible Scenario

A loss of containment from the redundant Angel flowlines was considered a credible scenario and modelled. Notably, the redundant flowlines have been depressurized via flare to ambient pressure and the topsides positively isolated. To ensure modelling was conservative, the last known flowing conditions were modelled to inform liquid hydrocarbon content in the lines and it is assumed that the whole volume would be lost should the flowline be ruptured. The characteristics of the scenario are summarised in **Table 6-30**.

Refer to **Section 6.7.2.1** for additional information on modelling methods and environmental impact, thresholds and hydrocarbon characteristics.

Table 6-30: Summary of worst-case subsea/riser equipment loss of containment release scenario

Scenario	*Hydrocarbon*	*Duration (hrs)*	*Depth (m)*	*Latitude*	*Longitude*	*Total condensate release volume (m^3)*
Scenario 3A Loss of Containment of the export pipeline at tie-in location with NRC (MEE-02)	Lambert Deep rich fluid	12	125	19°35’09’’ S	116°08’22’’ E	6100
Scenario 3B Loss of Containment of the export pipeline riser at the surface (MEE-02)	Lambert Deep rich fluid	42	Surface	19°29’54’’ S	116°35’52’’ E	5600
Scenario 7 Redundant Angel Flowlines release (AP4)	Angel condensate	Instantaneous	85	19°31' 16.44"S	116°35' 12.62"E	15

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 and riser 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.

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 6.7.2**). Company and societal values were also considered in the demonstration of ALARP and acceptability, through peer review, benchmarking and 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 (pipelines, flowlines, risers, etc.) 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 (RPS, 2021), on behalf of Woodside, to determine the fate of hydrocarbon released in each scenario based on the assumptions in **Section 6.7.2** and **Table 6-30** to **Table 6-32**. 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 6.7.2** for a discussion of Lambert Deep rich fluid and Angel 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 6-31** and **Table 6-32**, respectively).

Table 6-31: Near-field subsurface discharge model parameters, OILMAP deep model, for the loss of containment of the export pipeline at tie-in location scenario (Lambert Deep rich fluid)

	Parameter	***Scenario 3A***
Inputs	Release depth (m below sea level)	125
	Oil density (g/cm^3) (at 25°C)	0.736
	Oil viscosity (cP) (at 25°C)	2.952
	Oil temperature (°C)	25
	Gas:Oil ratio (m^3/m^3) [scf/bbl]	1, 244
	Oil flow rate (m^3/d)	4,340
	Hole diameter (m) [in]	0.724
Outputs	Plume diameter (m)	16
	Plume height (m above seabed	125 (at surface)
	Plume initial rise velocity (m/s)	27.6
	Plume terminal rise velocity (m/s)	20.6
Predicted oil droplet size distribution	20% droplets of size (µm)	41
	20% droplets of size (µm)	60
	20% droplets of size (µm)	78
	20% droplets of size (µm)	101
	20% droplets of size (µm)	147

Table 6-32: Near-field subsurface discharge model parameters, OILMAP deep model, for the loss of containment of the redundant Angel flowline (AP4) scenario (Angel condensate)

	Parameter	Scenario 7
Inputs	Release depth (m below sea level)	77
	Oil density (g/cm^3) (at 25°C)	0.733
	Oil viscosity (cP) (at 25°C)	0.205
	Oil temperature (°C)	25
	Gas:oil ratio (m^3/m^3) [scf/bbl]	3627
	Oil flow rate (m^3/d)	15
	Hole diameter (m) [in]	0.321
Outputs	Plume diameter (m)	11.2
	Plume height (m above seabed	77
	Plume initial rise velocity (m/s)	2.5
	Plume terminal rise velocity (m/s)	1.1
Predicted oil droplet size distribution	20% droplets of size (µm)	146.6
	20% droplets of size (µm)	214.0
	20% droplets of size (µm)	278.1
	20% droplets of size (µm)	361.5
	20% droplets of size (µm)	527.9

Likelihood

In accordance with the Woodside Risk Matrix, given prevention and mitigation measures in place (i.e., design, inspection and maintenance, pipeline marked on marine charts), the likelihood has been taken as 1 (Highly Unlikely). Within the riser platform 500 m PSZ, dropped object protection is applied to the pipeline, and as such the risk of dropped object impact leading to a release has also been assessed as 0 (Remote).

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, available information on environmental sensitivities that may credibly be impacted in the event of a worst-case spill (**Section 6.7.2**), and relevant literature and studies considering the effects of hydrocarbon exposure.

Consequence Assessment

Environment that May Be Affected

Scenario 3A

Surface Hydrocarbons

The hydrocarbon spill modelling indicated that concentrations of floating hydrocarbons equal to or greater than the 10 g/m^2 threshold could potentially be found, in the form of slicks, up to 20 km north and north-east from the release location. However, no receptors are predicted to be contacted by surface hydrocarbons at 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 419 km south-west from the release location. Receptors with the highest probability of contact at the ecological threshold (50 ppb) include Montebello AMP and Rankin Bank.

Entrained Hydrocarbons

Entrained oil concentrations equal to or greater than the 100 ppb threshold are predicted to be found up to 375 km south-west from the release location.

Receptors with the highest probability of contact at the ecological threshold (100 ppb) include Montebello AMP, Tryal Rocks, Muiron Islands and the Muiron Islands MMA.

Accumulated Hydrocarbons

No shoreline accumulation was predicted at or above 10 g/m^2.

Scenario 3B

Surface Hydrocarbons

The hydrocarbon spill modelling indicated that concentrations of floating hydrocarbons equal to or greater than the 10 g/m^2 threshold could potentially be found, in the form of slicks, 25 km north-east and south, from the release location. However, no receptors are predicted to be contacted by surface hydrocarbons at 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 338 km south-west from the release location. Receptors with the highest probability of contact at the ecological threshold (50 ppb) include Montebello AMP and Rankin Bank.

Entrained Hydrocarbons

Entrained oil concentrations equal to or greater than the 100 ppb threshold are predicted to be found up to 398 km south-west from the release location.

Receptors with the highest probability of contact at the ecological threshold (100 ppb) include Montebello AMP, Tryal Rocks, Muiron Islands and the Muiron Islands MMA.

Accumulated Hydrocarbons

No shoreline accumulation at the ecological threshold, at or above 100 g/m^2, was predicted. Contact at the socioeconomic threshold, 100 g/m^2, was predicted at the Muiron Islands.

Scenario 7

No receptors were contacted by hydrocarbons at the ecological thresholds for this scenario. The spill is restricted to a radius of about 35 km (entrained hydrocarbons) from the release location. Any impacts to biological and physical receptors within this area are addressed within the impacts discussion for MEE-01 (**Section 6.7.3**).

Consequence Assessment Summary

The credible worst-case hydrocarbon spill scenario that may arise from MEE-02 may impact upon a range of environmental receptors; refer to **Table 6-33** for a summary of receptors identified by the stochastic spill modelling studies. Potential impacts of a hydrocarbon spill to these receptors are considered in MEE-01; refer to **Section 6.7.3** for a description of potential impacts.

The credible worst-case hydrocarbon volumes that can credibly be released by MEE-02 are significantly smaller than the credible worst-case loss of well containment volumes considered in MEE-01. Additionally, the credible release durations are significantly shorter.

Table 6-33: 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

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 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)
Offshore	Argo-Rowley Terrace MP	✓						✓							✓	✓			✓			✓	✓	✓		✓			✓					1		
	Montebello MP	✓	✓	✓	✓	✓	✓	✓				✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓					15	12.5	
	Gascoyne MP	✓	✓												✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓				0.5	0.5	
	Ningaloo MP										✓	✓	✓	✓					✓					✓					✓	✓					1.5		
Mainland	Exmouth	✓	✓	✓	✓	✓	✓					✓			✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓					0.5		
Islands	Barrow-Montebello Islands	✓	✓	✓	✓	✓	✓	✓				✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓				1		
	Southern Pilbara Islands	✓	✓	✓	✓		✓	✓	✓	✓		✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓			0.5		4	0.5	
State Marine Parks and Nature Reserves	Barrow Island MP	✓	✓	✓	✓	✓	✓	✓				✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓				0.5		
	Barrow Island MMA	✓	✓	✓	✓	✓	✓	✓				✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓				1		
	Montebello Island MP	✓	✓	✓	✓	✓	✓				✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓					1.5		

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 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)
	Muiron Islands MMA	✓	✓	✓	✓		✓	✓		✓		✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓			✓	✓			0.5		4	0.5	
	Ningaloo Coast WH										✓	✓	✓	✓					✓				✓					✓	✓					1.5		
	Ningaloo MP (State)										✓	✓	✓	✓					✓				✓					✓	✓					1.5		
Submerged Banks and Shoals	Barrow – Montebello Reefs and Shoals	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓					2.5	0.5	
	Exmouth Banks and shoals	✓	✓	✓	✓		✓			✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓			✓	✓					3.5		
	Glomar Shoal	✓	✓	✓			✓	✓		✓						✓				✓		✓		✓	✓	✓		✓			0.5				1	
	Southern Pilbara Banks and Shoals	✓	✓	✓	✓					✓						✓	✓		✓	✓	✓	✓		✓	✓			✓						1		
	Rankin Bank	✓	✓	✓			✓	✓		✓						✓				✓		✓		✓	✓	✓		✓						1	13	

MEE-02 Subsea Equipment Loss of Containment – Risk Analysis
A bowtie risk analysis was undertaken to assess MEE-02; refer to **Figure 6-13**, **Figure 6-14**, **Figure 6-15**, **Figure 6-16** and **Figure 6-17** for bowtie diagrams which were an output of Woodside's risk analysis process.

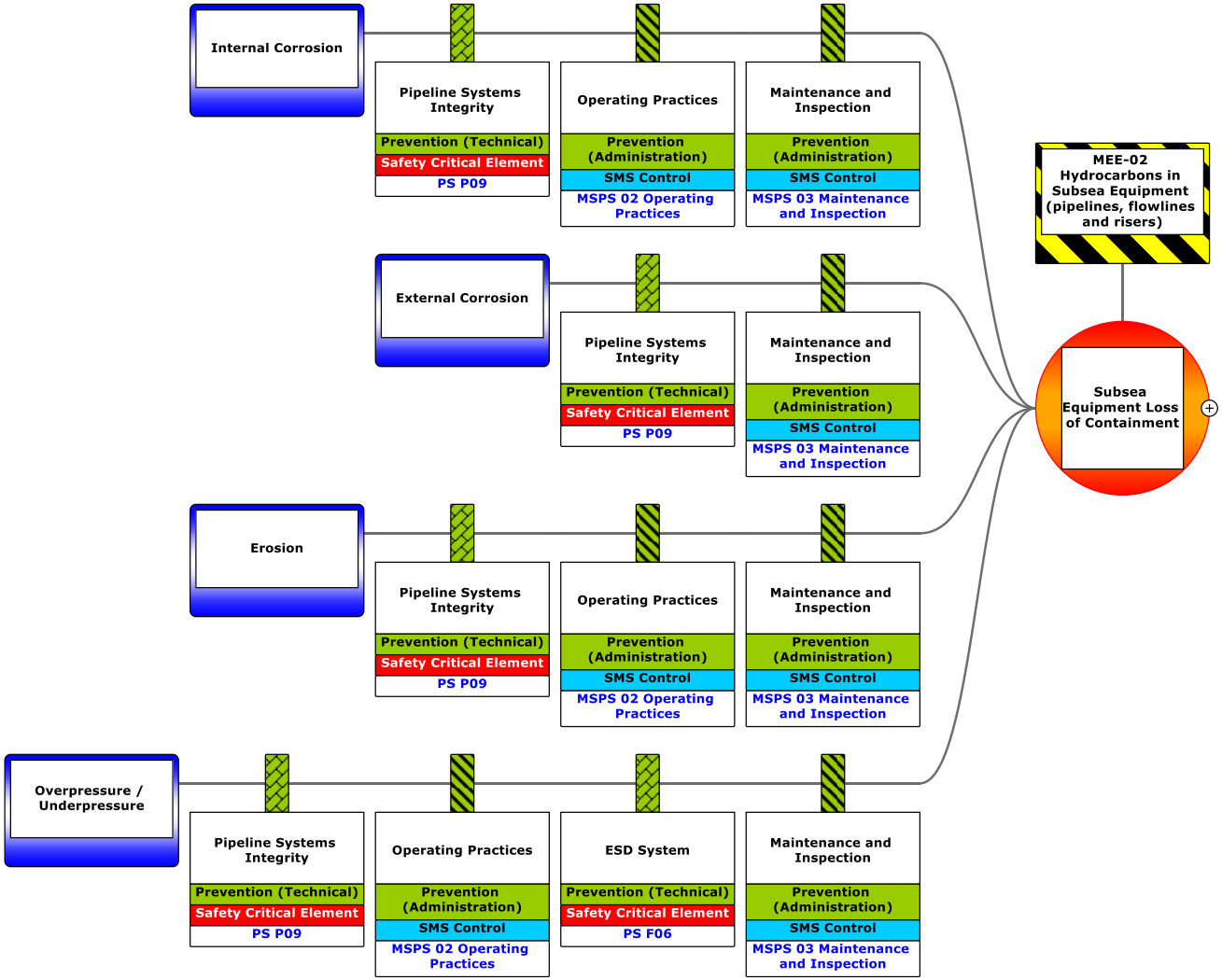


Figure 6-13: MEE-02 subsea equipment loss of containment (Causes 1 to 4)

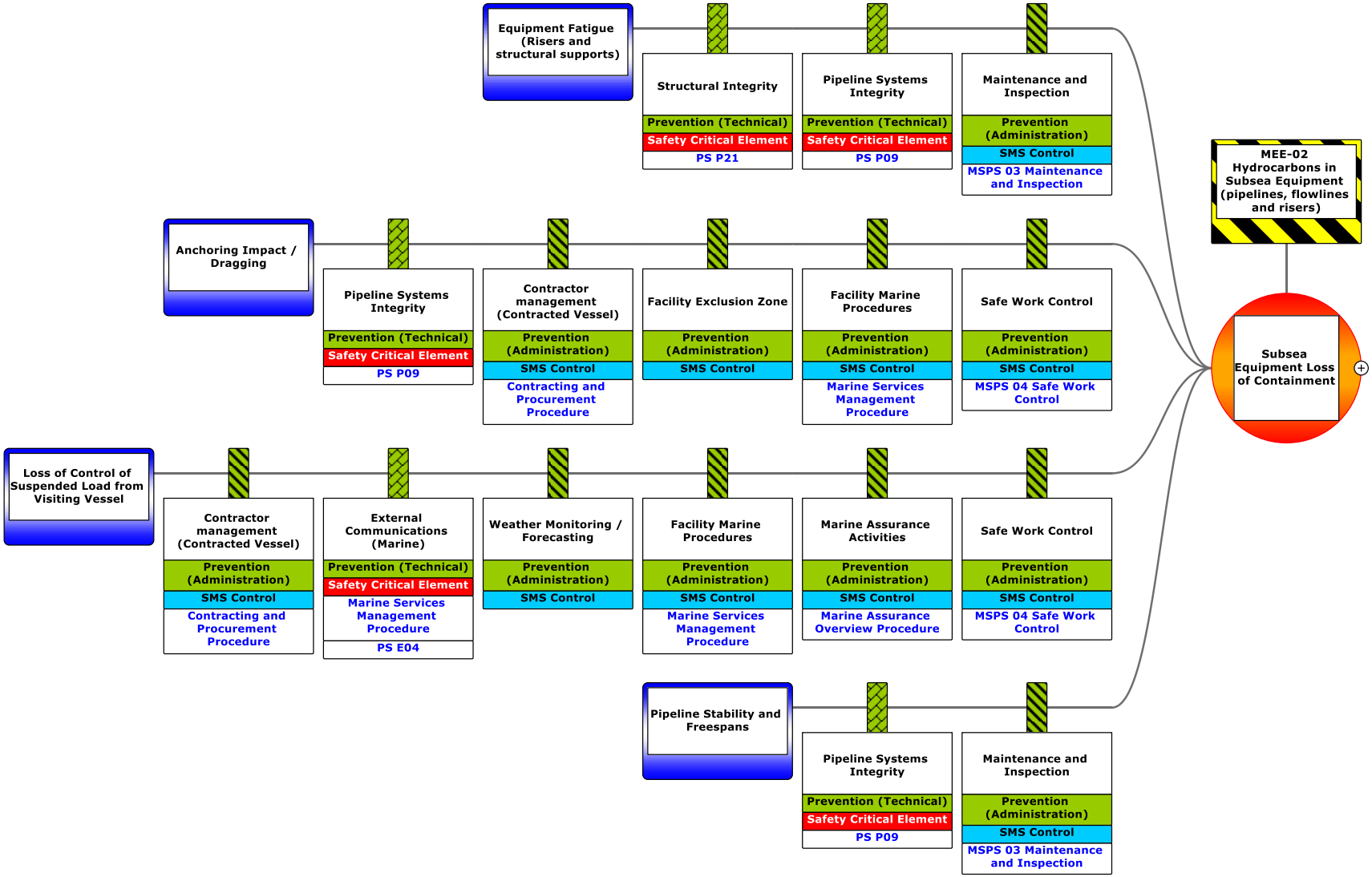


Figure 6-14: MEE-02 subsea equipment loss of containment (Causes 5 to 8)

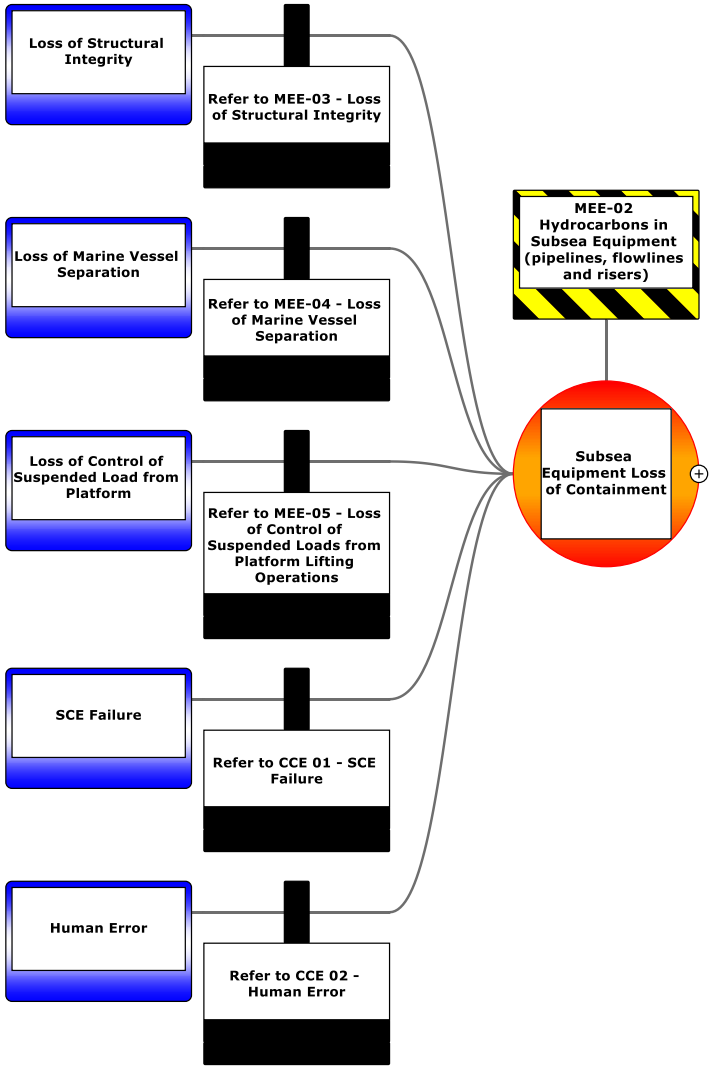


Figure 6-15: MEE-02 subsea equipment loss of containment (Causes 9 to 13)

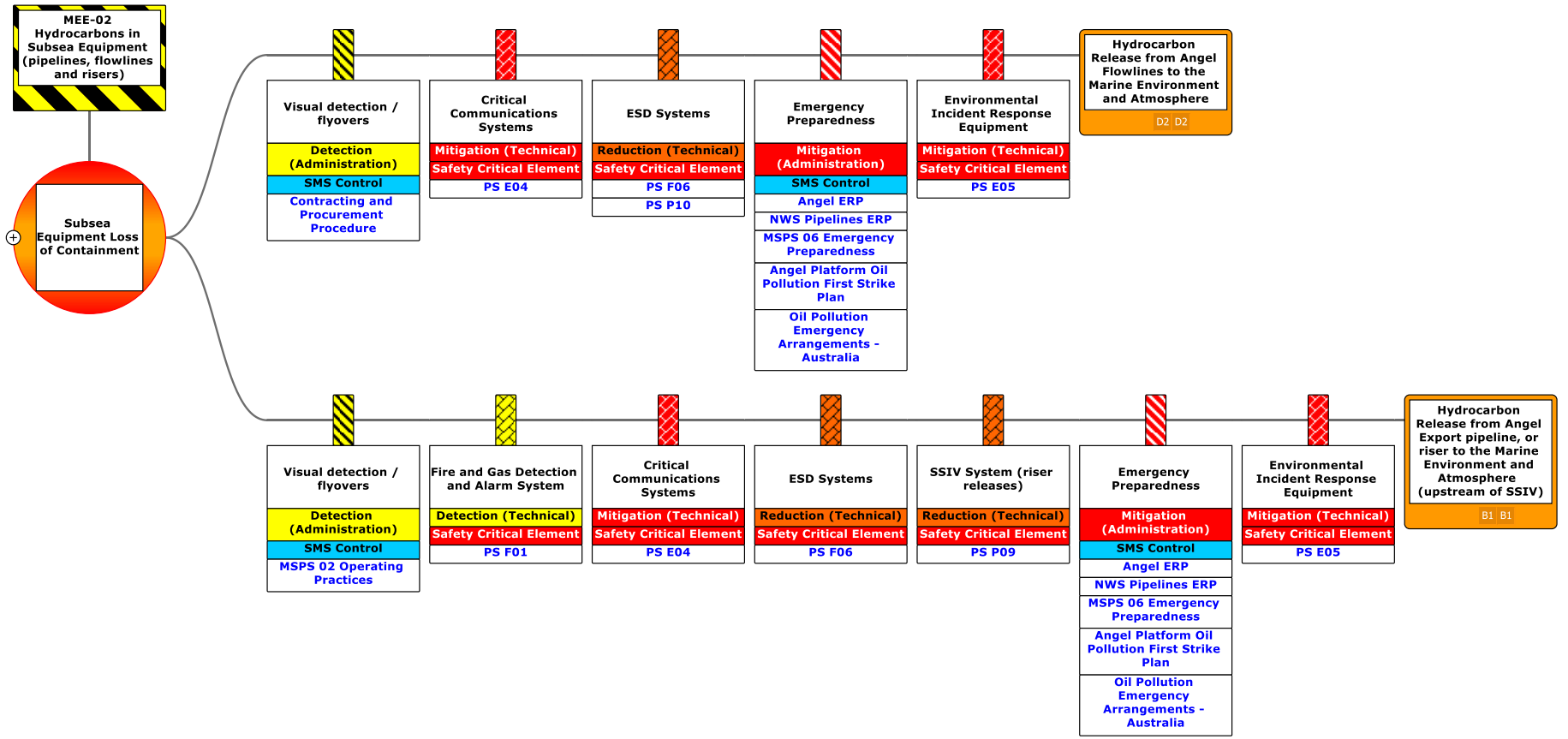


Figure 6-16: MEE-02 subsea equipment loss of containment (Outcomes 1 to 2)

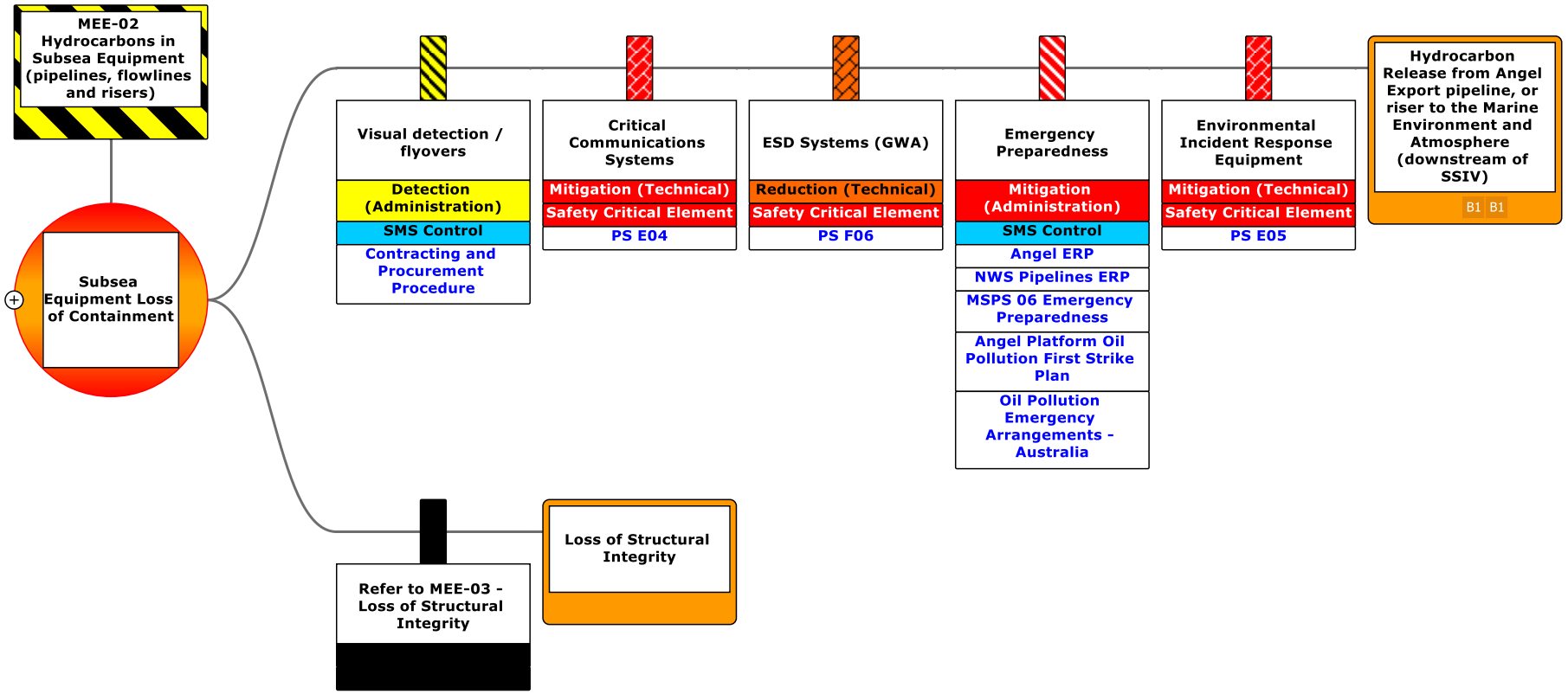


Figure 6-17: MEE-02 subsea equipment loss of containment (Outcomes 3 to 4)

MEE-02 Subsea Equipment Loss of Containment – Demonstration of ALARP ALARP Control Measures				
Hierarchy	***Control/barrier***	***SCE/Management System reference***	***Type of effect (refer to Table 6-23)***	***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 avoid an MEE.	F06 – Safety instrumented system P09 – Pipeline systems P21 – Substructures	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 facility to facilitate prevention and response to fire or gas hazards.	F01 – Fire and Gas detection and alarm systems	Detection (Technical)	Yes **C 14.2**
Engineering Controls	Maintain availability of 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 emergency shutdown actions) to detect and respond to pre-defined initiating conditions, and/or initiate responses that put the process plant, equipment and wells in a safe condition (e.g., through appropriate isolation of hazardous inventories) so as to prevent or mitigate the effects of an MEE.	F06 – Safety instrumented system P09 – Pipeline systems P10 – Wells (for flowlines)	Reduction/Control (Technical)	Yes **C 14.3**
Emergency Response	Maintaining environmental incident response equipment to implement initial response to enact the Angel Operations Oil Pollution First Strike Plan.	E05 – Environmental incident response equipment	Mitigation (Technical)	Yes **C 13.4**

MEE-02 Subsea Equipment Loss of Containment – Demonstration of ALARP ALARP Control Measures				
Hierarchy	***Control/barrier***	***SCE/Management System reference***	***Type of effect (refer to Table 6-23)***	***Control adopted***
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.	Angel Safety Case	Prevention/Mitigation (Administration)	Yes **C 14.4**
Procedures and Administration	OPGGS (Safety) Regulations 2009: Accepted Safety Case for the Pipeline 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.	North West Shelf Pipelines Safety Case	Prevention/Mitigation (Administration)	Yes **C 14.5**
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 13.6**

MEE-02 Subsea Equipment Loss of Containment – Demonstration of ALARP ALARP Control Measures				
Hierarchy	***Control/barrier***	***SCE/Management System reference***	***Type of effect (refer to Table 6-23)***	***Control adopted***
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
Emergency Response and Contingency Planning	Implement management systems to maintain: • M06 – Emergency preparedness • Angel Emergency Response Plan • Angel Operations Oil Pollution First Strike Plan • Oil Pollution Emergency Arrangements – Australia • Contracting and Procurement Procedure.	MSPS M06 – Emergency preparedness Angel Emergency Response Plan Angel Operations Oil Pollution First Strike Plan Oil Pollution Emergency Arrangements – Australia Contracting and Procurement Procedure	Mitigation (Administration)	Yes **C 13.7** **C 13.8** See **Section 7** Implementation Strategy Refer to **Appendix D** 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 Angel and NWS Pipelines 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 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 quantitative spill risk assessment was undertaken (refer **Section 6.7.2** for details of the method used).				

MEE-02 Subsea Equipment Loss of Containment – Demonstration of ALARP ALARP Control Measures				
Hierarchy	***Control/barrier***	***SCE/Management System reference***	***Type of effect (refer to Table 6-23)***	***Control adopted***
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 Compass. As detailed above, the Petroleum Activities Program 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 Petroleum Activities Program (**Section 5**). Woodside has consulted with AMSA and WA DoT on spill response strategies. In accordance with the MoU between Woodside and AMSA, a copy of the Oil Pollution First Strike Plan was provided to AMSA.				
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, SCE management procedures including performance standards for SCEs and MSPSs for Safety Critical Management System Controls. The application of Woodside 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 and the reduction in likelihood of a loss of containment from the redundant Angel flowlines as the mechanisms for erosion and corrosion are greatly reduced it is considered that MEE risk associated with a pipeline and riser loss of containment is managed to ALARP.				
Demonstration of Acceptability				
Acceptability Statement: Worst case loss of subsea equipment containment has been evaluated as having a 'moderate' (B0) level of risk rating. As per **Section 2.6.3**, Woodside considers 'moderate' (B0) risk ratings as acceptable if ALARP is demonstrated using good industry practice, company and societal values and risk based analysis are considered, 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 described in **Section 6.7.3** (MEE-01). The considerations include principles of Ecological Sustainable Development, internal context, external context and other requirements (including 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 Angel Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 14 Subsea loss of containment risks to the environment limited to High[80] during the Petroleum Activities Program.	**C 14.1** Maintaining pipeline, riser and hydrocarbon-containing infrastructure integrity to avoid an MEE.	**PS 14.1** Integrity will be managed in accordance with SCE Management Procedure (**Section 7.2.6**) and SCE Technical Performance Standard(s) to prevent environment risk related damage to SCEs for: • F06 – Safety instrumented system • P09 – Pipeline systems • 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.	**MC 1.13.1** Refer to **Section 6.6.1**.
	C 14.2 Maintaining fire and gas detection and alarm systems on the facility to facilitate prevention and response to fire or gas hazards.	**PS 14.2** Integrity will be managed in accordance with SCE Management Procedure (**Section 7.2.6**) and SCE Technical Performance Standard(s) to prevent environment risk related damage to SCEs for: • F01 – Fire and Gas Detection and Alarm Systems, • 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 1.13.1** Refer to **Section 6.6.1**.
	C 13.2 Refer to **Section 6.7.3**.	**PS 13.2** Refer to **Section 6.7.3**.	**MC 1.13.1** Refer to **Section 6.6.1**.
	C 14.3 Maintaining Safety Instrumented System (Safety Instrumented Functions and emergency shutdown actions) to detect and respond to pre-defined initiating conditions, and/or initiate responses that put the process plant, equipment and wells in a safe condition (e.g., through appropriate isolation of hazardous inventories) so as to	**PS 14.3** Integrity will be managed in accordance with SCE Management Procedure (**Section 7.2.6**) and SCE Technical Performance Standard(s) to prevent environment risk related damage to SCEs for: • F06 – Safety instrumented system • P09 – Pipeline systems • P10 – Wells (for flowlines), – 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 1.13.1** Refer to **Section 6.6.1**.

80 As defined in **Section 2.6.3**.

EPOs, EPSs and MC for Angel Facility Operations			
	prevent or mitigate the effects of an MEE.		
	C 13.4 Refer to **Section 6.7.3**.	**PS 13.4** Refer to **Section 6.7.3**.	**MC 1.13.1** Refer to **Section 6.6.1**.
	C 14.4 Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations 2009: Accepted Safety Case for the Angel 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.
	C 14.5 OPGGS (Safety) Regulations 2009: Accepted Safety Case for the 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.
	C 13.6 Refer to **Section 6.7.3**.	**PS 13.6** Refer to **Section 6.7.3**.	**MC 13.6** Refer to **Section 6.7.3**.
	C 13.7 Refer to **Section 6.7.3**.	**PS 13.7** Refer to **Section 6.7.3**.	**MC 13.7.1** Refer to **Section 6.7.3**.
	C 13.8 Refer to **Section 6.7.3**.	**PS 13.8.1** Refer to **Section 6.7.3**.	**MC 13.8.1** Refer to **Section 6.7.3**.
		PS 13.8.2 Refer to **Section 6.7.3**.	**MC 13.8.2** Refer to **Section 6.7.3**.

6.7.5 Unplanned Hydrocarbon Release: Loss of Structural Integrity (MEE-03)

Context		
Topsides – **Section 3.4.2.1** Subsea Infrastructure – **Section 3.4.4** Process Description – **Section 3.4.6** Hydrocarbon and Chemical Inventories and Selection – **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 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***
Surface or subsea release from flowline, pipeline and riser to the marine environment and atmosphere (MEE-02)		✓	✓	✓	✓	✓	✓	B	B	1	M	LCS GP PJ RBA	Acceptable if ALARP	**EPO 15**
Hydrocarbon release from topsides equipment to the marine environment and atmosphere (**Section 6.8.2**; not an MEE)			✓	✓		✓		A	D	1	M			
Marine environment footprint and associated hydrocarbon and chemical release associated with structural collapse of riser platform (MEE-03)		✓	✓	✓	✓	✓	✓	B	B	0	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, etc) 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
- fatigue
- extreme weather (cyclone, high waves)
- seismic events/seabed instability
- fire/overpressure event
- operation outside of design.

Escalation from other MEEs can also cause loss of structural integrity:

- subsea equipment hydrocarbon loss of containment (MEE-02; Section 6.7.4)
- loss of marine vessel separation (refer to MEE-04; Section 6.7.6)
- loss of control of suspended load from facility lifting operations (refer to MEE-05; Section 6.7.7).

There is a possibility of riser platform collapse ('slow' or 'rapid') caused by the extreme loads induced by strong winds and extreme waves.

A number of common failure causes due to human error and SCQ failures are presented in the generic Human Error and generic SCE Failure bowties in **Section 6.7.8**.

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; Section 6.7.4)
- loss of marine vessel separation (MEE-04; Section 6.7.6)
- topsides loss of containment (not a MEE; Section 6.8.2).

The worst-case credible spill scenarios associated with these MEEs/sources of risk are discussed in the relevant sections above; refer to these sections for further information.

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. The facility has never experienced a worst-case loss of 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 through peer review, benchmarking and consultation.

The 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 inventories and potentially vessels, well, and the riser platform itself.

Quantitative Spill Risk Assessment

Credible worst-case stochastic spill modelling for the scenarios associated with MEE-01 (**Section 6.7.3**), MEE-02 (**Section 6.7.4**) and MEE-04 (**Section 6.7.6**) has been undertaken. Results of these modelling studies have been used to inform the consequence assessment for these MEEs; these assessments are applicable to the consequence assessment for a loss of structural integrity event.

Likelihood

In accordance with the Woodside Risk Matrix (**Section 2.6.3**), the following likelihoods have been assigned to the sources of risk:

- release of hydrocarbons resulting from loss of export pipeline containment (AEP including 1TL inventory) (MEE-02): Highly Unlikely (refer to Section 6.7.4)
- release of hydrocarbons resulting from loss of containment of subsea flowlines and infrastructure (MEE-02): Highly Unlikely (refer to Section 6.7.4)
- hydrocarbon release from topsides equipment to the marine environment and atmosphere: Highly Unlikely (refer to **Section 6.8.2**)

marine environment footprint and associated hydrocarbon and chemical release associated with structural collapse of riser platform: Remote.

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, available information on environmental sensitivities that may credibly be impacted in the event of a worst-case spill (**Section 6.7.3**), 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 those which would result from:

- subsea equipment loss of containment (MEE-02; Section 6.7.4)
- loss of marine vessel separation (MEE-04; Section 6.7.6)
- topsides loss of containment (Section 6.8.2).

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 riser platform footprint plus 100 m in all directions; that is, approximately 237 m by 267 m (0.063 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, etc). 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 Glomar Shoals KEF and Ancient Coastline at 125 m Depth Contour KEFs, 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 **Figure 6-18**, **Figure 6-19 and Figure 6-20** for bowtie diagrams which were an output of Woodside's risk analysis process.

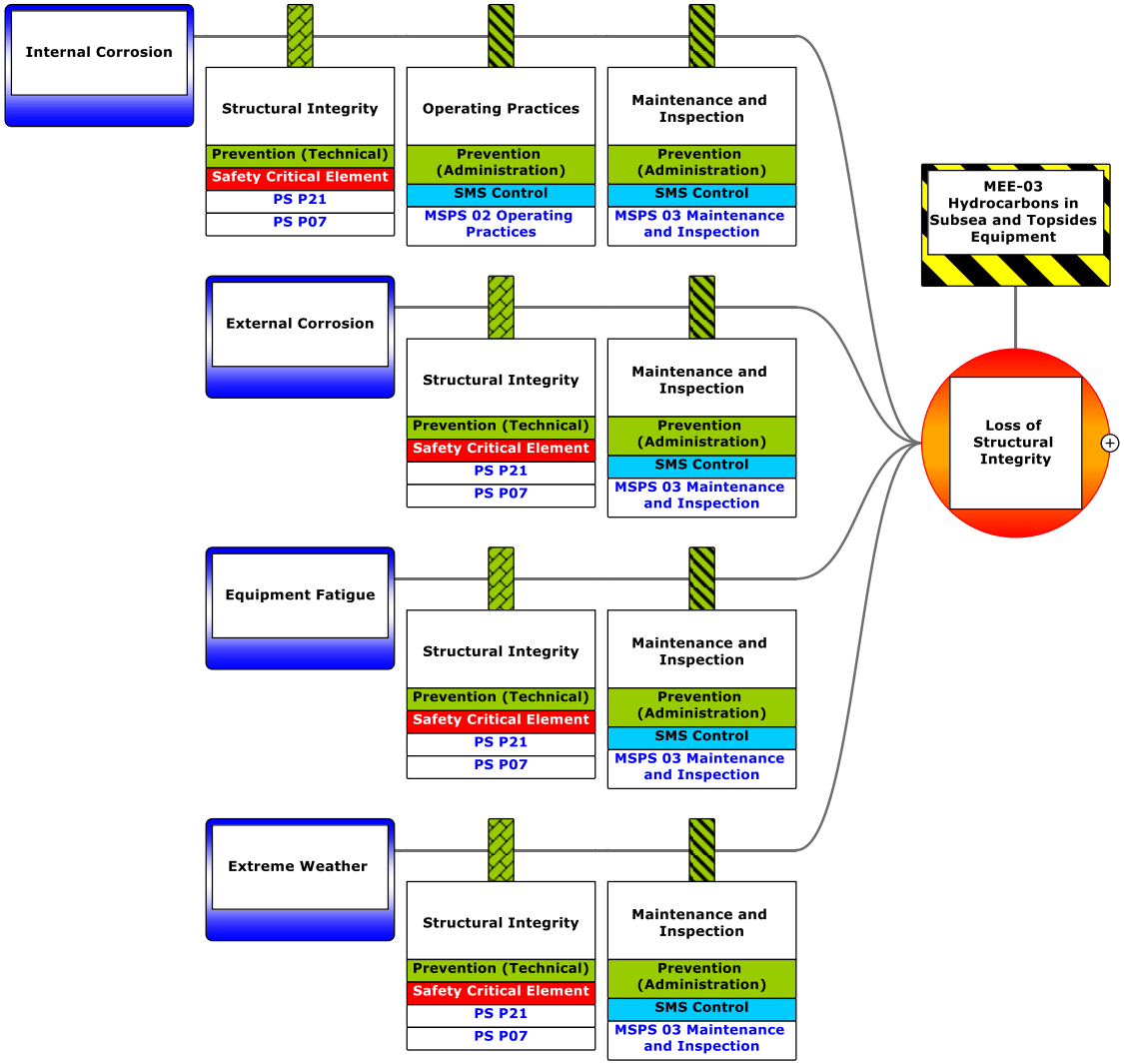


Figure 6-18: MEE-03 loss of structural integrity (Causes 1 to 4)

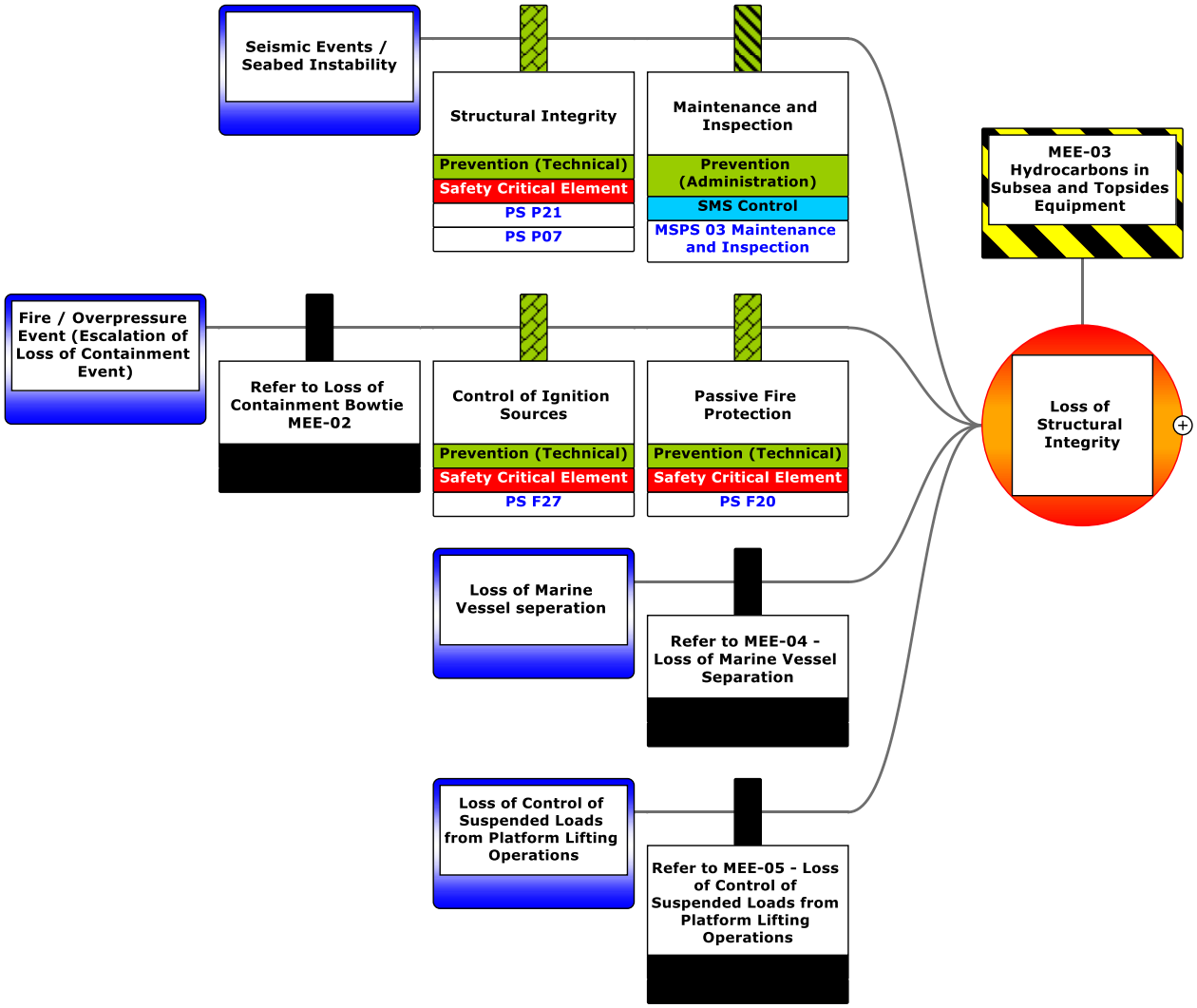


Figure 6-19: MEE-03 loss of structural integrity (Causes 5 to 8)

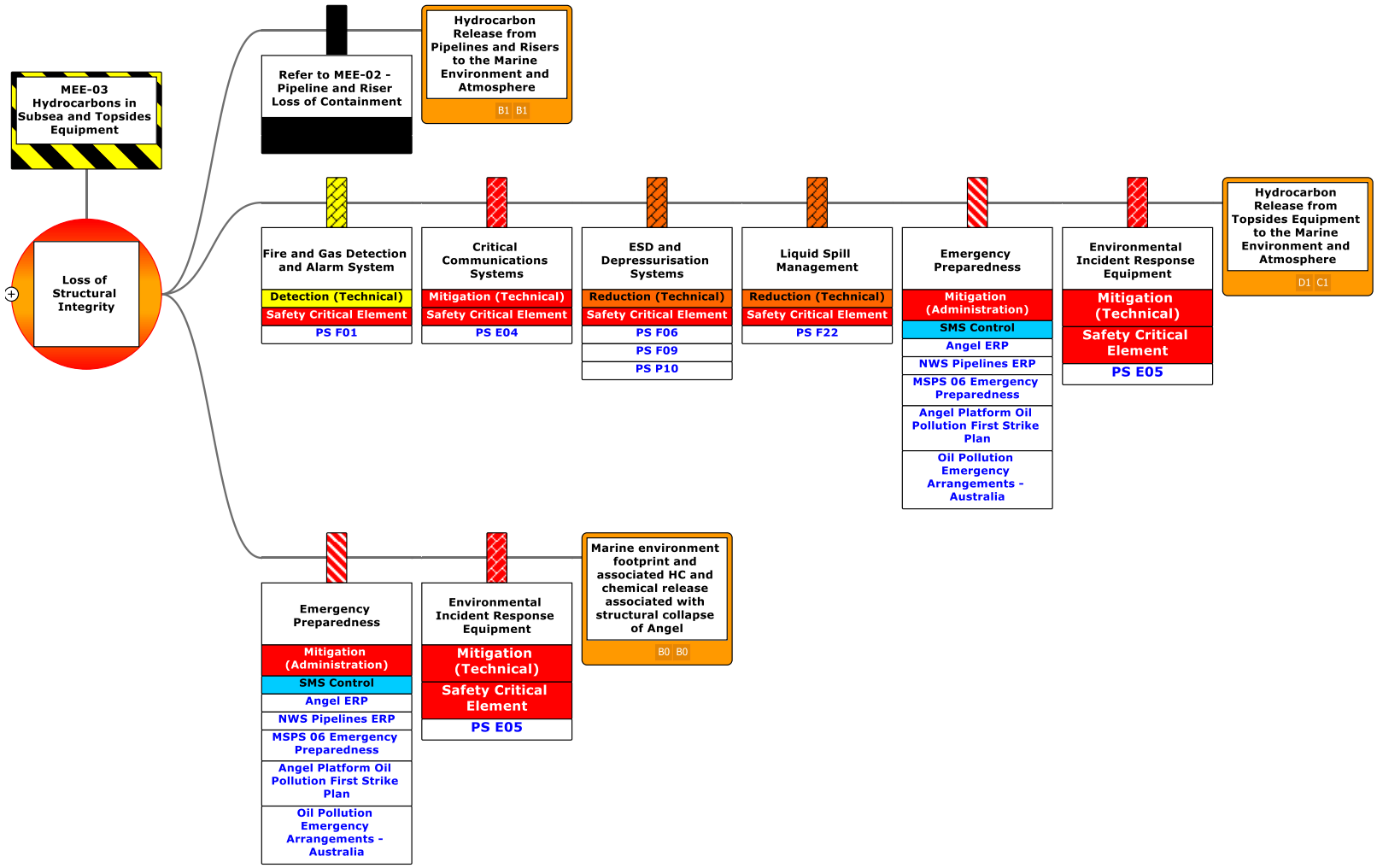


Figure 6-20: MEE-03 loss of structural integrity (Outcomes)

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 6-23)***	***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/ surface 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**
Mitigating Barrier – Safety and Environmental Critical Elements				
Engineering Controls (per MEE 02)	Maintaining fire and gas detection and alarm systems on the facility to facilitate prevention and response to fire or gas hazards.	F01 – Fire and gas detection and alarm systems	Detection (Technical)	Yes **C 14.2**
Engineering Controls (per MEE 002)	Maintaining availability of external and internal communication systems to facilitate response to accidents and emergencies.	E04 – Safety critical communication systems F09 – Depressurisation (blowdown)	Mitigation (Technical)	Yes **C 13.2**
Engineering Controls (per MEE 002)	Maintaining Safety Instrumented System (Safety Instrumented Functions and emergency shutdown actions) to detect and respond to pre-defined initiating conditions and/or initiate responses that put the process plant, equipment and wells in a safe condition (e.g., through appropriate isolation of hazardous inventories) so as to prevent or mitigate the effects of an MEE.	F06 – Safety instrumented system P09 – Pipeline systems P10 – Wells (for flowlines)	Reduction/Control (Technical)	Yes **C 14.3**
Engineering Controls	Facility open hazardous drain system integrity maintained as far as practicable.	F22 – Open Hazardous Drains	Reduction/Control (Technical)	Yes **C 6.5**
Emergency Response	Maintain environmental incident response equipment to implement initial response to enact the Angel Operations Oil Pollution First Strike Plan.	E05 – Environmental Incident Response Equipment	Mitigation (Technical)	Yes **C 13.4**

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.	Angel Safety Case	Prevention/Mitigation (Administration)	Yes **C 14.4**
Procedures and Administration	OPGGS (Safety) Regulations 2009: Accepted Safety Case for the Pipeline 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.	North West Shelf Pipelines Safety Case	Prevention/Mitigation (Administration)	Yes **C 14.5**
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 13.6**
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 • Angel Emergency Response Plan • NWS Pipelines Emergency Response Plan • Angel Operations Oil Pollution First Strike Plan • Oil Pollution Emergency Arrangements – Australia.	MSPS M06 – Emergency preparedness Angel Emergency Response Plan NWS Pipelines Emergency Response Plan Angel Operations Oil Pollution First Strike Plan Oil Pollution Emergency Arrangements – Australia	Mitigation (Administration)	Yes – **C 13.7** **C 13.8** See **Section 7** Implementation Strategy Refer to **Appendix D** 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 Angel 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 quantitative spill risk assessment was undertaken (refer **Section 6.7.2** for details of the method used).

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 Angel 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 Angel 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' (B0 to D1) 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 considerations described in **Section 6.7.3** (MEE-01). The considerations include principles of Ecological Sustainable Development, and other requirements (including 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 Angel Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 15 Structural integrity loss of containment risks to the environment limited to High[81] during the Petroleum Activities Program.	**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 Procedure (**Section 7.2.6**) and SCE Technical Performance Standard(s) to prevent environment risk related damage to SCEs for: • P07 – Topsides/surface structures • P21 – Substructures, 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 1.13.1** Refer to **Section 6.6.1**.

81 As defined in **Section 2.6.3**.

EPOs, EPSs and MC for Angel Facility Operations			
	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 Procedure (**Section 7.2.6**) and SCE Technical Performance Standard(s) to prevent environment risk related damage to SCEs for: • F27 – Control of Ignition Sources to: • prevent ignition of flammable or explosive atmospheres within identified Hazardous Areas. • F20 – Passive Fire and Explosion Protection to: mitigate the effects of a fire or explosion by maintaining the integrity of critical structure and equipment and limiting the potential for escalation.	**MC 1.13.1** Refer to **Section 6.6.1**.
	C 14.2 Refer to **Section 6.7.4**.	**PS 14.2** Refer to **Section 6.7.4**.	**MC 1.13.1** Refer to **Section 6.6.1**.
	C 13.2 Refer to **Section 6.7.3**.	**PS 13.2** Refer to **Section 6.7.3**.	**MC 1.13.1** Refer to **Section 6.6.1**.
	C 14.3 Refer to **Section 6.7.4**.	**PS 14.3** Refer to **Section 6.7.4**.	**MC 1.13.1** Refer to **Section 6.6.1**.
	C 6.5 Refer to **Section 6.6.6**.	**PS 6.5** Refer to **Section 6.6.6**.	**MC 1.13.1** Refer to **Section 6.6.1**.
	C 13.4 Refer to **Section 6.7.3**.	**PS 13.4** Refer to **Section 6.7.3**.	**MC 1.13.1** Refer to **Section 6.6.1**.
	C 14.4 Refer to **Section 6.7.4**.	**PS 14.4** Refer to **Section 6.7.4**.	**MC 14.4.1** Refer to **Section 6.7.4**.
	C 14.5 Refer to **Section 6.7.4**.	**PS 14.5** Refer to **Section 6.7.4**.	**MC 14.5.1** Refer to **Section 6.7.4**.
	C 13.6 Refer to **Section 6.7.3**.	**PS 13.6** Refer to **Section 6.7.3**.	**MC 13.6.1** Refer to **Section 6.7.3**.
	C 13.7 Refer to **Section 6.7.3**.	**PS 13.7** Refer to **Section 6.7.3**.	**MC 13.7.1** Refer to **Section 6.7.3**.
	C 13.8 Refer to **Section 6.7.3**.	**PS 13.8.1** Refer to **Section 6.7.3**.	**MC 13.8.1** Refer to **Section 6.7.3**.
		PS 13.8.2 Refer to **Section 6.7.3**	**MC 13.8.2** Refer to **Section 6.7.3**.

6.7.6 Unplanned Hydrocarbon Release: Loss of Marine Vessel Separation (MEE-04)

Context		
Topsides – **Section 3.4.2.1** Subsea Infrastructure – **Section 3.4.4** Process Description – **Section 3.4.6** Hydrocarbon and Chemical Inventories and Selection – **Section 3.8** Project Vessels **-Section 3.5**	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***
Surface or subsea release from flowline, pipeline and riser to the marine environment and atmosphere (MEE-02)		✓	✓	✓	✓	✓	✓	B	B	1	M	LCS GP PJ RBA	Acceptable if ALARP	**EPO 16**
Hydrocarbon release from topsides equipment to the marine environment and atmosphere (**Section 6.8.2**; not an MEE)			✓	✓		✓		A	D	1	M			
Marine environment footprint and associated hydrocarbon and chemical release associated with structural collapse of riser platform (MEE-03)		✓	✓	✓	✓	✓	✓	B	B	0	M			

Surface release from support vessel diesel tank (MEE-04).		✓	✓	✓	✓	✓	✓	B	D	1	M			

Description of Source of Risk

A loss of marine vessel separation between a vessel and the riser platform may result in a loss of hydrocarbon containment from the Angel facility and/or the release of fuel from the vessel. A loss of marine vessel separation 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 – ships which are visiting the riser platform can accidentally collide with the platform during approach to, or manoeuvring alongside, the platform

errant passing vessel collision – ships which are not visiting the riser platform (i.e., passing vessels) can, for one reason or another, move off-course and collide with the platform.

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.

Given the facility is NNC, the frequency of visits by vessels is inherently lower than those for a staffed facility.

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 facility (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 (**Section 6.6.1**). The riser platform is NNC, so monitoring and control (and isolation) of the platform and associated flowlines and export pipeline takes place from NRC.

A number of common failure causes due to human error and SCQ failures are presented in the generic Human Error and SCE Failure bowties in **Section 6.7.8**.

Errant Mobile Offshore Drilling Unit Collision

An errant MODU is a drilling unit that has a broken/failed mooring system and is drifting uncontrolled in the ocean. It may be a MODU contracted to Woodside, drilling in the area proximate to Angel, particularly during tie-back activities, or a unit contracted to a third party. High energy weather events such as cyclones, while a 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 collision with other assets or infrastructure.

For a moored MODU, personnel on-board the MODU are typically evacuated during cyclones (and hence response capabilities in the event of a mooring failure may be limited). Woodside, for example, implements a risk-based assessment process to aid in decision making for cyclone evacuations, with the well suspended prior to MODU evacuation. Operational experience indicates cyclone evacuations typically last for seven days.

Note that single and double mooring line failures do not typically result in the loss of station keeping. In the event of partial or complete mooring failures that 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 & 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 & 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).

Vessel Collision

A collision between a support vessel 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, during operations. This was assessed as being credible, but highly unlikely, given:

- the platform support vessels typically operate in the PAA
- the presence of subsea vessels in the PAA is typically temporary (e.g., while undertaking IMMR activities)
- vessels undertaking the Petroleum Activities Program typically operate at low speeds or are stationary
- the standard vessel operations and equipment in place to prevent collision at sea
- the construction and placement of storage tanks.

An unplanned loss of hydrocarbons resulting from vessel collision during tie-back activities is not considered under the typical Operations MEE framework primarily due to safety case scopes. Typically, the MEE register associated with operations sits with the asset and aligns with the asset safety case to ensure appropriate coverage and risk management for the duration of facility operations. During drilling operations, the responsibility and risk is limited to and covered under the vessel safety case responsible for performing the activities. As such the risk associated with vessel collisions under this circumstance only exists for the duration that this limited time activity is performed and will have its own unique controls to manage this risk to an ALARP level.

The largest tank of a platform support vessel (**Section 3.4.14.1**) or subsea support vessel (**Section 3.5.6.3**) may range up to ~150 m^3. A review of previous modelling identified an instantaneous release of 105 m^3 of diesel at the Angel platform that is considered representative of a loss of containment from a support vessel. Release characteristics for fuel tank loss of containment scenario are summarised in **Table 6-34.**

Table 6-34: Summary of worst-case support vessel fuel tank loss of containment during operations scenario

Scenario	*Hydrocarbon*	*Duration (minutes)*	*Depth (m)*	*Latitude*	*Longitude*	*Total hydrocarbon release volume (m^3)*
Support vessel fuel tank loss of containment	Marine Diesel	< 10	Surface	19° 29’ 54.60” S	116° 35’ 52.80” E	105

Loss of Vessel Separation – Credible Hydrocarbon Spill Scenario

The loss of marine vessel separation during operations is considered a Major Environment Event (MEE-04). A loss of structural integrity could result in a significant release of hydrocarbons. A loss of structural integrity may result in credible spill scenarios consistent with:

- subsea equipment loss of containment, including loss from risers (MEE-02; Section 6.7.4)
- topsides loss of containment (Section 6.8.2; not an MEE).

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.

Worst-case hydrocarbon release scenarios for subsea equipment loss of containment (MEE-02) that could result from loss of marine vessel separation are discussed in the relevant sections referenced above. 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 which 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 Petroleum Activities Program is not considered a credible risk.

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, through peer review, benchmarking and consultation.

Quantitative Spill Risk Assessment

Stochastic spill modelling of the worst-case credible spill of the support vessel fuel tank loss of containment scenario was undertaken by RPS, on behalf of Woodside. The simulation was based on the assumptions in **Section 6.7.2**. 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 volume for a support vessel fuel tank loss of containment.

Credible worst-case stochastic spill modelling for the scenarios associated with MEE-02 (**Section 6.7.4**) has been undertaken. Results of these modelling studies have been used to inform the consequence assessment for these MEEs; these assessments are applicable to the consequence assessment for a loss of structural integrity event.

Likelihood

In accordance with the Woodside Risk Matrix (**Section 2.6.3**), the following likelihoods have been assigned to the sources of risk:

- release of hydrocarbons resulting from loss of export pipeline containment (AEP including 1TL inventory) (MEE-02): Highly Unlikely (refer to Section 6.7.4)
- release of hydrocarbons resulting from loss of containment of subsea flowlines and infrastructure (MEE-02): Highly Unlikely (refer to Section 6.7.4)
- hydrocarbon release from topsides equipment to the marine environment and atmosphere: Highly Unlikely (refer to Section 6.8.2; not an MEE)
- marine environment footprint and associated hydrocarbon and chemical release associated with structural collapse of riser platform (MEE-03): Remote (refer to Section 6.7.5)
- surface release from support vessel fuel tank: Highly Unlikely.

Consequence

The spatial extent and fate (including weathering) of the spilled hydrocarbon from the support vessel was considered during the impact assessment for a worst-case loss of marine vessel separation. These considerations were informed primarily by the outputs from the numerical modelling studies undertaken by, available information on environmental sensitivities that may credibly be impacted in the event of a worst-case spill (**Section 6.7.2**), 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; Section 6.7.4)
- topsides loss of containment (Section 6.8.2).

The potential impacts are therefore discussed in the above-mentioned sections.

Marine Diesel

No contact at the ecological impact thresholds defined in **Table 6-25** for all hydrocarbon fates was predicted for the modelled scenario. The marine diesel spill would be highly localised with no impacts to receptors within the EMBA anticipated. Impacts to water quality and air quality in the immediate location of the spill would be expected to be minor and short term.

MEE-04 Loss of Marine Vessel Separation – Risk Analysis

A bowtie risk analysis was undertaken to assess MEE-04; refer to **Figure 6-21** and **Figure 6-22** for bowtie diagrams which were an output of Woodside's risk analysis process.

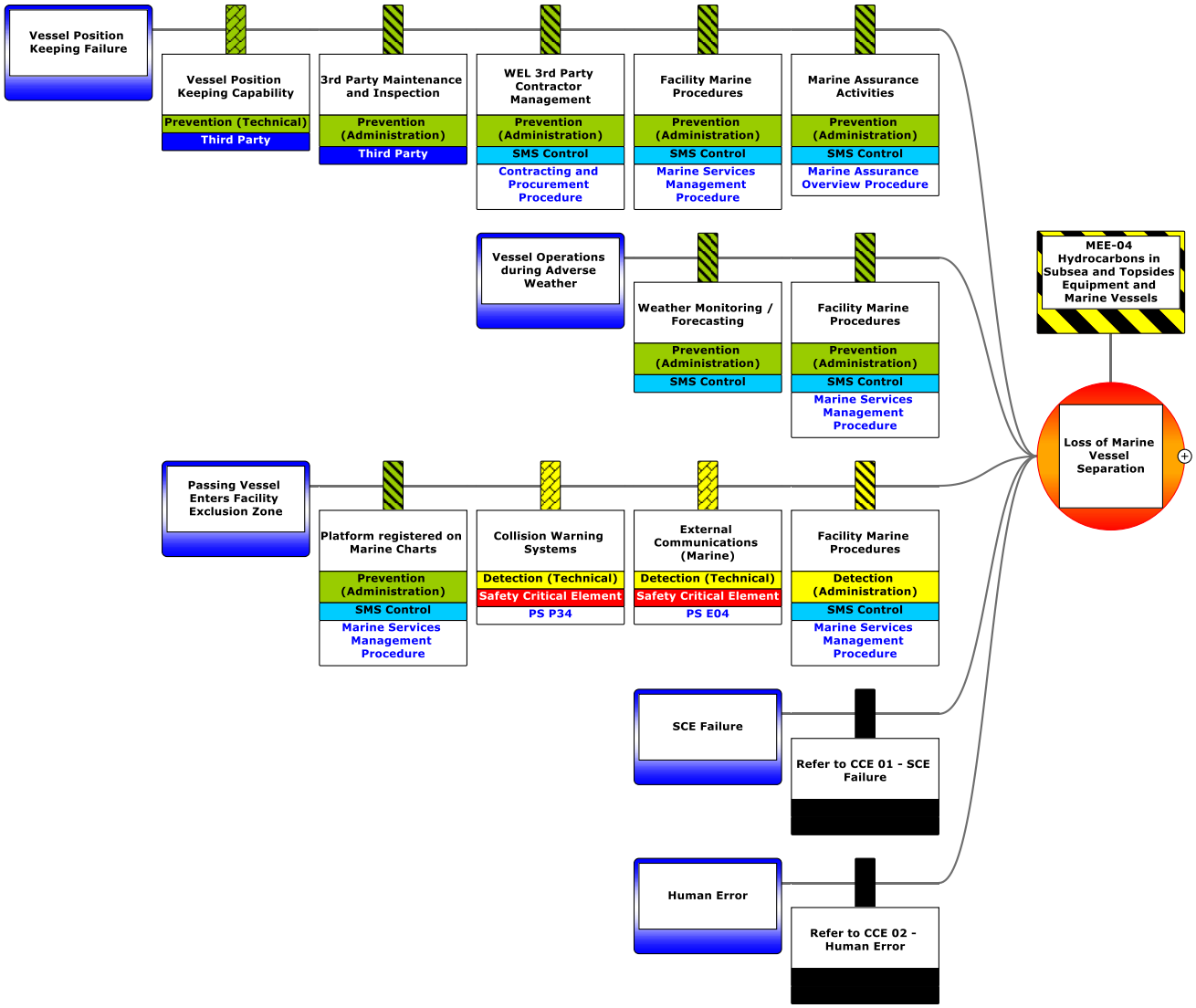


Figure 6-21: MEE-04 loss of vessel separation (Causes)

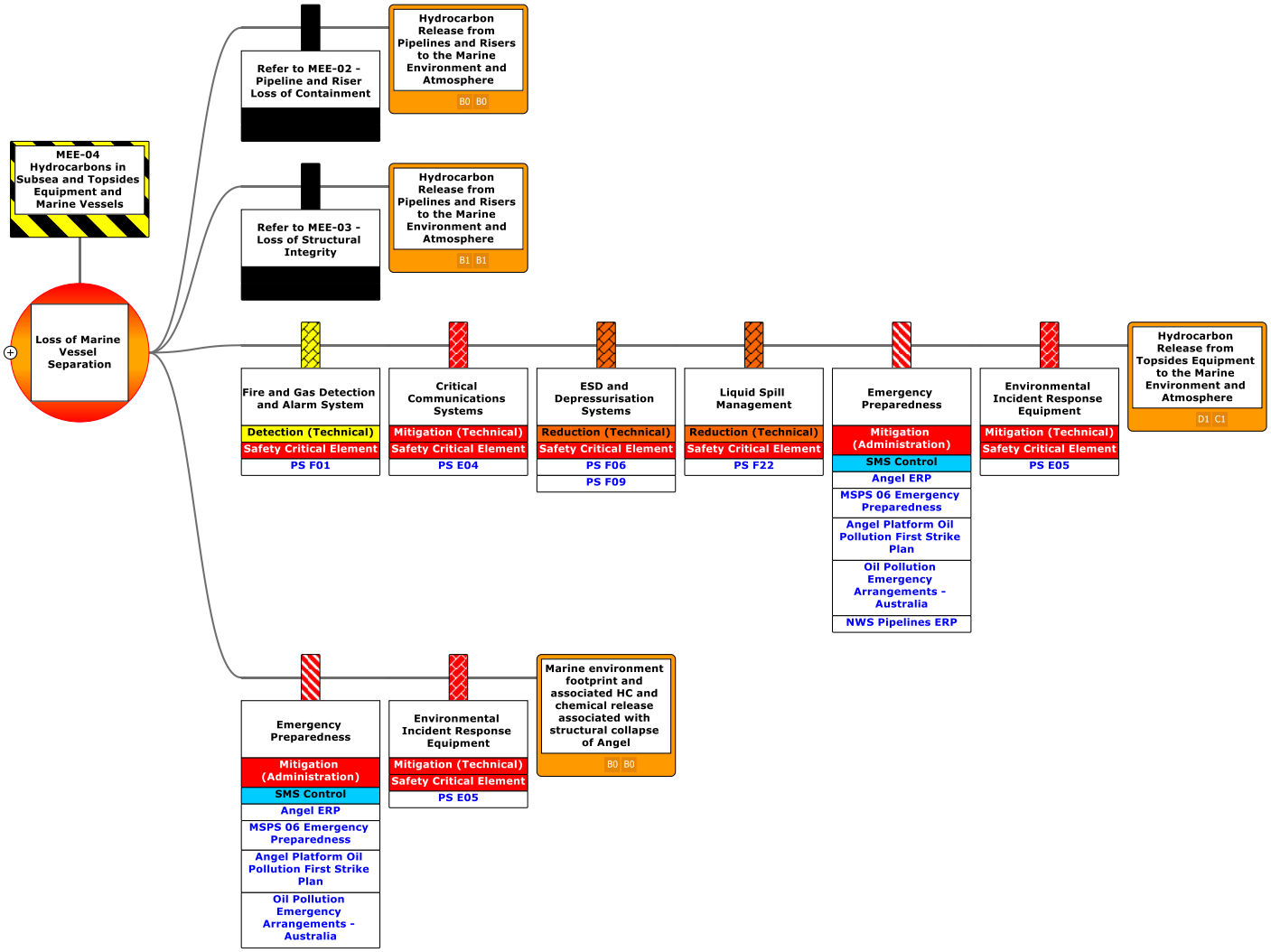


Figure 6-22: MEE-04 loss of vessel separation (Outcomes)

MEE-04 Loss of Marine Vessel Separation – Demonstration of ALARP ALARP Control Measures				
Hierarchy	***Control / Barrier***	***SCE / Management System Reference***	***Type of Effect (Refer to Table 6-23)***	***Control Adopted***
Preventative Barriers – Safety and Environmental Critical Elements				
Elimination Substitution	N/A.	No elimination or substitution controls were identified beyond those incorporated in design.		
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 they may take timely action to avoid the facility and hence reduce likelihood of collision.	P34 – Collision prevention systems	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	Detection (Technical)	Yes **C 13.2**
Mitigating Barrier – Safety and Environmental Critical Elements				
Emergency Response	Maintaining environmental incident response equipment to implement initial response to enact the Angel Operations Oil Pollution First Strike Plan.	E05 – Environmental incident response equipment	Mitigation (Technical)	Yes **C 13.4**
Engineering Controls	Maintaining fire and gas detection and alarm systems on the facility to facilitate prevention and response to fire or gas hazards.	F01 – Fire and Gas Detection and Alarm Systems	Detection (Technical)	Yes **C 14.2**
Engineering Controls	Maintain emergency shutdown system to isolate hazardous inventories.	F06 – Safety Instrumented System F09 – Depressurisation F22 – Open Hazardous Drains	Reduction/Control (Technical)	Yes **C 16.2**
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,	Angel Safety Case	Prevention/ Mitigation (Administration)	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 (Refer to Table 6-23)***	***Control Adopted***
	thus contributing to management of associated potential environmental consequences of MAEs.			
Procedures and Administration	OPGGS (Safety) Regulations 2009: Accepted Safety Case for the Pipeline 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.	North West Shelf Pipelines Safety Case	Prevention/ Mitigation (Administration)	Yes **C 14.5**
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 13.6**
Management System Specific Measures: Key Standards or Procedures				
Procedures and Administration	Implementing management systems to maintain: • Marine Services Management Procedure • Marine Assurance Overview Procedure • Contracting and Procurement Procedure.	Marine Services Management Procedure Marine Assurance Overview Procedure Contracting and Procurement Procedure	Prevention (Administration)	Yes – See **Section 7** Implementation Strategy

MEE-04 Loss of Marine Vessel Separation – Demonstration of ALARP ALARP Control Measures				
Hierarchy	***Control / Barrier***	***SCE / Management System Reference***	***Type of Effect (Refer to Table 6-23)***	***Control Adopted***
Emergency Response and Contingency Planning	Implementing management systems to maintain: • M06 – Emergency preparedness • Angel Emergency Response Plan • NWS Pipelines Emergency Response Plan • Angel Operations Oil Pollution First Strike Plan • Oil Pollution Emergency Arrangements – Australia.	MSPS M06 – Emergency preparedness Angel Emergency Response Plan NWS Pipelines Emergency Response Plan Angel Operations Oil Pollution First Strike Plan Oil Pollution Emergency Arrangements – Australia	Mitigation (Administration)	Yes **C 13.7** **C 13.8** See **Section 7** Implementation Strategy Refer to **Appendix D** 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 Angel and NWS Pipelines 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 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 quantitative spill risk assessment was undertaken (refer **Section 6.7.2** for details of the method used).

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 marine vessel separation.

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 marine vessel separation 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 Angel and NWS Pipelines Safety Cases, 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 Angel and NWS Pipelines Safety Cases 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 with a loss of marine vessel separation is managed to ALARP.

Demonstration of Acceptability			
Acceptability Statement: A loss of marine vessel separation during operations has been evaluated as having 'moderate' (B0 to D1) risk rating (via the consideration of applicable MEEs). As per **Section 2.6.3**, Woodside considers 'moderate' (B0) risk ratings as acceptable if managed to ALARP. Due to the consequence associated with MEE-04, Decision Type B has been applied; 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 considerations described in **Section 6.7.3** (MEE-01). The considerations include principles of Ecological Sustainable Development and other requirements (including laws, policies, standards and conventions). On the basis of the environmental impact assessment outcomes and Woodside's criteria for acceptability outlined in **Section 5.4**, this is considered an acceptable level of risk.			
EPOs, EPSs and MC for Angel Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 16 Loss of marine vessel separation during operations risks to the environment limited to High[82] during 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 Procedure (**Section 7.2.6**) 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 1.13.1** Refer to **Section 6.6.1**.
	C 13.2 Refer to **Section 6.7.3**.	**PS 13.2** Refer to **Section 6.7.3**.	**MC 1.13.1** Refer to **Section 6.6.1**.
	C 13.4 Refer to **Section 6.7.3**.	**PS 13.4** Refer to **Section 6.7.3**.	**MC 1.13.1** Refer to **Section 6.6.1**.
	C 14.2 Refer to **Section 6.7.4**.	**PS 14.2** Refer to **Section 6.7.4**.	**MC 1.13.1** Refer to **Section 6.6.1**.
	C 16.2 Maintain Safety Instrumented Systems (e.g., emergency shutdown and safety instrumented functions) system, blowdown and open hazardous drains system to isolate, remove and control hazardous inventories so as to mitigate the effects of an	**PS 16.2** Integrity will be managed in accordance with SCE Management Procedure (**Section 7.2.6**) and SCE technical Performance Standard(s) to prevent environment risk related Damage to SCEs for: • F06 – Safety Instrumented System, to:	**MC 1.13.1** Refer to **Section 6.6.1**.

82 Defined in **Section 2.6.3**.

	MEE/prevent escalation to a MEE.	• detect and respond to pre-defined initiating conditions, and initiate responses that function to put the process plant, equipment, and the wells in a safe condition through appropriate isolation of hazardous inventories so as to prevent or mitigate the effects of a MEE. • F09 – Depressurisation (Blowdown), to: • safely depressurise the installation in order to avoid, or minimise the escalation of an uncontrolled loss of containment. • F22 – Open Hazardous 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.	
	C 14.4 Refer to **Section 6.7.4**.	**PS 14.4** Refer to **Section 6.7.4**.	**MC 14.4.1** Refer to **Section 6.7.4**.
	C 14.5 Refer to **Section 6.7.4**.	**PS 14.5** Refer to **Section 6.7.4**.	**MC 14.5.1** Refer to **Section 6.7.4**.
	C 13.6 Refer to **Section 6.7.3**.	**PS 13.6** Refer to **Section 6.7.3**.	**MC 13.6.1** Refer to **Section 6.7.3**.
	C 13.7 Refer to **Section 6.7.3**.	**PS 13.7** Refer to **Section 6.7.3**.	**MC 13.7.1** Refer to **Section 6.7.3**.
	C 13.8 Refer to **Section 6.7.3**.	**PS 13.8.1** Refer to **Section 6.7.3**.	**MC 13.8.1** Refer to **Section 6.7.3**.
		PS 13.8.2 Refer to **Section 6.7.3**.	**MC 13.8.2** Refer to **Section 6.7.3**.

6.7.7 Unplanned Hydrocarbon Release: Loss of Control of Suspended Load from Platform (MEE-05)

Context		
Lifting Operations – **Section 3.4.12.8** Project Vessels – **Section 3.5**	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***
Surface or subsea release from flowline, pipeline and riser to the marine environment and atmosphere (MEE-02)		✓	✓	✓	✓	✓	✓	B	B	1	M	LCS GP PJ RBA CV SV	Acceptable if ALARP	**EPO 17**
Hydrocarbon release from topsides equipment to the marine environment and atmosphere (**Section 6.8.2**; not an MEE)			✓	✓		✓		A	D	1	M			

Description of Source of Risk

Lifting activities on the riser platform can take place from the pedestal crane on the east side of the platform. Lifts may occur between supply vessels and laydown areas, primarily to transfer stores and equipment to or from the riser platform. Lifting operations could potentially lead to dropped objects impacting assets (topsides equipment, subsea infrastructure) inside the PSZ. This may lead to a hydrocarbon loss of containment from topsides 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
- incorrectly slung loads
- excessive loads.
- crane operator error; dropped anchor/object from supply/standby or work vessel
- adverse weather conditions.

A number of common failure causes due to human error and SCQ failures are presented in the generic Human Error and SCE Failure bowties in **Section 6.7.8**.

Loss of Control of Suspended Load – Credible Scenarios

The potential outcome of a loss of control of a suspended load is a topsides and/or subsea flowlines and riser loss of containment. Refer to **Section 6.7.4** (MEE-02) and **Section 6.8.2** for a description of subsea and topsides loss of containments scenarios, respectively.

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 values were also considered in the demonstration of ALARP and acceptability through peer review, benchmarking and consultation.

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. Refer to **Section 6.7.2** for additional information on quantitative spill risk assessments for this scenario. A quantitative spill risk assessment was not conducted for the topsides loss of containment scenario due to the relatively small credible release volume; refer to **Section 6.8.2** for additional information.

Likelihood

In accordance with the Woodside Risk Matrix, given prevention and mitigation measures in place (i.e., design, inspection and maintenance), the likelihood assigned to the worst-case risk events are considered 1 (Highly Unlikely).

Consequence

The spatial extent and fate (incl. 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 6.7.4** (MEE-02) and **Section 6.8.2** for a description of the consequence potentially resulting from subsea and topsides loss of containment scenarios, respectively.

MEE-05 Loss of Control of Suspended Load from Platform – Risk Analysis

A bowtie risk analysis was undertaken to assess MEE-05; refer to **Figure 6-23** and **Figure 6-24** for bowtie diagrams which were an output of Woodside's risk analysis process.

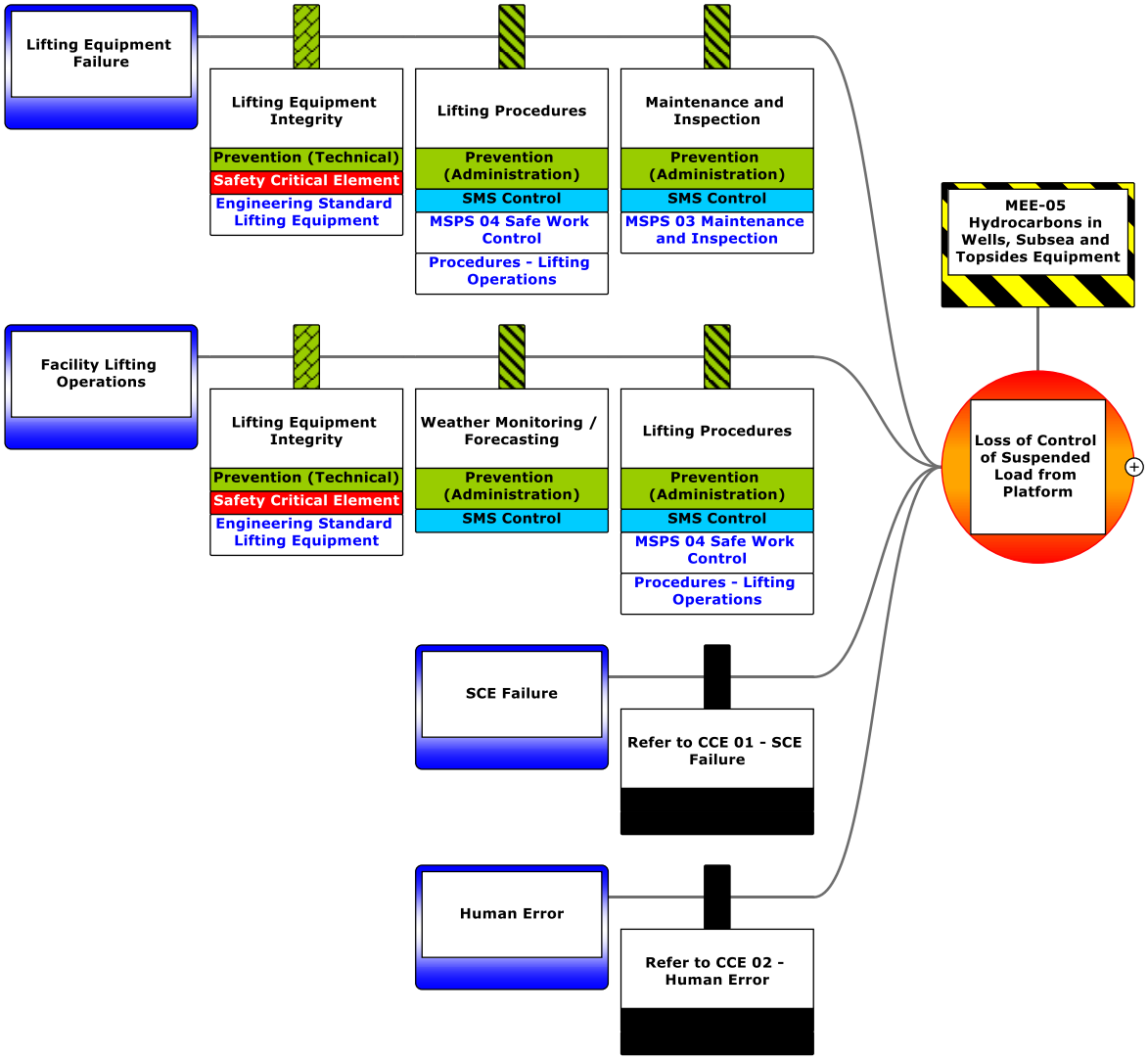


Figure 6-23: MEE-05 loss of control of suspended load from platform (Outcomes)

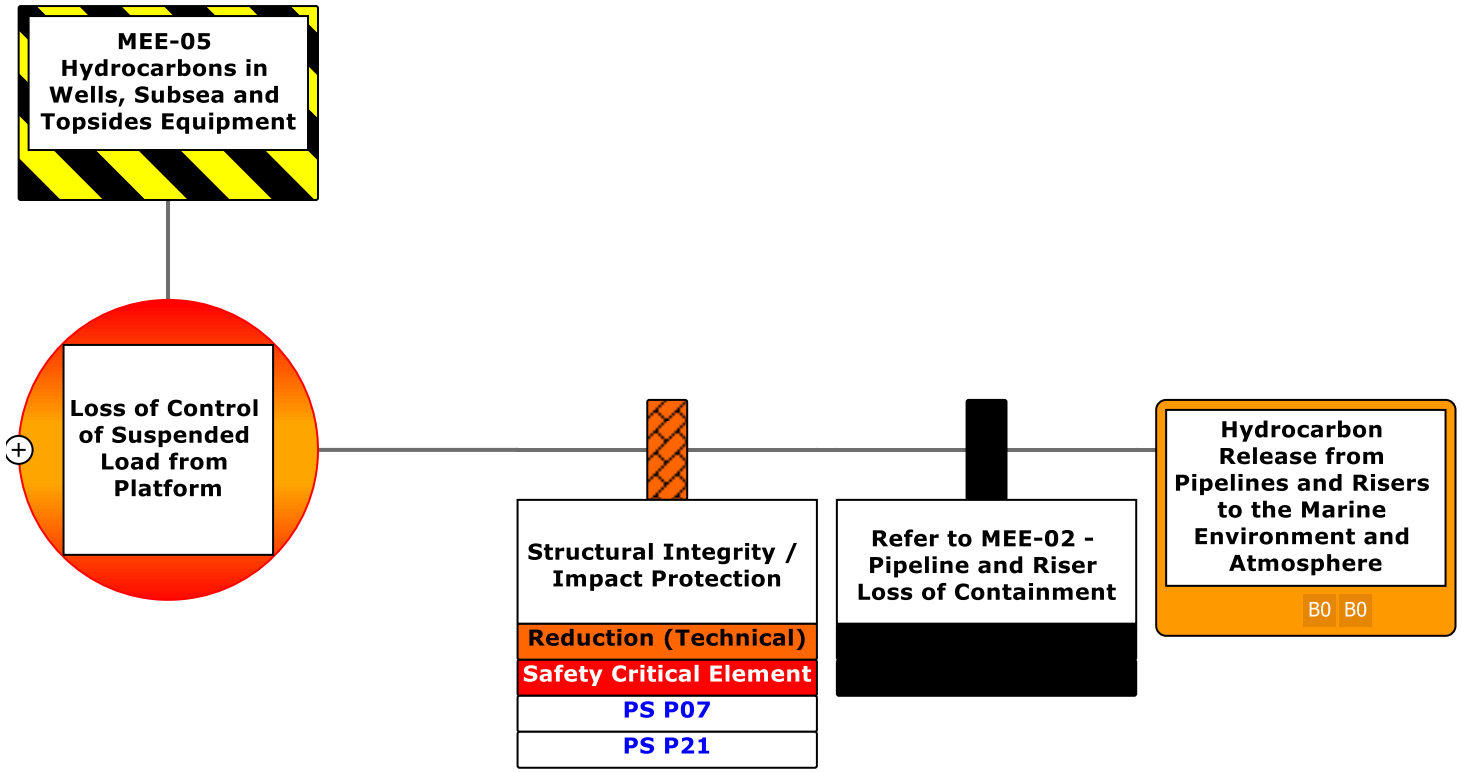


Figure 6-24: MEE-05 loss of control of suspended load from platform (Outcomes)

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 (refer to Table 6-23)***	***Control adopted***
Preventative Barriers – Safety and Environmental Critical Elements				
Elimination Substitution	N/A.	No elimination or substitution controls were identified beyond those incorporated in design.		
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	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/surface structures P21 – Substructures	Mitigation (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.	Angel Safety Case,	Prevention (Administration)	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)	Yes **C 13.6**
Management System Specific Measures: Key Standards or Procedures				
Procedures and Administration	Implement management systems to maintain: • Engineering Standard – Lifting equipment • M03 – Maintenance and inspections • M04 – Safe work control	Engineering Standard Lifting Equipment MSPS M03 – Maintenance and inspections	Mitigation (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 (refer to Table 6-23)***	***Control adopted***
	• Procedures – Lifting Operations.	MSPS M04 – Safe work control Procedures – Lifting Operations		
Emergency Response and Contingency Planning	Implement management systems to maintain: • M06 – Emergency Preparedness • Angel Emergency Response Plan • NWS Pipelines Emergency Response Plan • Angel Operations Oil Pollution First Strike Plan • Oil Pollution Emergency Arrangements – Australia.	MSPS M06 – Emergency preparedness Angel Emergency Response Plan NWS Pipelines Emergency Response Plan Angel Operations Oil Pollution First Strike Plan Oil Pollution Emergency Arrangements – Australia	Mitigation (Administration)	Yes **C 13.7** **C 13.8** See **Section 7** Implementation Strategy Refer to **Appendix D** 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 Angel and NWS Pipelines 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 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 was undertaken to assess MEE-05, refer to **Figure 6-23** and **Figure 6-24** for bowtie diagrams. • A quantitative spill risk assessment was undertaken (refer **Section 6.7.2** for details of the method used).				
Company Values				
Refer to **Section 6.7.4** for a discussion of company values in relation to the pipeline and riser loss of containment scenario.				
Societal Values				
Refer to **Section 6.7.4** for a discussion of societal values in relation to the pipeline and riser loss of containment scenario.				

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 (refer to Table 6-23)***	***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 of a loss of control of suspended loads.

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 control of suspended load 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 Angel and NWS Pipelines Safety Cases, 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 Angel and NWS Pipelines Safety Cases 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 with a loss of control of suspended load is managed to ALARP.

Demonstration of Acceptability

Acceptability Statement:

A loss of marine vessel separation has been evaluated as having 'moderate' (B1 to D1) risk rating (via the consideration of applicable MEEs). As per **Section 2.2.1.** Woodside considers 'moderate' (B1) risk ratings as acceptable if managed to ALARP. Due to the consequence associated with MEE-05, Decision Type B has been applied; 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 considerations described in **Section 6.7.3** (MEE-01). The considerations include principles of Ecological Sustainable Development, company and societal values, and other requirements (including laws, policies, standards and conventions).

On the basis of the environmental impact assessment outcomes and Woodside's criteria for acceptability outlined in **Section 5.4**, this is considered an acceptable level of risk.

EPOs, EPSs and MC for Angel Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 17 Loss of suspended load from riser platform risks to the environment	**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 Procedure (**Section 7.2.6**) and SCE Technical Performance Standard(s) to prevent environment risk related damage to SCEs for: P20 – Lifting equipment, to: • prevent platform lifting equipment failure or dropped/swinging loads that could result in an MEE by maintaining lifting equipment integrity.	**MC 1.13.1** Refer to **Section 6.6.1**.

EPOs, EPSs and MC for Angel Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
limited to High[83] during the Petroleum Activities Program.	**C 15.1** Refer to **Section 6.7.5**.	**PS 15.1** Refer to **Section 6.7.5**.	**MC 1.13.1** Refer to **Section 6.6.1**.
	C 14.4 Refer to **Section 6.7.4**.	**PS 14.4** Refer to **Section 6.7.4**.	**MC 14.4.1** Refer to **Section 6.7.4**.
	C 13.6 Refer to **Section 6.7.3**.	**PS 13.6** Refer to **Section 6.7.3**.	**MC 13.6.1** Refer to **Section 6.7.3**.
	C 13.7 Refer to **Section 6.7.3**.	**PS 13.7** Refer to **Section 6.7.3**.	**MC 13.7.1** Refer to **Section 6.7.3**.
	C 13.8 Refer to **Section 6.7.3**.	**PS 13.8.1** Refer to **Section 6.7.3**.	**MC 13.8.1** Refer to **Section 6.7.3**.
		PS 13.8.2 Refer to **Section 6.7.3**.	**MC 13.8.2** Refer to **Section 6.7.3**.

83 Defined in **Section 2.6.3**.

6.7.8 Major Environmental Event Common Cause Event Failure Mechanisms: Safety and Environment 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.

Angel: Major Environment Event Datasheet	
MEE Number	All
Hazard Description	Generic SCE Failure
Hazard Description	
Hazard Overview and Scope	
There are a number of causes which contribute to failures of SCEs and other systems which 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 6-25** and **Figure 6-26**) illustrates the causes, outcomes and the controls in place to manage these failure mechanisms.	
Hazard Management (Bowtie Diagrams)	

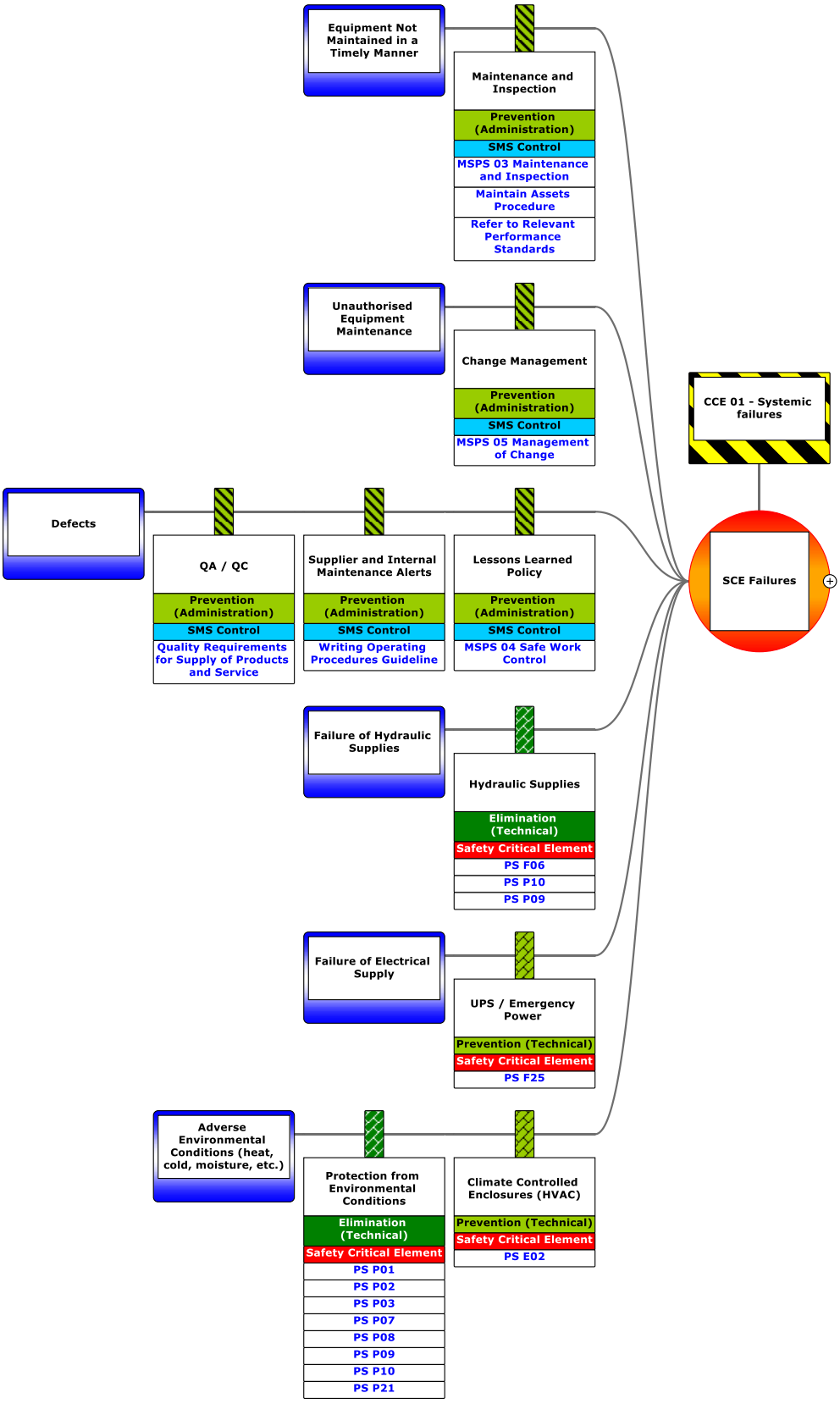


Figure 6-25: Generic bowtie – safety and environment critical failures (Causes)

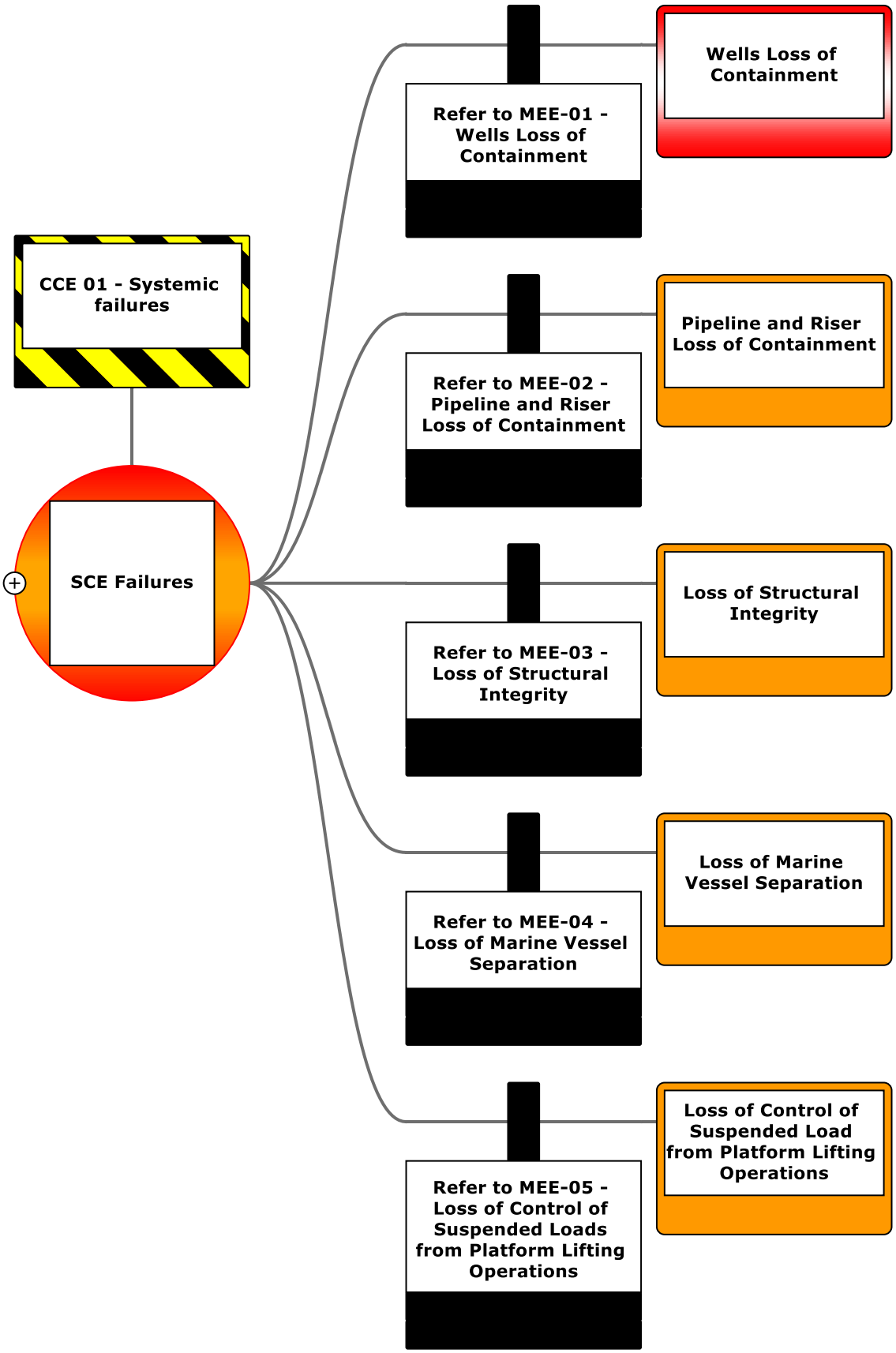


Figure 6-26: Generic bowtie – safety and environment critical failures (Outcomes)

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 X)***	***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	Elimination (Technical)	Yes **C 18.1**
	Maintain protection from environmental conditions.	P07 – Topsides/ Surface Structures P08 – Piping Systems P09 – Pipeline Systems P10 – Wells P21 – Substructures	Elimination (Technical)	Yes **C 18.2**
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 18.3**
	Maintain climate controlled enclosures to protect essential equipment from adverse environmental conditions.	E02 – Safety Critical Buildings	Prevention (Technical)	Yes **C 18.4**
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 Angel 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 a MAE to ALARP, thus contributing to management of associated potential environmental consequences of MAEs.	Angel 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				
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 • MSPS-04 • MSPS-05 • 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			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
EPO 18 Refer to relevant MEE EPOs: **EPOs 13-17**	**C 18.1** Maintain hydraulic supplies (e.g., to support Safety Instrumented Systems and actuation of SCE valves/isolations).	**PS 18.1** Integrity will be managed in accordance with SCE Management Procedure (**Section 7.2.6**) and SCE technical Performance Standard(s) to prevent environment risk related Damage to SCEs for: F06 – Safety Instrumented System, to: • maintain hydraulic supplies (e.g., to support Safety Instrumented Systems and actuation of SCE valves/isolations).	**MC 1.13.1** Refer to **Section 6.6.1**.
	C 18.2 Maintain protection from environmental conditions.	**PS 18.2** Integrity will be managed in accordance with SCE Management Procedure (**Section 7.2.6**) and SCE technical Performance Standard(s) to prevent environment risk related Damage to SCEs for: 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,	**MC 1.13.1** Refer to **Section 6.6.1**.

CCE-01 Safety Critical Element Failure Performance Outcomes, Standards and Measurement Criteria			
		moisture, chemical reaction/ incompatibility)..	
	C 18.3 Maintain UPS/emergency power system to supply Essential safety systems.	**PS 18.3** Integrity will be managed in accordance with SCE Management Procedure (**Section 7.2.6**) 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 1.13.1** Refer to **Section 6.6.1**
	C 18.4 Maintain climate controlled enclosures to protect essential equipment from adverse environmental conditions.	**PS 18.4** Integrity will be managed in accordance with SCE Management Procedure (**Section 7.2.6**) and SCE technical Performance Standard(s) to prevent environment risk related Damage to SCEs for: E02 – Safety Critical Buildings to; protect essential equipment from adverse environmental conditions by: • providing ventilation to ensure that the zonal classification is maintained within an enclosure or building via adequate or dilution ventilation • preventing ingress of hazardous products from external sources into buildings/enclosures located within a hazardous/ non-hazardous area.	**MC 1.13.1** Refer to **Section 6.6.1**
	C 14.4 Refer to **Section 6.7.4**.	**PS 14.4** Refer to **Section 6.7.4**.	**MC 14.4.1** Refer to **Section 6.7.4**

Angel: 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 errors bowtie (**Figure 6-27**, **Figure 6-28** and **Figure 6-29**) 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 Management System Procedures.

Hazard Management (Bowtie Diagrams)

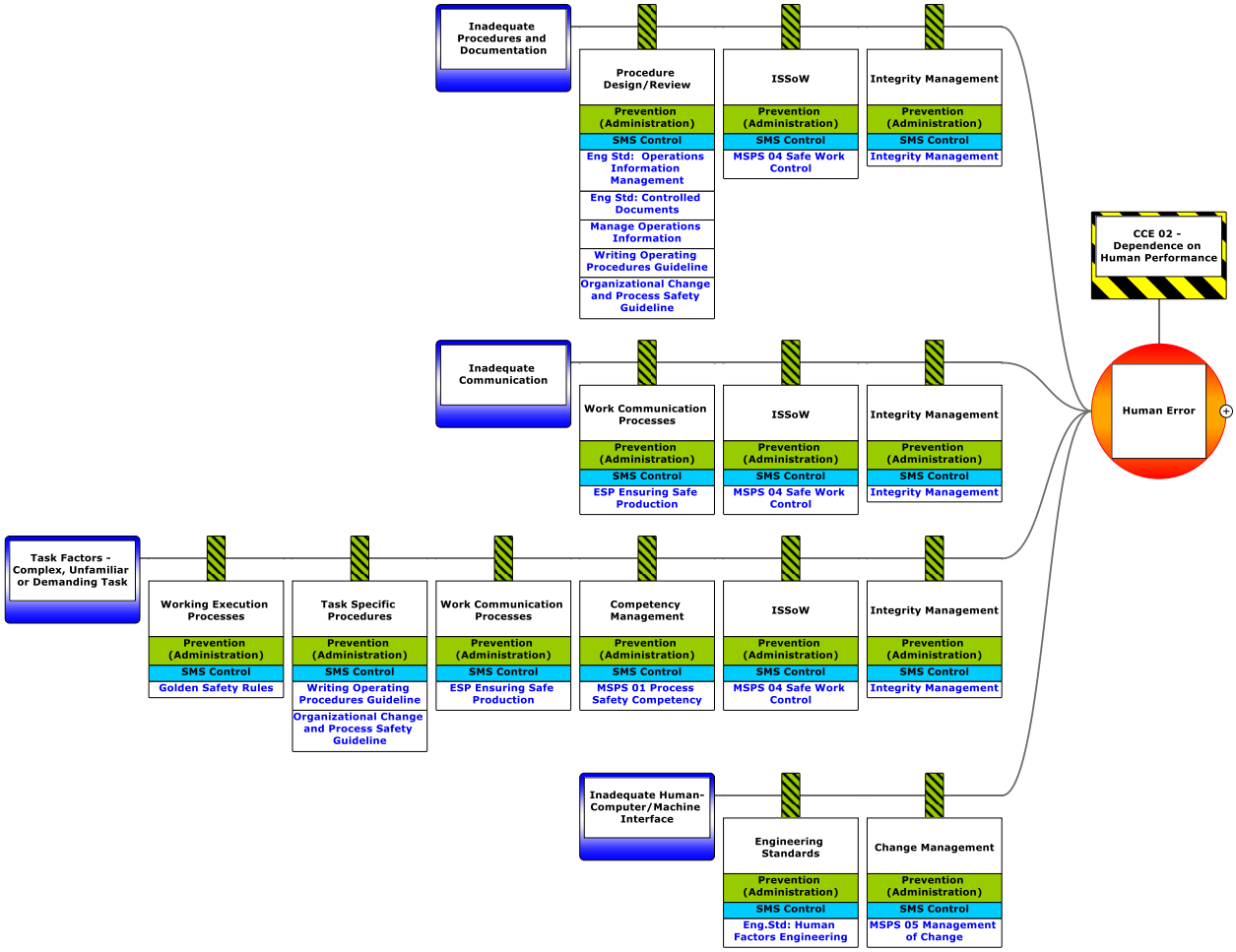


Figure 6-27: Generic bowtie – human error (Causes 1 to 4)

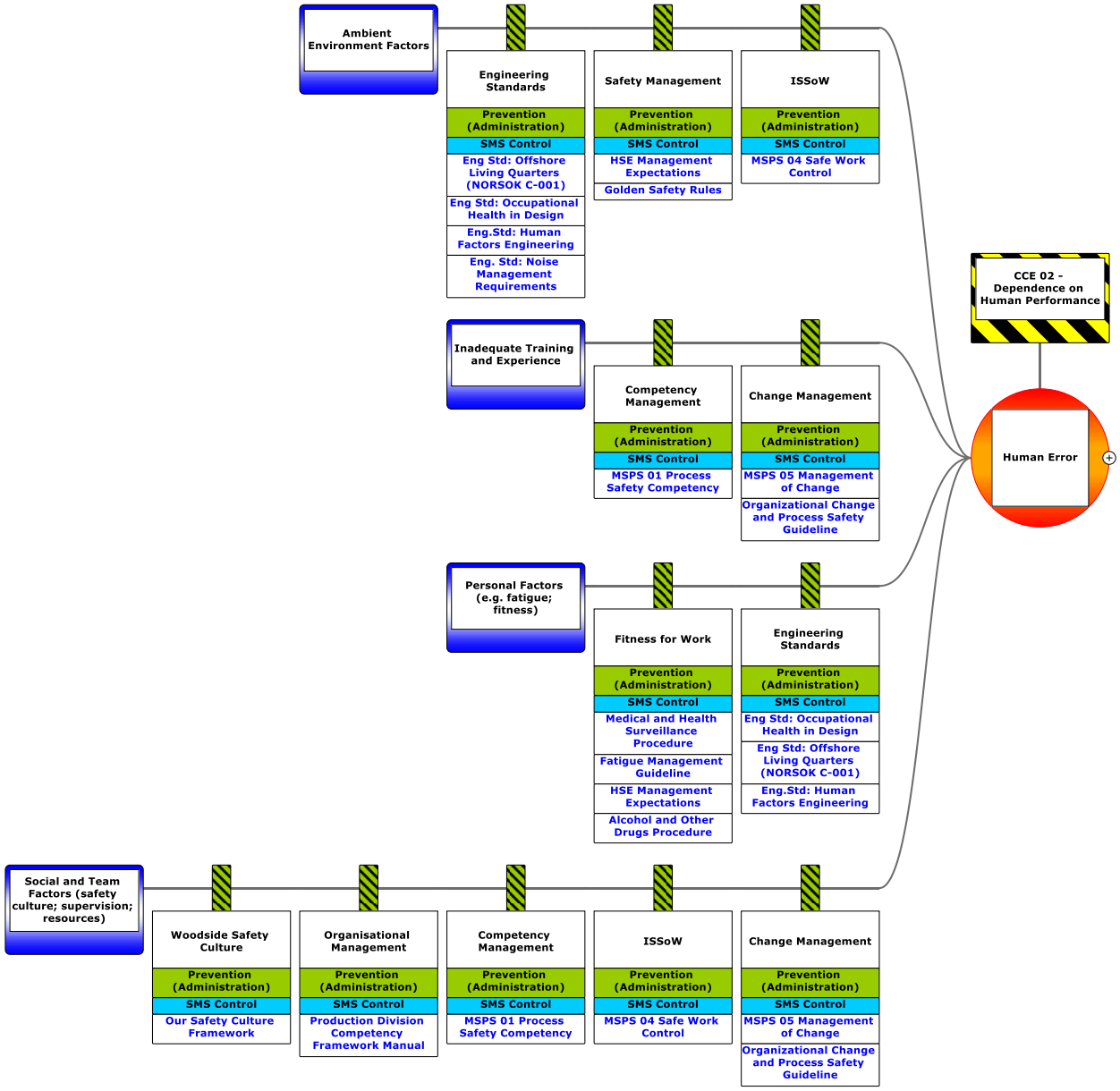


Figure 6-28: Generic bowtie – human error (Causes 5 to 8)

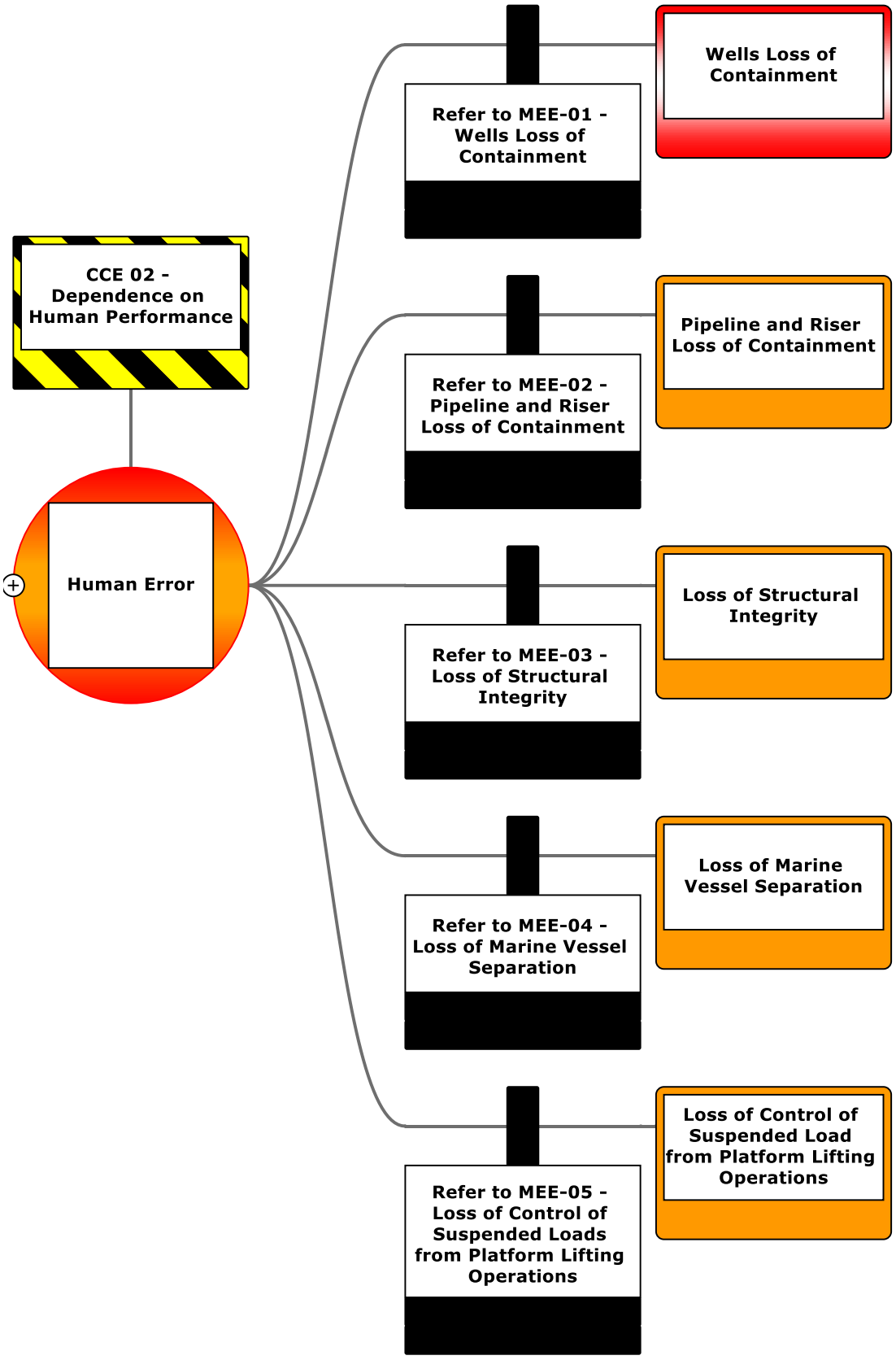


Figure 6-29: Generic bowtie – human error (Outcomes)

6.8 Unplanned Events (Accidents, Incidents, Emergency Situations)

6.8.1 Unplanned Hydrocarbon Release: Loss of Well Integrity during Drilling of LDA-02

Context		
Drilling Activities – **Section 3.5.2**	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**

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***	***Likelihood***	***Risk Rating***	***ALARP Tool***	***Acceptability***	***Outcome***
Loss of hydrocarbons to marine environment due to loss of well containment during drilling of the LDA-02 well	✓	✓	✓	✓	✓	✓	B	B	1	M	LCS GP PJ RB A CV SV	Acceptable if ALARP	**EPO 19**

Description of Source of Impact

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 during drilling of the LDA-02 well. A loss of well containment is an uncontrolled release of reservoir hydrocarbon 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 BOP) or activation of the same has failed. Woodside has identified one well blowout scenario:

- 'swab' blowout – full reservoir open to flow in the 12.375" hole section.

The Loss of Well Containment MEE scenario from all Angel wells during operations is considered separately in **Section 6.7.3**.

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 × 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 60-year history, it has not experienced any well containment events that have resulted in significant releases or significant environmental impacts.

Therefore, in accordance with the Woodside Risk Matrix, a loss of well containment and resulting blowout event corresponds to a 'highly unlikely' event as it has occurred many times in the industry, but not in the Company.

Credible Scenario – Loss of Well Containment

The credible worst-case scenario to be considered during drilling of the LDA-02 well is an uncontrolled subsea release to environment lasting <77 days (Refer to **Section 6.7.3**). 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

Spill modelling was undertaken by RPS, on behalf of Woodside, to determine the fate of hydrocarbon released from the loss of well containment scenario, based on the Lambert Deep condensate characteristics (**Table 6-24)**. The modelled release rate provided assumes the worst-case scenario for the largest oil volume release (**Table 6-35**). 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 6-35: Summary of modelled credible scenario – well blowout

	Loss of well integrity
Total discharge[84] at surface	5 days 2187 m^3
Total discharge at seabed	72 days 28,998 m^3
Water depth	130 m
Fluid	Lambert Deep 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. The mixed plume is initially forecast to jet towards the water surface with a vertical velocity of around 8 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 16.7 m.

Given the discharge velocity and turbulence generated by the expanding gas plume, the release is predicted to generate droplet sizes ranging from approximately 3179 µm to 11,452 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.

Impact Assessment

Potential Impacts Overview

EMBA

Quantitative hydrocarbon spill modelling results are shown in **Table 6-36** and have been used to define the EMBA (**Section 4.1**).

Surface Hydrocarbons

Quantitative hydrocarbon spill modelling results for surface hydrocarbons are shown in **Figure 4-1**. 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 391 km and 19 km respectively from the release site. Floating oil concentrations greater than 1 g/m^2 are predicted to contact Gascoyne AMP at a 3% probability. No receptors are predicted to be in contact with floating oil above 10 g/m^2 (**Table 6-36**).

Entrained Hydrocarbons

Entrained hydrocarbons at concentrations equal to or greater than the 100 ppb threshold are predicted to be found up to 406 km from the release site. Contact by entrained hydrocarbons at concentrations equal to or greater than 100 ppb is predicted at the Montebello AMP (6%), with a worst-case entrained concentration of 240 ppb. Several other

84 The discharge volumes in **Table 6-35** 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.

sensitive receptors are predicted to be contacted at concentrations equal to or greater than 100 ppb with probabilities of 1 to 2% (**Table 6-36**).

Dissolved Hydrocarbons

Dissolved aromatic hydrocarbons at concentrations equal to or greater than the 50 ppb thresholds are predicted to be found up to around 552 km from the release site. Contact by dissolved aromatic hydrocarbons at concentrations equal to or greater than 50 ppb is predicted to be greatest at the Montebello AMP (9%), with a worst-case dissolved concentration of 447 ppb. Several other sensitive receptors are predicted to be contacted at concentrations equal to or greater than 50 ppb with probabilities of 1 to 2% (**Table 6-36**).

Accumulated Hydrocarbons

Shoreline oil concentrations above 10 g/m^2 are predicted to contact Muiron Islands with 18% probability. No shoreline oil impact is predicted at 100 g/m^2 (**Table 6-36**).

Table 6-36: Key receptor locations and sensitivities potentially contacted above impact thresholds by the loss of well containment scenario during drilling of LDA-02 with summary hydrocarbon spill contact (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 [WM0000PG10055394])																												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																				Socio-economic and cultural					Socio-cultural EMBA		Ecological EMBA			
		Water quality	Sediment quality	Marine primary producers				Other communities/habitats						Protected species									Other species									Surface hydrocarbon (1 to 10 g/m²)	Accumulated hydrocarbons (10 to 100 g/m²)	Surface hydrocarbon (≥10 g/m²)	Entrained hydrocarbon (≥100 ppb)	Dissolved aromatic hydrocarbon (≥50 ppb)	Accumulated hydrocarbons (>100 g/m²)
		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)						
Offshore[85]	Argo-Rowley Terrace AMP	✓						✓							✓	✓			✓			✓	✓	✓		✓				✓		-	-	-	2	2	-
	Montebello AMP	✓	✓	✓			✓	✓							✓	✓			✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		-	-	-	6	9	-
	Ningaloo AMP	✓	✓	✓			✓	✓							✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		-	-	-	2	1	-
	Gascoyne AMP	✓	✓												✓	✓			✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	3			1	1	-
	Rankin Bank	✓	✓	✓			✓	✓		✓						✓			✓		✓		✓		✓	✓	✓		✓			-	-	-		1	-
Islands	Montebello Islands (including MP and Hermite Islands)	✓	✓	✓	✓	✓	✓	✓				✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		-	2	-	-	1	-
	Barrow Island (including MMA, MP, Boodie and Middle Islands and NRs)	✓	✓	✓	✓		✓	✓				✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	-	-	-	-	1	-

85 Note: hydrocarbons cannot accumulate on open ocean, submerged receptors, or receptors not fully emergent.

Environmental setting	Location/name	Environmental, social, cultural, heritage and economic aspects presented as per the environmental risk definitions (Woodside's Risk Management Procedure [WM0000PG10055394])																												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																						Socio-economic 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 to 10 g/m²)	Accumulated hydrocarbons (10 to 100 g/m²)	Surface hydrocarbon (≥10 g/m²)	Entrained hydrocarbon (≥100 ppb)	Dissolved aromatic hydrocarbon (≥50 ppb)	Accumulated hydrocarbons (>100 g/m²)
	Pilbara Island – Southern Islands (Airlie, Bessieres, Mary Anne Group, Middle, Passage, Peak, Serrurier, Table and Thevenard Islands, Great Sandy Island NR, North Sandy Island NR, Thevenard Island NR)	✓	✓		✓		✓		✓			✓		✓		✓	✓		✓	✓		✓	✓	✓	✓	✓	✓		✓	✓		-	8	-	-	-	-
	Muiron Islands (includes MMA and Sunday Island)	✓	✓	✓	✓		✓	✓		✓		✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓			✓	✓		-	18	-	2	-	-
	Bedwell island	✓	✓	✓	✓		✓	✓		✓		✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓			✓	✓		-	3	-	-	-	-
Reefs, Banks and Shoals	Rowley Shoals	✓	✓	✓			✓	✓			✓				✓	✓			✓	✓	✓	✓		✓	✓						-	8	-	-	-	-
	Glomar Shoals	✓	✓	✓			✓	✓			✓				✓	✓			✓	✓	✓	✓		✓	✓						-	-	-	-	1	-
	Exmouth		✓	✓		✓	✓	✓			✓	✓		✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓			✓	✓			1	-	-	-	-
	Ningaloo (WHA, MP, Cape Range NP)	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		-	-	-	2	1	-

Summary of Potential Impacts to Environmental Values(s)

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 6.7.3**. Potential impacts specific the loss of well containment during drilling of the LDA-02 well are summarised below.

Marine Mammals

A range of cetaceans were identified as potentially occurring within the PAA and wider EMBA (**Section 4.6.3**). In the event of a loss of well containment during drilling of LDA-02, 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 pygmy blue whales (northbound and southbound migrations). As described in **Section 4.6.3** 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).

Pygmy blue whales and humpback whales are known to migrate seasonally through the wider EMBA. A major spill in May to November would coincide with humpback whale migration through the waters off the Pilbara and North West Cape (**Section 4.6.3**). A major spill in April to 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 (see **Table 6-36**) 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 (~181 km south of the PAA).; 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 loss of well containment during drilling of LDA-02 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 PAA 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 to 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 (8% and 1% respectively).

There are no overlapping BIAs with the PAA (**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 LDA-02 well is proposed to be undertaken in Q3 2024, which coincides with hawksbill turtle nesting and hatching, but is outside 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 (**Table 6-36**).

In summary, a loss of well containment during drilling of LDA-02 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 LDA-02 has the potential to result in major long-term impacts to sea snakes, with consequence severity dependent on the duration and extent of a spill in relation to the distribution of sea snakes.

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 LDA-02 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 PAA and 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). Foraging and breeding BIAs for a number of seabirds and migratory shorebirds overlap with the EMBA (**Section 4.6.4).** 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. Refer to **Table 6-36** for locations within the predicted extent of the EMBA that are identified as habitat for seabirds/migratory shorebirds. 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

Within the EMBA resulting from a loss of well containment during drilling of the LDA-02 well, there is the potential for plankton communities to potentially be impacted where entrained hydrocarbon threshold concentrations are exceeded. 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 marine diesel. 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/m^2) are not predicted to reach any protected areas.

Socio-economic

A spill resulting from a loss of well containment during drilling of the LDA-02 well is considered unlikely to cause significant direct impacts on the target species fished by Commonwealth State active fisheries identified in **Section 4.9.2** which overlap with the 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 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/m^2 may also occur up to 391 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 Values and Heritage

Through consultation and review of available literature (**Section 4.9.1**), 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 vessel collision. 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 4.9.1**), with cultural and environmental values intrinsically linked (DCCEEW, 2023; MAC, 2021, as cited in Woodside, 2023b). 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 4.9.1**). In the event of a worst-case release of MDO 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 EMBA overlaps no Registered Aboriginal Sites and two Other Heritage Places. Any oil 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. are assessed in Section 6.10

Marine parks: The EMBA overlaps five AMPs under North-West Marine Parks Network Management Plan 2018 and six State Marine Parks. Management Plans for these parks recognise cultural values of Indigenous groups (**Section 4.8**). Due to the low maximum concentrations predicted to reach any marine park, these values are expected to be maintained.

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.

There are a number of historic shipwrecks identified within the EMBA, but none identified within 50 km of the PAA (**Section 4.9.1**).

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 4.9.1**). 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 Value(s)
In the highly unlikely event of a major hydrocarbon spill due to a loss of well integrity during drilling of the LDA-02 well, the EMBA includes the areas listed in **Table 6-36**. This incorporates 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. The overall environmental consequence is defined as 'B – Major, long term impact (10 to 50 years) on highly valued ecosystem, species, habitat, physical or biological attributes'.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[86]***	***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, 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: • Effectiveness of primary and secondary barriers shall be	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 in likelihood reduces the overall risk.	Benefits outweigh cost/sacrifice.	Yes **C 19.1**

86 Qualitative measure.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[86]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
verified (physical evidence of the correct placement and performance) during the permanent plugging of the well (if required).				
In the event of a spill, emergency response activities implemented in accordance with the OPEP (per **Appendix D**).	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 13.7**
Arrangements supporting the activities in the OPEP (per **Appendix D**) will be tested to ensure the OPEP can be implemented as planned.	F: Yes. CS: Moderate costs associated with exercises. Standard practice.	Testing the OPEP activities would not reduce the likelihood, but response activities may reduce the consequence.	Benefits outweigh cost/sacrifice.	Yes **C 13.8**
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 19.2**
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 hydrocarbon release.	Benefits outweigh cost/sacrifice.	Yes **C 19.3**
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 19.4**

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[86]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Well specific barrier elements, and the specified verification requirements, are identified in accordance with the Well Acceptance Criteria Procedure.	F: Yes. CS: Minimal cost. Standard practice.	This procedure will reduce the likelihood of a spill occurring from a suspended well. Although changes in consequence would occur, the reduction in likelihood results in a reduction in overall risk.	Benefits outweigh cost/sacrifice.	Yes **C 19.5**
Good Practice				
BOP installed during drilling operations. To ensure no loss of hydrocarbons from loss of well integrity, the BOP shall have, at a minimum: • 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. 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 Well Control Manual, Original Equipment Manufa[ct]urer (OEM) Standards and API Standard 53 4th Edition.	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 19.6**
Project-specific MODU 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**

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[86]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
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 6.7.2**)				
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 Compass. As detailed above, the Petroleum Activities Program 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. In accordance with the MoU between Woodside and AMSA, a copy of the Oil Pollution First Strike Plan was provided to AMSA.				
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 LDA-02 well has been evaluated as having a high level of current risk rating due to the scale of potential environmental impacts. However, the likelihood of a loss of well integrity occurring is considered extremely low. 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				

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[86]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***

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 ESD

The impact and risk evaluation has taken into account the relevant principles of ESD, being:

- decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations
- the principle of inter-generational equity—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 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 (**Appendix A**)
- Woodside Risk Management Policy (Appendix A)
- 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 (**Appendix D**).
- Monitoring and Evaluation (operational monitoring) as a key response in the 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 (refer to Section 5.8 of the Oil Spill Assessment and Mitigation Plan) 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. In accordance with the MoU between Woodside and AMSA, a 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 LDA-02 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
- APPEA Memorandum of Understanding: Mutual Assistance for relief well drilling; 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 (refer also to Appendix D)
- OPGGS (Resource Management and Administration) Regulations 2011 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, in accordance with **Section 7.10**. A mutual aid MoU for relief well drilling is in place and the Drilling Engineering Manager maintains a list of rigs that are currently operating in WA.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[86]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
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. As demonstrated in **Section 6.9**, the residual risk of accidental hydrocarbon release from loss of well integrity during drilling of the LDA-02 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 Petroleum Activities Program is not considered to be inconsistent with the overall recovery objectives and actions of these recovery plans and conservation advice (**Section 6.9**).				
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 to 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 Petroleum Activities Program 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 LDA-02 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 6.9** 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 Drilling and Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Standards***	***Measurement Criteria***
EPO 19 No loss of well integrity resulting in loss of hydrocarbons to the marine environment during the Petroleum Activities Program.	**C 19.1** 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	**PS 10.4** Refer to **Section 6.6.10**.	**MC 10.4.1** Refer to **Section 6.6.10**.

EPOs, EPSs and MC for Drilling and Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Standards***	***Measurement Criteria***
	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).		
	C 13.7 In the event of a spill emergency response activities implemented in accordance with the OPEP (per **Appendix D**). Refer to **Section 6.7.3**.	**PS 13.7** In the event of a spill the OPEP (per Appendix D) requirements are implemented Refer to **Section 6.7.3**.	**MC 13.7** Refer to **Section 6.7.3**.
	C 13.8 Refer to **Section 6.7.3**.	**PS 13.8.1** Refer to **Section 6.7.3**.	**MC 13.8.1** Refer to **Section 6.7.3**.
		PS 13.8.2 Refer to **Section 6.7.3**.	**MC 13.8.2** Refer to **Section 6.7.3**.
	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** Refer to **Section 6.6.10**.	**MC 10.5.1** Refer to **Section 6.6.10**.
	C 19.3 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.	**PS 19.3** Abandonment conducted in accordance with criteria identified in accepted WOMP.	**MC 19.3.1** Records demonstrate abandonment conducted in accordance with well acceptance criteria and accepted WOMP.
	C 19.4 An approved SCERP shall exist prior to drilling, including feasibility and any specific considerations for relief well kill.	**PS 19.4** The SCERP is in place to ensure feasibility of responding to a source control incident.	**MC 19.4.1** An approved Source Control Emergency Response Plan.
	C 19.5	**PS 19.5**	**MC 19.5.1**

EPOs, EPSs and MC for Drilling and Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Standards***	***Measurement Criteria***
	Well-specific barrier elements, and the specified verification requirements, are identified in accordance with the Well Acceptance Criteria Procedure.	Well-specific barrier elements and verification in accordance with internal Woodside procedure.	Records demonstrate well specific barrier elements and verification criteria have been met.
	C 19.6 BOP installed during drilling operations. To ensure no loss of hydrocarbons from loss of well integrity, the BOP shall have, at a minimum: • 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. 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 Well Control Manual, Original Equipment Manufa^{ct}urer (OEM) Standards and API Standard 53 5th Edition.	**PS 19.6** Subsea BOP specification, installation and function testing compliant with internal Woodside Standards and international requirements (API Standard 53) as agreed by Woodside and MODU contractor.	**MC 19.6.1** Records demonstrate that BOP and BOP control system specifications and function testing were in accordance with minimum standards for the expected drilling conditions as agreed by Woodside and MODU contractor.
	C 2.8 Refer **Section 6.6.2**.	**PS 2.8** Refer **Section 6.6.2**.	**MC 2.8.1** Refer **Section 6.6.2**
	For oil spill response outcomes, standards and measurement criteria refer to **Appendix D**.		

6.8.2 Unplanned Hydrocarbon Release: Topsides Loss of Containment

Context		
Topsides – **Section 3.4.2.1** Process Description – **Section 3.4.6** Hydrocarbon and Chemical Inventories and Selection – **Section 3.8**	Physical Environment – **Section 4.4** Biological Environment – **Section 4.5**	Consultation – **Section 5**

Risk 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*
Hydrocarbon release from topsides process equipment to the marine environment and atmosphere			✓	✓		✓		A	D	1	M	LC S GP PJ	Acceptable if ALARP	**EPO 20**

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
- extreme weather.
- Escalation from MEEs can cause topsides loss of containment:
- loss of structural integrity (MEE-03; Section 6.7.5)
- loss of marine vessel separation (MEE-04; Section 6.7.6)
- loss of control of suspended load from facility lifting operations (MEE-05; Section 6.7.7).

A number of common failure causes due to human error and SCQ failures are presented in the generic human error and SCE failure bowties in Section 6.7.8.

Topsides Loss of Containment – Credible Scenarios

Topsides process and non-process hydrocarbon inventories, and therefore, worst case credible spill scenarios, are relatively low for the riser platform in comparison to other facilities on the NWS. This is due to the lower production rate from single train Angel facility, the provision of a remote power supply from NRC, and the facility's NNC status.

The worst credible hydrocarbon release volume is 30 m^3 condensate from the condensate cooler/PWCS, although there are several smaller condensate inventories also present on the topsides (**Table 3-6**). Small volumes of diesel, hydraulic oil and waste oil may also be released (**Table 3-7**) refer to **Section 6.8.4**. 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.

Consequence Assessment

Once released to the open offshore marine environment around the riser platform (refer to **Section 4**), Angel condensate is expected to weather rapidly. As a consequence, the potential for impacts to environmental receptors is limited to those in the immediate vicinity. Hydrocarbon weathering modelling indicates approximately 67.0% of the mass should evaporate within the first 12 hours (RPS, 2021)

Spill modelling has been undertaken for a smaller surface spill of 21 m^3 of condensate (released in under ten minutes) from the Angel platform (APASA, 2012). In summary, the modelling indicated the released condensate would disperse rapidly and the EMBA impact would be confined to open ocean. No contact with sensitive receptors above impact thresholds for any hydrocarbon type was predicted to occur.

Based on modelling for a much larger surface release of 5600 m^3 (RPS, 2021), it is likely that given the density of the hydrocarbon, decrease in water quality would be restricted to the top few metres of the water column. As such, impacts to demersal or benthic receptors (e.g., Glomar Shoal) are not credible. Refer to **Section 6.7.4** for a description of potential impacts from this larger release.

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 Angel condensate would be accompanied by a gas plume 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 6.7.2**). 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.

Demonstration of ALARP

While the loss of topsides containment does not constitute an MEE, it is considered to be a potential MAE in the Safety Case for the facility. As such, this source of risk is managed under the SCE management system (**Section 7.2.6**) for the facility. Specific measures and controls presented below are drawn from this management system.

Demonstration of ALARP				
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 Angel facility.	F: Yes. CS: Minimal cost. Standard practice.	Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations 2009: Accepted Safety Case for the Angel 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.	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.	Yes **C 13.6**
Professional Judgement – Elimination				
None identified.				
Professional Judgement – Substitute				
None identified.				

Demonstration of ALARP				
Professional Judgement – Engineered Solution				
Maintain topsides hydrocarbon-containing infrastructure integrity.	F: Yes. CS: Minimal cost. Standard practice.	Reduces the likelihood of topsides loss of containment through inspection and assurance of key hydrocarbon containing vessels.	Benefits outweigh cost/sacrifice.	Yes **C 20.1**
Maintaining Safety Instrumented Systems to prevent/respond to hydrocarbon loss of containment.	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 20.2**
Facility open hazardous drain system integrity maintained as far as practicable.	F: Yes. Drain systems in place as far as practicable to suit NNC facility safety design requirements. CS: Some safety philosophy sacrifice. Installed as far as reasonably practicable.	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 6.5**
In the event of a spill, emergency response activities implemented in accordance with the OPEP.	F: Yes. CS: Costs associated with implementing response strategies, vary dependant on nature and scale of spill event. Standard practice.	Potentially reduces consequence by implementing response to reduce impacts to the marine environment.	Control based on regulatory requirement – must be adopted.	Yes **C 13.7**

Demonstration of ALARP				
Arrangements supporting the activities in the OPEP will be tested to ensure the OPEP can be implemented as planned.	F: Yes. CS: Moderate costs associated with exercises. Standard practice	No change to impact or risk; however, ensures OPEP can be implemented in the event of a hydrocarbon spill thereby potentially reducing the consequence.	Benefits outweigh the cost/sacrifice. Control is also standard practice.	Yes **C 13.8**
ALARP Statement: The controls for the Process Topsides Loss of Containment are based on the controls identified for MEE-03, MEE-04 and MEE-05 (**Sections 6.7.5** to **6.7.7**). 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 topsides loss of containment represents a moderate risk rating that is highly unlikely to result in a consequence greater than minor, short-term impacts that are localised to the release location. 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 the facility 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 a topsides loss of containment to a level that is acceptable if ALARP.				

EPOs, EPSs and MC for Angel Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 20 Topsides loss of containment risks to the environment limited to High[87] during the Petroleum Activities Program.	**C 14.4** Refer to **Section 6.7.4.**	**PS 14.4** Refer to **Section 6.7.4.**	**MC 14.4.1** Refer to **Section 6.7.4**.
	C 13.6 Refer to **Section 6.7.3**.	**PS 13.6** Refer to **Section 6.7.3**.	**MC 13.6.1** Refer to **Section 6.7.3**.
	C 20.1 Maintaining topsides hydrocarbon-containing infrastructure integrity.	**PS 20.1** Integrity will be managed in accordance with SCE Management Procedure (**Section 7.2.6**) and SCE Technical Performance Standard(s) to prevent environment risk related damage to SCEs for P01 – Pressure Vessels to: • provide minimum required mechanical integrity for identified pressure vessel systems for operation within defined integrity limits so as to prevent a loss of	**MC 1.13.1** Refer to **Section 6.6.1**.

87 Defined in **Section 2.6.3**.

EPOs, EPSs and MC for Angel Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
		containment that may result in an MAE/MEE.	
	C 20.2 Maintaining Safety Instrumented Systems to prevent/respond to hydrocarbon loss of containment.	**PS 20.2** Integrity will be managed in accordance with SCE Management Procedure (**Section 7.2.6**) and SCE Technical Performance Standard(s) to prevent environment risk related damage to SCEs for F06 – Safety Instrumented System to: • detect and respond to pre-defined initiating conditions and/or initiate responses that put the process, plant equipment and wells in a safe condition to prevent or limit the escalation of an MAE/MEE.	**MC 1.13.1** Refer to **Section 6.6.1**.
	C 6.5 Refer **Section 6.6.6.**	**PS 6.5** Refer **Section 6.6.6**.	**MC 1.13.1** Refer to **Section 6.6.1**.
	C 13.7 Refer to **Section 6.7.3**.	**PS 13.7** Refer to **Section 6.7.3**.	**MC 13.7.1** Refer to **Section 6.7.3**.
	C 13.8 Refer to **Section 6.7.3**.	**PS 13.8.1** Refer to **Section 6.7.3**.	**MC 13.8.1** Refer to **Section 6.7.3**.
		PS 13.8.2 Refer to **Section 6.7.3**.	**MC 13.8.2** Refer to **Section 6.7.3**.

6.8.3 Unplanned Hydrocarbon Release: Vessel Collision During Drilling and Tie-back Activities

Context		
Project Vessels – **Section 3.5.6**	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**

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***	***Likelihood***	***Risk Rating***	***ALARP Tool***	***Acceptability***	***Outcome***
Loss of hydrocarbons to marine environment due to a vessel collision during drilling and tie-back of the LDA-02 well (e.g., project vessels or other marine users)		✓		✓	✓	✓	A	D	1	M	LCS GP PJ	Broadly Acceptable	**EPO 21**

Description of Source of Risk

Background

The temporary presence of the MODU and project vessels in the PAA during drilling and tie-back activities will result in a navigational hazard for commercial shipping within the immediate area. This navigational hazard could result in a third party vessel colliding with the MODU or a project vessel which could release hydrocarbons.

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.

A typical project vessel (e.g., a support or survey vessel) is likely to have multiple isolated marine diesel tanks distributed throughout the hull of the vessel. The marine diesel storage capacity of a support vessel can be in the order of 1000 m^3 (total) that is distributed through multiple isolated tanks typically located mid-ships and can range in typical size from 22 to 105 m^3. Support vessels can have fuel tank sizes ranging from 111m^3 to 247m^3. The AHV is considered to have a maximum fuel tank size of 264 m^3, and the survey vessel a maximum of 275 m^3.

In the unlikely event of a vessel collision involving a project vessel during drilling and 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 6.7.6**.

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 to 30 L of oil 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 (**Table 6-37**). 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 refuelling 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 would be lost, as fuel is stored in more than one tank.
- It is not a credible scenario that a storage tank on the MODU would be damaged due to the location of the tanks within the hull, behind the bilge tanks, below the waterline.
- It is highly unlikely that the full volume of the largest storage tank on a support vessel would be lost.

The last scenario considered was a collision between a project vessel with a third-party vessel (i.e., commercial shipping, other petroleum related vessels and commercial fishing vessels). 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 6-37**. Given the offshore location of the PAA, vessel grounding is not considered a credible risk.

Table 6-37: 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 m^3.	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 to 105 m^3 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

Analogous modelling was performed by RPS, on behalf of Woodside to determine the fate of marine diesel released from a collision within the PAA. 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).

Hydrocarbon Characteristics

Marine diesel is a mixture of both volatile and persistent hydrocarbons. 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 (**Figure 6-30**) (RPS, 2023). 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 diesel is expected to undergo rapid spreading and this, together with evaporative loss, is likely to result in a rapid dissipation of the spill. Marine diesel distillates tend not to form emulsions at the temperatures found in the region. The characteristics of the marine diesel are given in **Table 6-38**.

Table 6-38: Characteristics of the marine diesel

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 diesel	0.829	4.0	% of total	6	34.6	54.4	5

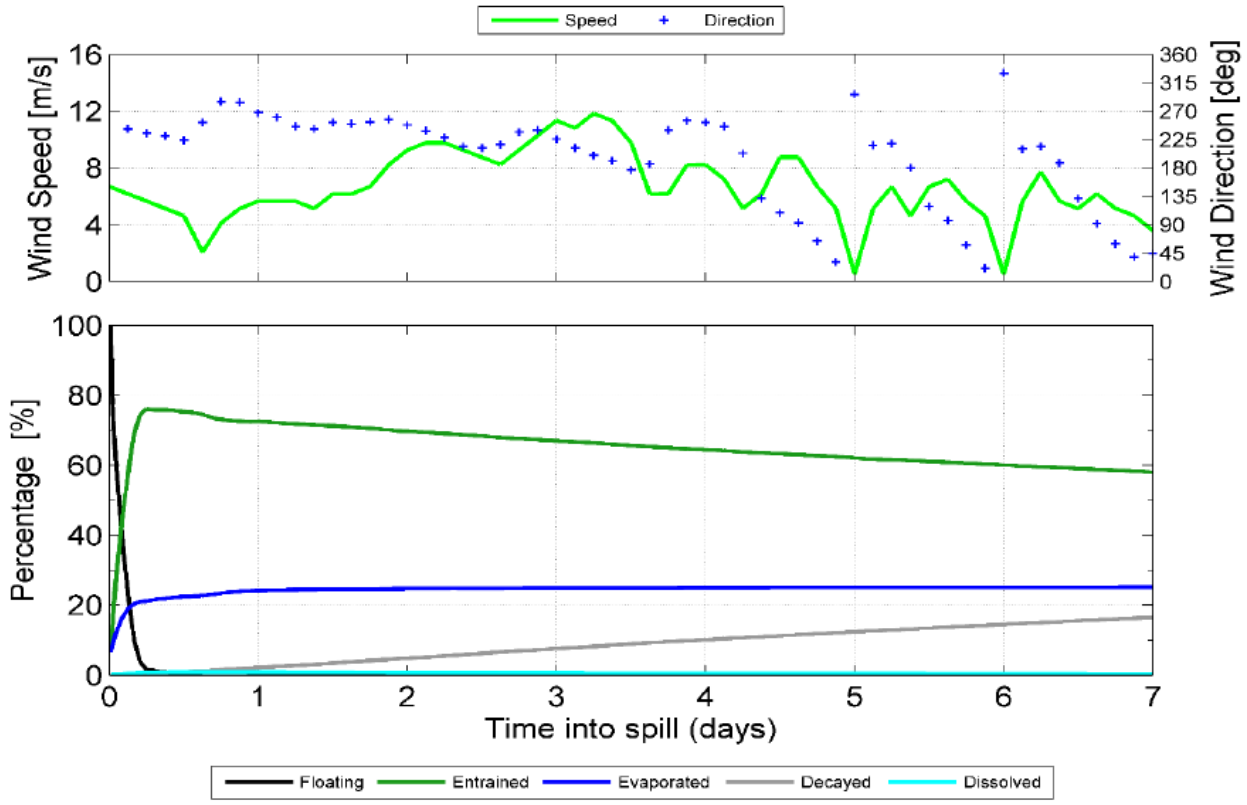


Figure 6-30: Proportional mass balance plot representing weathering of a 1000 m³ surface spill of marine diesel as a one-off release (at a rate of 50 m³/hr) and subject to variable wind at 27°C water temperature and 25°C air temperature (RPS, 2023)

Consequence Assessment

Potential Impacts Overview

Environment that May Be Affected

Surface Hydrocarbons

Quantitative hydrocarbon spill modelling results for surface hydrocarbons are shown in **Table 6-39**. If this scenario occurred, a surface hydrocarbon slick would form down-current of the release location, with the trajectory dependent on prevailing wind and current conditions at the time. The modelling indicates that the EMBA would be confined to open water, with surface hydrocarbons extending up to about 105 km and 65 km from the release location at or above the 1 g/m² and 10 g/m² impact threshold. A socio-cultural EMBA for surface hydrocarbons which includes the threshold for visible surface hydrocarbons of 1 g/m^2 may extend beyond the EMBA in which ecological impacts may occur.

Entrained Hydrocarbons

Quantitative hydrocarbon spill modelling results are shown in **Table 6-39**. If this vessel collision scenario occurred, a plume of entrained hydrocarbons would form down-current of the release location, with the trajectory dependent on prevailing current conditions at the time. The modelling indicates that locations exposed to entrained hydrocarbons at or above the threshold concentration of 100 ppb are restricted to offshore areas, islands, and reefs. **Table 6-39** provides details of receptors potentially contacted by entrained diesel at or above 100 ppb.

Dissolved Hydrocarbons

Dissolved aromatic hydrocarbons at concentrations equal to or greater than the 50 ppb threshold are predicted to be confined to offshore areas and reefs. Dissolved hydrocarbon concentrations above 400 ppb are not predicted to contact any sensitive receptor locations.

Accumulated Hydrocarbons

Accumulated hydrocarbons above threshold concentrations (≥100 g/m²) were not predicted by the modelling to occur at any location. Potential for accumulation of oil on shorelines is predicted to be low, with the worst-case maximum local accumulation of oil on any surrounding shoreline being 1.7 g/m^2 at Barrow Island.

Taking into consideration the EMBA derived from hydrocarbon spill modelling for a marine diesel spill, the environment that may be affected will fall within the EMBA of the spill from a loss of well integrity outlined in **Section 6.7.3**.

Table 6-39: Probability of hydrocarbon spill contact above impact thresholds within the environment that may be affected with key receptor locations and sensitivities for a 2000 m³ instantaneous release of marine diesel

Environmental setting	Location/name	Environmental, social, cultural, heritage and economic aspects presented as per the environmental risk definitions (Woodside's Risk Management Procedure [WM0000PG10055394])																														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*																										*Socio-economic and cultural*					*Socio-cultural EMBA*		*Ecological EMBA*			
		Water quality	*Sediment quality*	*Marine primary producers*				*Other communities/habitats*							*Protected species*										*Other species*		*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 hydrocarbon (≥10 g/m²)*	*Entrained hydrocarbon (≥100 ppb)*	*Dissolved aromatic hydrocarbon (≥50 ppb)*	*Accumulated hydrocarbons (>100 g/m²)*
		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*											
Offshore[88]	Argo-Rowley Terrace AMP	✓						✓							✓	✓			✓			✓	✓	✓		✓			✓		-	-	-	1	-	-
	Montebello AMP	✓	✓	✓			✓	✓							✓	✓			✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		-	-	-	5.5	0.5	-
	Gascoyne AMP	✓	✓												✓	✓			✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	-	-	-	1.5	-	-
	Rankin Bank	✓	✓	✓			✓	✓		✓						✓				✓		✓		✓	✓	✓		✓			-	-	-	-	0.5	-
Islands	Montebello Islands (including State Marine Park)	✓	✓	✓	✓	✓	✓	✓				✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		-	-	-	5.5	-	-
	Muiron Islands (WHA, State Marine Park)	✓	✓	✓	✓		✓	✓		✓		✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓			✓	✓		-	-	-	0.5	-	-
	Ningaloo Coast (North, Middle & South; WHA, and State Marine Park)	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		-	-	-	0.5	-	-
Reefs, Shoals and Banks	Outtrim Patches	✓	✓	✓			✓	✓			✓				✓	✓			✓	✓	✓	✓		✓	✓						-	-	-	0.5	-	-

88 Note: hydrocarbons cannot accumulate on open ocean, submerged receptors, or receptors not fully emergent.

Potential Impacts to Environmental Values(s)

In the event of a 1000 m³ release of marine diesel spill due to vessel collision, the modelling predicts a low probability of receptors being contacted by entrained hydrocarbons >100 ppb or dissolved aromatic hydrocarbons >50 ppb. The greatest likelihood of contact is at the Montebello AMP and Montebello Islands (5.5% probability for entrained and 0.5% for dissolved). All other sensitive locations identified in **Table 6-39** are predicted to have a 1% 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/m^2 are predicted to contact sensitive receptors and no shoreline oiling above 100 g/m^2 is predicted.

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 detail in **Section 6.7.3**.The potential impacts of entrained hydrocarbons provided in **Section 6.7.3**, and the scale of impact described provides a suitable assessment for potential impacts of a 1000 m³ release of marine diesel. Impacts specific to a spill of marine diesel are summarised below. It is noted that the toxic components in marine diesel include alkylated naphthalene's which can be rapidly accumulated by marine biota including invertebrates such as marine oysters, clams, shrimp, as well as a range of vertebrates, such as finfish. Marine diesel also contains additives that contribute to its toxicity.

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 low magnitude and temporary in nature.

Protected Species

As identified in **Section 4.6**, protected species including migrating pygmy blue whales 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.

The EMBA 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 Montebello 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 may also be exposed to marine diesel on the sea surface or upper water column, if resting or foraging in waters near to the spill. 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 protected species that may occasionally transit through the area and may potentially be exposed to a marine diesel spill, 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 result in 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 low numbers of animals that may transit through the area during the short period when spilled hydrocarbons are present.

Given the limited number of animals that may be impacted and the rapid dispersion of marine diesel, it is considered that any potential impacts will be minor.

Other Habitats, Species and Communities

Within the EMBA for a marine diesel spill resulting from a vessel collision, there is the potential for plankton communities to potentially be impacted where entrained hydrocarbon threshold concentrations are exceeded. 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. 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 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.

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 marine diesel. The potential impact is therefore expected to be low.

Protected Areas

Entrained hydrocarbons at or exceeding the 100 ppb threshold have a low probability of contacting the Montebello AMP, Gascoyne AMP, Argo-Rowley Terrace AMP and Ningaloo WHA. 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/m^2) 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 4.9.2** which overlap with the 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 to 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. Visible surface hydrocarbons at or exceeding 1 g/m^2 may also occur up to 105 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 Values and Heritage

Through consultation and review of available literature (**Section 4.9.1**), 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 vessel collision. Cultural features and heritage values that have the potential to be impacted are considered in **Section 6.8.1**.

Summary of Potential Impacts to Environmental Values(s)

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: 1 to 2 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)[89]***	***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	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**

89 Qualitative measure.

• Marine Order 27 (Safety of navigation and radio equipment) 2016 • Marine Order 30 (Prevention of collisions) 2016.				
Establishment of a 500 m petroleum safety zone around MODU and 500 m exclusion zone around the installation vessel and communicated to marine users.	F: Yes. CS: Minimal cost. Standard practice.	Legislative requirements to be followed reduce the likelihood of a collision.	Controls based on legislative requirements – must be adopted.	Yes **C 1.3**
In the event of a spill, emergency response activities implemented in accordance with the OPEP (per **Appendix D**).	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 13.7**
Arrangements supporting the activities in the OPEP (per **Section 7.12**) will be tested to ensure the OPEP can be implemented as planned.	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 13.8**
Good Practice				
Support vessel on standby as required during the Petroleum Activities Program 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 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	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 21.1**

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.				
Notify AHO of activities where vessels will be in the Operational Area, but outside of the Petroleum Safety Zone >3 weeks, 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 update maritime charts thereby reducing the likelihood of a collision with a third-party vessel.	Benefits outweigh cost/sacrifice. Control is also standard practice.	Yes **C 1.9**
Notify relevant persons of activities three months prior to commencement and upon completion of activities.	F: Yes. CS: Minimal cost. Standard practice.	Communication of the Petroleum Activities Programme 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 AMSA JRCC of activities and movements of the activity 24 to 48 hours before operations commence.	F: Yes. CS: Minimal cost. Standard practice.	Communication of the Petroleum Activities Program to other marine users ensures they are informed and aware, thereby reducing the likelihood of a collision with a third-party vessel occurring	Benefits outweigh cost/sacrifice. Control is also standard practice.	Yes **C 1.10**
Develop a SIMOPS Plan to manage rig interactions with other facilities/vessels, i.e. during Xmas tree installation. SIMOPS Plan will contain information on: minimum separation distances • communications • MODU/vessels/activities involved in SIMOPS	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 the likelihood of vessel collision.	Benefits outweigh cost/sacrifice. Control is also standard practice.	Yes **C 1.12**

• 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.				
DP Activity Specific Operating Guidelines (ASOGS) procedure.	F: Yes. CS: Minimal cost. Standard practice.	Ensure safe and accurate DP throughout all activities.	Benefits outweigh cost/sacrifice. Control is also Standard Practice.	Yes **C 21.4**
Mitigation: Oil Spill Response.	Refer to **Appendix D**.			
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 Petroleum Activities Program 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 Drilling and Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Standards***	***Measurement Criteria***
EPO 21 No release of hydrocarbons to the marine environment due to a vessel collision associated with the Petroleum Activities Program.	**C 1.1** Refer **Section 6.6.1**.	**PS 1.1** Refer **Section 6.6.1**.	**MC 1.1.1** Refer **Section 6.6.1**.
	C 1.3 Refer **Section 6.6.1**.	**PS 1.3** Refer **Section 6.6.1**.	**MC 1.3.1** Refer **Section 6.6.1**.
			MC 1.3.2 Refer **Section 6.6.1**.
	C 13.7 Refer to **Section 6.7.3**.	**PS 13.7** Refer to **Section 6.7.3**.	**MC 13.7.1** Refer to **Section 6.7.3**.
	C 13.8 Refer to **Section 6.7.3**.	**PS 13.8.1** Refer to **Section 6.7.3**.	**MC 13.8.1** Refer to **Section 6.7.3**.
		PS 13.8.2 Refer to **Section 6.7.3**.	**MC 13.8.2** Refer to **Section 6.7.3**.
	C 21.1 Support vessel on standby as required during the Petroleum Activities Program 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 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.	**PS 21.1** 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 21.1.1** Daily Drilling Report will include details on the support vessel that is on standby. Non-conformance will be detailed in an incident report.

EPOs, EPSs and MC for Drilling and Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Standards***	***Measurement Criteria***
	• 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 Refer **Section 6.6.1**.	**PS 1.9** Refer **Section 6.6.1.**	**MC 1.9.1** Refer **Section 6.6.1**.
	C 1.11 Refer **Section 6.6.1**.	**PS 1.11** Refer **Section 6.6.1**.	**MC 1.11.1** Refer **Section 6.6.1**.
	C 1.10 Refer **Section 6.6.1**	**PS 1.10** Refer **Section 6.6.1**	**MC 10.1.1** Refer **Section 6.6.1**.
	C 1.12 Refer **Section 6.6.1**.	**PS 1.12** Refer **Section 6.6.1**.	**MC 1.12.1** Refer **Section 6.6.1**.
	C 21.2 DP specific ASOGS procedure.	**PS 21.2** Follow ASOG guidelines.	**MC 21.2.1** Records demonstrate compliance with ASOG guidelines.
	Detailed preparedness and response performance outcomes, standards and measurement criteria for the Petroleum Activities Program are presented in **Appendix D**.		

6.8.4 Unplanned Discharge: Release of Hydrocarbons during Bunkering, Transfer, Storage and Use

Context		
Operational Details – **Section 3.4.5** Diesel Fuel – **Section 3.4.12.7** Refuelling – **Section 3.5.6.9** Hydrocarbons – **Section 3.4.13.1**	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***						
	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 to the marine environment during transfer, storage or use			✓			✓		A	E	1	L	LC S GP PJ	Broadly Acceptable	**EPO 22**

Description of Source of Risk

Marine Diesel Transfer, Storage and Use

Operations

Marine diesel is transferred to the riser platform via containers (e.g., ISO tanks), as no bunkering of marine diesel (either vessel to vessel, or vessel to riser platform) occurs in the PAA.

Transfer of diesel from the storage area to the crane diesel tank is by hose; transfer from the storage area to the lifeboat is by jerry can. The crane and lifeboat are refilled as required when the riser platform is staffed.

Marine diesel containers (2×4 m^3) are stored in a bunded storage area on the riser platform. The bund drains to the hazardous open drains system, which features hydrocarbon separation and recovery. Drain water is discharged to the sea following hydrocarbon recovery (refer to **Section 6.6.6**). Diesel storage volumes beyond the bund are small and associated with equipment on the riser platform, such as the lifeboat (0.2 m^3) and crane diesel tank (1.2 m^3). Small volumes of diesel may also be used on platform and subsea support vessels to fuel equipment on deck (typically <0.2 m^3).

The worst-case credible loss of marine diesel during transfer, storage and use is the loss of a single ISO container during transfer operations (e.g., via lifting equipment failure). The volume of marine diesel transferred in ISO containers is 4 m^3.

Tie-back Activities

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, 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 defined in **Section 4.1** 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 spill scenario 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 would 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 during transfer, storage and use.

Given the limited volume of the potential release and offshore location no modelling has been undertaken as it is within significantly less than the 1000 m^3 of MDO assessed under the Vessel Collision scenario in **Section 6.8.3**.

Hydrocarbon Characteristics

Refer to **Section 6.7.2** for a description of the characteristics of marine diesel, including detail on the predicted fate and weathering of a spill to the marine environment.

Impact Assessment

Given the low viscosity of marine diesel, along with the high portion of volatile components, a spill of up 4 m^3 of marine diesel during transfer, storage or use during operations would spread and weather rapidly. A spill at the surface of up to 24 m^3 from bunkering activities related to the MODU and project vessels associated with tie-back activities is likely to be localised with limited potential contact with sensitive receptor locations. The potential biological and ecological impacts associated with much larger hydrocarbon spills are presented in **Section 6.8.3**; further detail on impacts specific to a spill of marine diesel from a bunkering loss are provided below.

Environmental receptors at risk would be restricted to those in the immediate vicinity and may include:

- marine fauna, particularly fauna associated with the sea surface (e.g., seabirds, air breathing vertebrates)
- plankton.

Given the relatively small worst-case credible release volume, the non-persistent nature of marine diesel and the low sensitivity of the receiving environment within the PAA (i.e., offshore open water environment, refer to **Section 4**), potential impacts are expected to be short term (<1 year) and confined to less than 1 km from the release location. Such impacts may include:

- localised decrease in water quality
- acute toxic effects to planktonic organisms in the immediate area of the spill.

Impacts to plankton may include acute toxicity resulting in mortality of planktonic organisms. Given the rapid turnover of plankton communities, these impacts would 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. Impacts to larger fauna such as cetaceans and marine turtles are expected to 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.

No impacts are predicted to Glomar Shoals or the Ancient Coastline KEF. Although, they do overlap the PAA (**Figure 4-11**), due to the nature of the spill (i.e., surface spill) and the reduced likelihood of diesel components interacting with the seafloor where the KEF values (i.e., unique hard substrate and associated demersal finfish and benthic fauna) are situated, it is unlikely there will be impacts with the Glomar Shoals or Ancient Coastline KEFs.

Minor, short term impacts may occur to other marine users (e.g., commercial fisheries); however, given the small scale of a worst-case marine diesel spill, fishing vessel exclusion within the PSZ, it is unlikely there would be any significant impact to commercial fishers.

Summary of Potential Impacts to Environmental Values(s)

Given the adopted controls, it is considered that spills to the marine environment from bunkering, transfer, storage and use of hydrocarbons will not result in a potential impact greater than slight, 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)***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Legislation, Codes and Standards				
Contract vessels complying with Marine Order 91 (Marine pollution prevention – oil) for safe vessel operations.	F: Yes. CS: Minimal cost. Standard practice.	Marine Order 91 is 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 22.1**
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 22.2**
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 22.3**
DP specific ASOGS procedure.	F: Yes. CS: Minimal cost. Standard practice.	Reduced the likelihood of an unplanned release.	Benefits outweigh cost/sacrifice.	Yes **C 21.2**
Bunkering is completed in accordance with: • Woodside's Engineering Standard Rig Equipment requirements for MODUs • Engineering Operating Standard: Standard for Construction Vessels for IMMR support vessels (ISVs).	F: Yes. CS: Minimal cost. Standard practice.	Reduced the likelihood of an unplanned release.	Benefits outweigh cost/sacrifice.	Yes **C 22.4**
Good Practice				
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.	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	Benefits outweigh cost/sacrifice.	Yes **C 22.5**

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
• 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.		consequence could result, the overall risk is reduced.		
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. • 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 22.6**
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 22.7**

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
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 13.6**
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 released.	Benefits outweigh cost/sacrifice.	Yes **C 5.4**
Professional Judgement – Elimination				
No refuelling of helicopter on MODU.	F: No. Given the distance of the PAA from the airports suitable for helicopter operations, and the 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.	Not considered – control not feasible.	Not considered – control not feasible.	No
The MODU and project vessels brought into port to refuel.	F: No. Does not eliminate the fuel transfer risk. It is not operationally practical to transit MODU/installation vessel back to port for refuelling based on the frequency of the refuelling requirements and distance from the nearest port. CS: Significant due to schedule delay and vessel transit costs and day rates.	Eliminates the risk in the PAA. However, moves risk to another location. Therefore, no overall benefit.	Disproportionate. The cost/sacrifice outweighs the benefit gained.	No
Professional Judgement – Substitute				
None identified.				

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Professional Judgement – Engineered Solution				
None identified.				
Emergency Response				
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 of accidental spills of hydrocarbons during bunkering, transfer, storage and use. 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 of hydrocarbons during bunkering, transfer, storage and use 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. Consultation with relevant persons has not indicated any concerns in relation to accidental spills of hydrocarbons during bunkering, transfer, storage and use. 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 accidental spills of hydrocarbons during transfer, storage and use to a level that is broadly acceptable.

EPOs, EPSs and MC for Angel Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 22 Environment risk posed by accidental spills of hydrocarbons during transfer, storage and use limited to Moderate[90] during the Petroleum Activities Program.	**C 22.1** Contract vessels complying with Marine Order 91 (Marine pollution prevention – oil) for safe vessel operations.	**PS 22.1** Vessels contracted whose practices comply with Marine Orders as applicable to vessel size, type and class (Marine Order 91).	**MC 22.1.1** Marine verification records demonstrate compliance with Marine Order 91.
	C 22.2 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 off-shore helicopter landing sites, including vessels.	**PS 22.2** Failure of primary containment in storage areas does not result in loss to the marine environment.	**MC 22.2.1** Records confirms all fuels are stored in bunded/secondarily contained areas when not being handled/moved temporarily.
	C 22.3	**PS 22.3**	**MC 22.3.1**

90 As defined in **Section 2.6.3**

EPOs, EPSs and MC for Angel Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	Implementation of bunkering procedures to reduce the risk of a hydrocarbon release as a result of a bunkering incident.	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 Offshore Installation Manager (OIM). • Communications between the supply vessel and facility bunker station will be maintained during bunkering. • 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.	Records demonstrate bunkering undertaken in accordance with facility and contractor bunkering procedures.
	C 21.4 Refer to **Section 6.8.3**.	**PS 21.4** Refer to **Section 6.8.3**.	**MC 21.4.1** Refer to **Section 6.8.3**.
	C 22.4 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. • Visually monitoring of gauges, hoses, fittings	**PS 22.4** Compliance with Contractor procedures for the management of bunkering/helicopter operations.	**MS 22.4.1** Records demonstrate bunkering/refuelling undertaken in accordance with contractor bunkering procedures.

EPOs, EPSs and MC for Angel Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	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.		
	C 22.7 Safely storing chemicals/diesel to prevent the release to the marine environment.	**PS 22.7** 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 22.7.1** Riser platform chemical/diesel storage areas for transportable containers provided with adequate bunding/containment.
	C 14.6 Refer to **Section 6.7.3**.	**PS 14.6** Refer to **Section 6.7.3**.	**MC 14.6** Refer to **Section 6.7.3**.
	C 6.4 Refer to **Section 6.6.5**.	**PS 6.4** Refer to **Section 6.6.5**.	**MC 6.4.1** Refer to **Section 6.6.5**.

EPOs, EPSs and MC for Drilling and Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 22 Environment risk posed by accidental spills of hydrocarbons during transfer, storage and use limited to Moderate[91] during the Petroleum Activities Program.	**C 22.1** Contract vessels complying with Marine Order 91 (Marine pollution prevention – oil) for safe vessel operations.	**PS 22.1** Vessels contracted whose practices comply with Marine Orders as applicable to vessel size, type and class (Marine Order 91).	**MC 22.1.1** Marine verification records demonstrate compliance with Marine Order 91.
	C 22.2 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	**PS 22.2** Failure of primary containment in storage areas does not result in loss to the marine environment.	**MC 22.2.1** Environmental and aviation inspection records confirm all fuels are stored in bunded/secondarily contained areas when not being handled/moved temporarily.

91 As defined in **Section 2.6.3**

EPOs, EPSs and MC for Drilling and Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	the development and operation of off-shore helicopter landing sites, including vessels		
	C 22.3 Implementation of bunkering procedures to reduce the risk of a hydrocarbon release as a result of a bunkering incident.	**PS 22.3** 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. • 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.	**MC 22.3.1** Environmental inspection records demonstrate bunkering undertaken in accordance with facility and contractor bunkering procedures.
	C 21.2 Refer **Section 6.8.3**.	**PS 21.2** Refer **Section 6.8.3**.	**MC 21.2.1** Refer **Section 6.8.3**.
	C 22.4 Bunkering is completed in accordance to Woodside's Engineering Standard Rig Equipment requirements for MODUs Engineering Operating Standard: Standard for Construction Vessels.	**PS 22.4** Implement Engineering Standard Rig Equipment and Engineering Operating Standard: Standard for Construction Vessels.	**MS 22.4.1** Environmental inspection records demonstrate bunkering completed in accordance with Woodside's Engineering Standards.

EPOs, EPSs and MC for Drilling and Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	C 22.5 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** To ensure damaged equipment is replaced prior to failure.	**MS 22.5.1** Environmental inspection records confirm the MODU bunkering equipment is subject to systematic integrity checks.
		PS 22.5.2 All diesel transfer hoses to have dry break couplings and pressure rating suitable for intended use.	**MS 22.5.2** Inspection records confirm presence of dry break of couplings and flotation on fuel hoses.
		PS 22.5.3 To ensure adequate resources are available to allow implementation of Ship Oil Pollution Emergency Plan (SOPEP).	**MS 22.5.3** Environmental inspection records confirm presence of spill kits.
	C 22.6 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. • 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.	**PS 22.6** Compliance with Contractor procedures for the management of bunkering/helicopter operations.	**MS 22.6.1** Environmental inspection 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***
	C 22.7 Chemicals and diesel stored safely to prevent the release to the marine environment.	**PS 22.7** 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 22.7.1** Riser platform chemical/diesel storage areas for transportable containers provided with adequate bunding/containment.
	C 13.6 Refer to **Section 6.7.3**.	**PS 13.6** Refer to **Section 6.7.3**.	**MC 13.6.1** Refer to **Section 6.7.3**.
	C 5.4 Refer to **Section 6.6.5**.	**PS 5.4** Refer to **Section 6.6.5**.	**MC 5.4.1** Refer to **Section 6.6.5**.

6.8.5 Unplanned Discharges: Deck and Subsea Spills

Context		
Tie-back Activities – **Section 3.5** Project Vessels – **Section 3.4.14** Project Vessel-based Activities – **Section 3.5.6** Subsea Chemical Use – **Section 3.4.15.5**	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***						
	Marine Sediment	***Water Quality***	***Air Quality (incl Odour)***	***Ecosystems/Habitat***	***Species***	***Socio-economic***	***Decision Type***	***Consequence***	***Likelihood***	***Risk Rating***	***ALARP Tool***	***Acceptability***	***Outcome***
Accidental discharge of chemicals from MODU and project vessels deck activities and equipment, from subsea ROV hydraulic leaks		✓		✓	✓		A	F	2	L	LCS GP	Broadly Acceptable	**EPO 23**

Description of Source of Risk

Operations

Chemical Transfer

Bulk transfer of TEG via hose between platform support vessels and the facility occurs as required. Potential glycol spill volumes during transfer are less than 0.2 m^3, based on the volume of the transfer hose and the immediate shut-off of the pumps by personnel involved in the bulk transfer process. The worst-case credible TEG spill scenario during transfer could result in up to 8 m^3 of glycol being discharged. This unlikely scenario represents a complete failure of the bulk transfer hose combined with a failure to follow procedures (which require transfer activities to be monitored), coupled with a failure to immediately shut off pumps (i.e., pumping continues for up to five minutes).

Other chemicals (e.g., corrosion inhibitor, hydraulic oil, control fluid, facility maintenance chemicals, etc) are transferred to the facility in containers of various volume (e.g., ISO tanks, drums, etc). The typical largest chemical transfer container is approximately 4.5 m^3 ISO tanks (used for transferring MEG and corrosion inhibitor).

Chemical Storage and Use

Spills can originate from stored chemicals or equipment on the facility and support vessel decks or subsea (refer to **Section 6.6.5** for an assessment of the impacts of planned chemical discharges).

Selection of operational chemicals is undertaken in accordance with the Woodside Chemical Selection and Assessment Environment Guideline.

Operational chemicals on the Angel facility that are kept in larger quantities are typically stored in dedicated vessels which have similar controls to those related to mitigating hydrocarbon releases (e.g., dedicated tanks, permanent piping to the process, isolatable by valves, etc). The chemicals stored in the largest volumes on the facility are TEG (40 m^3), corrosion inhibitor (30 m^3), MEG (25 m^3) and subsea control fluid (10m^3). The MEG, TEG and corrosion inhibitor tanks are classified as pressure vessels. MEG and TEG vessels are considered SCEs (primarily for MAE) and the corrosion inhibitors are managed via RBI. As the MEG and TEG are provided with a hydrocarbon gas blanket from the LP gas system inherent to the nature of explosion/gas loss of containment risks, and as such are covered under P01 – Pressure Vessels technical performance standard. The design of the vessel and associated integrity SCE assurance provides a robust prevention regime associated with the potential loss of containment to sea risk, along

with safe-guarding under the facility Safety Case (refer to see **Section 6.8.2** for additional information). However, the worst-case credible chemical spill scenario could result in up to 30 m^3 of corrosion inhibitor being discharged.

Chemical storage areas are typically set up in cabinets or bunded storage areas to contain releases to deck from transportable containers (e.g., bulk containers, barrels, drums, pails, etc). Releases from equipment are predominantly from the failure of hydraulic hoses or minor leaks from process components, or spills during refuelling of equipment, which can either be located within bunded/drained areas or outside of bunded/drained areas (e.g., over grating on cranes).

All chemical storage areas for transportable chemical containers drain to the hazardous open drains system, which features hydrocarbon separation and recovery.

The facility and support vessels also store other non-process chemicals and hydrocarbons, in various volumes (**Table 3-7** and **Table 3-8**). Operational non-process chemicals and maintenance chemicals present on the facility and support vessels are generally held in low quantities (usually less than 50 L isolatable volumes).

Tie-back Activities

MODU, Project Vessel and ROV Operations

Deck spills can result from spills from stored chemicals or equipment. Project vessels typically store chemicals in various volumes (20 L, 205 L; up to approximately 4000 to 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 up to 50 L.

Non-Process Hydrocarbons

Woodside's operational experience demonstrates that spills are most likely to originate from hydraulic hoses and have been less than 100 L, with an 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 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 3.4.15.5**. A review of these spills to the marine environment in the past 12 months showed subsea spills did not exceed approximately 26 L in Woodside's Drilling function.

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 leaks during wireline activities with a live well are described to 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

Potential Impacts to Environmental Values

Water Quality

Unplanned discharges of non-process chemicals and hydrocarbons may decrease the water quality in the immediate vicinity of the release. Only small volumes (<0.2 m^3) are anticipated, resulting in very short-term impacts to water quality, and limited to the immediate release location.

As discussed in **Section 6.6.5**, MEG and TEG are miscible in water, non- hazardous and biodegradable; both are rated OCNS Group E and MEG is considered PLONOR. A maximum credible spill of MEG or TEG is expected to mix with the receiving environment with no lasting environmental impact.

Accidental releases of chemicals (including corrosion inhibitor, a PLONAR Group E substance; non-toxic) or non-process hydrocarbons decrease the water quality in the immediate area of the release. The consequence is expected to be a minor short-term impact given the open ocean mixing environment, distance from sensitive receptors and relatively low credible release volumes.

Marine Fauna

Depending on the chemical released, the toxicity and/or potential to bioaccumulate may potentially result in localised impacts to pelagic fish or other marine species in the vicinity of the discharge. Given that surface discharges are rapidly dispersed, and subsea discharges (from ROVs) would be of very small volumes, potential impacts would be highly localised and temporary. 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 would 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. The magnitude of potential impact to marine fauna is no lasting effect, which results in a consequence of F.

Summary of Potential Impacts to Environmental Values(s)

Given the adopted controls, it is considered that deck and subsea spills to the marine environment will have no lasting effect with localised impacts (<1 month) on species, habitat (but not affecting ecosystems function), physical and biological attributes (i.e., Environment Impact – F).

Demonstration of ALARP

Control Considered	*Control Feasibility (F) and Cost/Sacrifice (CS)*[92]	*Benefit in Impact/Risk Reduction*	*Proportionality*	*Control Adopted*
Legislation, Codes and Standards				
Contract vessels complying with Marine Order 91 (Marine pollution prevention – oil) for safe vessel operations.	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 22.1**
Where there is potential for loss of primary containment of oil and chemicals	F: Yes. CS: Minimal cost. Standard practice.	System complies with Woodside Engineering Standard Rig	Benefits outweigh cost/sacrifice.	Yes **C 6.3**

92 Qualitative measure.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[92]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
on the MODU, deck drainage must be collected via a closed drainage system; e.g., drill floor.		Equipment. 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.		
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 23.1**
Good Practice				
Chemical reviews will be performed on all previously approved chemicals to confirm potential chemical impacts are reduced to ALARP.	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**

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[92]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
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 will be 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 23.2**
Check for the functionality of: • additional SCE (augers and cuttings dryers)	F: Yes. CS: Minimal cost. Standard practice	Reduces the likelihood of an event occurring and reduces the potential consequences (by	Benefits outweigh cost/sacrifice.	Yes **C 23.3**

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[92]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
• mud tanks • mud tank room • transfer hoses • NWBM base fluid transfer lines • NWBM base fluid transfer station • base fluid storage.		limiting volume released).		
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 consequence is unchanged.	Benefits outweigh cost/sacrifice.	Yes **C 23.4**
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 23.5**
Spill response procedures; e.g., Oil Pollution First Strike Plan, SOPEP and Emergency Response Plan.	F: Yes. CS: Minimal cost. Standard practice.	Will not reduce the likelihood but may reduce the consequence of spill.	Benefits outweigh cost/sacrifice.	Yes **Appendix G** and **Appendix H**
Hoses and fittings carry an appropriate pressure rating.	F: Yes. CS: Minimal cost. Standard practice.	Reduce likelihood of deck spills.	Benefits outweigh cost/sacrifice.	Yes **C 23.7**
Personnel controlling the subsea equipment are competent to undertake the activity.	F: Yes. CS: Minimal cost. Standard practice.	Personnel are trained, reducing likelihood of spill events.	Benefits outweigh cost/sacrifice.	Yes **C 23.8**

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[92]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
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**
Limiting unplanned volume of subsea control fluid discharged to the marine environment through monitoring subsea control fluid use, investigating material discrepancies.	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.	Benefits outweigh cost/sacrifice.	Yes **C 23.9**
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 released.	Benefits outweigh cost/sacrifice.	Yes **C 23.10**
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 22.7**
Professional Judgement – Eliminate				
No additional controls identified.				
Professional Judgement – Substitute				
No additional controls identified.				

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[92]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
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 onboard MODU/ project vessels.	F: Yes. Increases the risks associated with transportation and lifting operations. CS: Project delays if required chemicals not on board. Increases the risks associated with transportation and lifting operations.	No reduction in likelihood or consequence since chemicals will still be required to enable drilling activities to occur.	Disproportionate. The cost/sacrifice outweighs the benefit gained.	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 chemicals and hydrocarbons from deck and subsea spills. 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 accidental discharge of chemicals represents a low current risk rating and is unlikely to result in a risk consequence greater than localised with no lasting effect. BIAs within the PAA include the whale shark foraging and wedge-tailed shearwater breeding. Relevant recovery plans and conservation advice have been considered during the impact assessment, and the Petroleum Activities Program 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 identified during impact assessment. 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 an unplanned discharge of chemicals /hydrocarbons to a level that is broadly acceptable.				

EPOs, EPSs and MC for Angel Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 23 No unplanned releases of deck and subsea spills to the marine environment inside the PAA greater than a consequence level of E[93] during the Petroleum Activities Program.	**C 22.1** See **Section 6.8.4**.	**PS 22.1** See **Section 6.8.4**.	**MC 22.1.1** See **Section 6.8.4**
	C 6.3 See **Section 6.6.6**.	**PS 6.3** See **Section 6.6.6**.	**MC 6.3.1** See **Section 6.6.6**.
	C 23.1 Liquid chemical and fuel storage areas are bunded or secondarily contained when they are not being handled/ moved temporarily.	**PS 23.1** Failure of primary containment in storage areas does not result in loss to the marine environment.	**MC 23.1.1** Records confirms all liquid chemicals and fuel are stored in bunded/secondarily contained areas when not being handled/moved temporarily.
	C 5.5 See **Section 6.6.5**.	**PS 5.5** See **Section 6.6.5**.	**MC 5.5.1** See **Section 6.6.5**.
	C 23.4 Spill kits positioned in high risk locations around the rig (near potential spill points such as transfer stations).	**PS 23.4** Spill kits to be available for use to clean up deck spills.	**MC 23.4.1** Records confirms that spill kits are present, maintained, and suitably stocked.
	C 23.7 Hoses and fittings carry an appropriate pressure rating.	**PS 23.7** Pressure ratings meet appropriate standards.	**MC 23.7.1** Records demonstrate pressure ratings.
	C 23.8 Personnel controlling the subsea equipment are competent to undertake the activity.	**PS 23.8** Induction include training for crew in controlling subsea equipment.	**MC 23.8.1** Records show subsea equipment control training.
	C 5.1 See **Section 6.6.5**.	**PS 5.1** See **Section 6.6.5**.	**MC 5.1.1** See **Section 6.6.5**.
	C 23.9 Limiting unplanned volume of subsea control fluid discharged to the marine environment through monitoring subsea control fluid use, investigating material discrepancies.	**PS 23.9** Subsea control fluid use monitored and, where losses are unexplained, potential integrity issues are investigated.	**MC 23.9.1** Records demonstrate subsea control fluid use is documented, and unexplained discrepancies investigated.
	C 23.10 Implement Woodside Engineering Operating Standard – Subsea Isolation). Proven isolation in place for relevant IMMR activities.	**PS 23.10** Proven isolation in place in compliance with Woodside Engineering Operating Standard – Subsea Isolation.	**MC 23.10.1** Records demonstrate that there was a proven isolation in place as required.
	For oil spill response outcomes, standards and measurement criteria refer to **Appendix D**.		

93 Defined as "Slight, short term impacts (<1 year) as in **Table 2-3, Section 2.6.3**.

EPOs, EPSs and MC for Drilling and Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 23 No unplanned releases of deck and subsea spills to the marine environment inside the PAA greater than a consequence level of E[94] during the Petroleum Activities Program.	**C 6.3** See **Section 6.6.6**.	**PS 6.3** See **Section 6.6.6**.	**MC 6.3.1** See **Section 6.6.6**.
	C 6.1 See **Section 6.6.6**.	**PS 6.1** See **Section 6.6.6**.	**MC 6.1.1** See **Section 6.6.6**.
	C 23.1 Liquid chemical and fuel storage areas are bunded or secondarily contained when they are not being handled/moved temporarily.	**PS 23.1** Failure of primary containment in storage areas does not result in loss to the marine environment.	**MC 23.1.1** Environmental inspection records confirms all liquid chemicals and fuel are stored in bunded/secondarily contained areas when not being handled/moved temporarily.
	C 23.2 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 will be 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 23.2** Compliance with Contractor procedures to limit accidental loss to the marine environment.	**MC 23.2.1** Records demonstrate drilling fluid transfers are performed in accordance with the applicable contractor procedures.
	C 23.3		

94 Defined as “Slight, short term impacts (<1 year)” as in **Table 2-3, Section 2.6.3**.

EPOs, EPSs and MC for Drilling and Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	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.		
	C 23.4 Spill kits positioned in high risk locations around the rig (near potential spill points such as transfer stations).	**PS 23.4** Spill kits to be available for use to clean up deck spills.	**MC 23.4.1** Environmental inspection records confirm that spill kits are present, maintained, and suitably stocked.
	C 23.5 Installation vessels have self-containing hydraulic oil drip tray management system.	**PS 23.5** To contain any on-deck spills of hydraulic oil.	**MC 23.5.1** Environmental inspection records demonstrate project installation are equipped with self-containing hydraulic oil drip tray management system.
	For oil spill response outcomes, standards and measurement criteria refer to **Appendix D**.		

6.8.6 Unplanned Discharge: Drilling/Project Fluids

Context		
Tie-back Activities – **Section 3.5** Subsea IMMR Activities – **Section 3.4.15**	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*						
	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		✓		✓	✓	✓	A	E	1	L	LCS GP	Broadly Acceptable	**EPO 24**

Description of Source of Impact

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 m^2 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 m^3 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 m^3) plus the volume of fluid lost in the one minute (maximum) taken to shut down the pumps. At a flow rate of 1000 gallons per minute this volume would equate to an additional 3.8 m^2. In total, it is expected that this catastrophic failure would result in a loss of 5.3 m^2.

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 m^3) 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 m^3 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 (refer to **Table 6-40**). 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 6-40: 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*
			Non-Persistent		*Persistent*		
Base oil (Saraline 185V)	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 m^3 of base oil could be released in the event of the riser being disconnected when drilling with NWBM.

Impact 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

The worst-case drilling fluid or cement unplanned discharge is 8 m^2 which could occur during bulk transfer from the supply vessel to the MODU during drilling and may decrease the water quality in the immediate vicinity of the release. These discharges would be to the sea surface and would rapidly dilute through mixing by surface currents and wave action. All chemicals that may be operationally released or discharged to the marine environment by the Petroleum Activities Program 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 quality would be localised. Receptor sensitivity of water quality is low (low value, open ocean), and therefore the consequence of a release of hydrocarbons/chemicals on water quality would be no lasting effect (F).

Marine Fauna

Injury or Mortality to Marine Fauna

The small footprint of a worst-case base oil spill would mean traversing marine fauna such as marine mammals, marine reptiles and fish would unlikely come into direct contact during an unplanned release, thus it is anticipated any impacts would be negligible and temporary in nature.

As a result of a change in water quality, further impacts to receptors may occur, which 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 500 mg/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 PAA (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 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 unplanned discharges during tie-back activities is slight and short-term.

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 disturbance, localised extent of impact, and low sensitivity deep water benthos within the PAA 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 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 PAA, 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 4.9.1**, the PAA overlaps the Ancient Coastline at 125 m depth contour KEF and therefore there is 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, further archaeological studies will be undertaken prior to the activity commencing to understand any potential cultural features (see **C 4.1**).

Summary of Potential Impacts to Environmental Values(s)

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)[95]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Legislation, Codes and Standards				
Marine Order 91 (marine pollution prevention – oil) 2014, requires SOPEP (as appropriate to vessel class).	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 22.1**
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 24.1**
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. CS: Minimal cost. Standard practice.	Environmental assessment of chemicals will 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 therefore no reduction in likelihood can occur.	Benefits outweigh cost/sacrifice.	Yes **C 5.1**

95 Qualitative measure

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[95]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
Chemical reviews will be performed on previously approved chemicals to confirm potential chemical impacts are reduced to ALARP.	F: Yes. CS: Minimal cost. Standard practice.	Reduces the consequence of impacts resulting from discharges to the marine environment by confirming 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 couplings for oil-based mud hoses • transfer hoses to have floatation devised to allow detection of a leak • the valve line-up will be 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 24.2**

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[95]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
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 24.3**
Mud pits 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.	Reduces the consequence of the release to the environment, resulting in an environmental benefit.	Benefits outweigh cost/sacrifice.	Yes **C 24.4**
Bulk base oil will not be disposed overboard.	F: Yes. CS: Minimal cost. Standard practice.	Reduces the consequence of the release to the environment. Although no change in likelihood is provided, the decrease in consequence results in an environmental benefit.	Benefits outweigh cost/sacrifice.	Yes **C 24.5**
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

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[95]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
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 Acceptability				
Acceptability Statement: The impact assessment has determined that accidental discharge of project fluids represents a low current risk rating and is unlikely to result in a risk consequence greater than Slight. BIAs within the PAA include the whale shark foraging and wedge-tailed shearwater breeding. Relevant recovery plans and conservation advice have been considered during the impact assessment, and the Petroleum Activities Program 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 identified during impact assessment. 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 an unplanned discharge of chemicals /hydrocarbons to a level that is broadly acceptable.				

EPOs, EPSs and MC for Drilling and Tie-back Activities			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
EPO 24 No unplanned releases of deck and subsea spills to the marine environment inside the PAA greater than a consequence level of E[96] during the Petroleum Activities Program.	**C 22.1** See **Section 6.8.4**.	**PS 22.1** See **Section 6.8.4**.	**MC 22.1.1** See **Section 6.8.4**.
	C 24.1 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 24.1** MODU's joint packer designed and maintained to reduce hydrocarbons discharged to the environment.	**MC 24.1.1** Environmental inspection records demonstrate that MODU's joint packer is compliant.
	C 5.1 See **Section 6.6.5**.	**PS 5.1** See **Section 6.6.5**.	**MC 5.1.1** See **Section 6.6.5**.

96 Defined as "Slight, short term impacts (<1 year)" as in **Table 2-3**, **Section 2.6.3**.

EPOs, EPSs and MC for Drilling and Tie-back Activities			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
	C 5.5 See **Section 6.6.5**.	**PS 5.5** See **Section 6.6.5**.	**MC 5.5.1** See **Section 6.6.5**.
	C 24.2 Contractor procedure for managing drilling 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 will be 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 24.2** Compliance with Contractor procedures to limit accidental loss to the marine environment.	**MC 24.2.1** Environmental inspection records demonstrate drilling fluid transfers are performed in accordance with the applicable contractor procedures.
	C 24.3 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.	**PS 24.3** To prevent unacceptable use or discharge of NWBM/base oil.	**MC 24.3.1** Inspection records demonstrate the presence and functionality of the specified equipment.
	C 24.4 Mud pits contaminated with hydrocarbons will be treated prior to discharge or contained.	**PS 24.4** Achieve oil concentration <1% by volume prior to discharge.	**MC 24.4.1** Discharge reports demonstrate that discharge criteria was met prior to discharge or contained.

EPOs, EPSs and MC for Drilling and Tie-back Activities			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
	If discharge specification not met, the fluid will be returned to shore.		
	C 24.5 Bulk base oil will not be disposed overboard.	**PS 24.5** No bulk base oil discharged to the marine environment.	**MC 24.5** Incident reports of any unplanned discharges of base oil.
	For oil spill response outcomes, standards and measurement criteria refer to **Appendix D**.		

6.8.7 Unplanned Discharges: Hazardous and Non-hazardous Waste Management

Context		
Operational Details – **Section 3.4.5**	Physical Environment – **Section 4.4** Biological Environment – **Section 4.5**	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		✓	✓			✓		A	F	2	L	LCS GP	Broadly Acceptable	**EPO 25**

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. 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.

All waste materials not suitable for discharge to the environment, including hazardous wastes (i.e., liquid and solid wastes), generated during the Petroleum Activities Program are transported to shore for disposal or recycling by Woodside's licenced waste contractor.

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.

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 affect to an individual. Marine debris has been identified as 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				
Contract 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 25.1**
Contract vessels complying with Marine Order 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 25.2**
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 25.3**

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
If safe and practicable to do so, using MODU, vessels, ROV or crane to attempt recovery of material[97] 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 25.4**
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 13.6**

97 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 Drilling and Completions 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 25.5**
Professional Judgement – Elimination				
None identified.				
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 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 the 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 the Waste Management Plan 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 Angel Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 25 Environmental risk from hazardous and non-hazardous waste management limited to Moderate[98] during the Petroleum Activities Program.	**C 25.1** Contract vessels complying with Marine Orders for safe vessel operations, Marine Order 94 (Marine pollution prevention – packaged harmful substances) 2014.	**PS 25.1** Vessels contracted whose practices comply with Marine Orders as applicable to vessel size, type and class (Marine Order 94).	**MC 25.1.1** Marine verification records demonstrate compliance with standard maritime safety procedure (Marine Order 94).
	C 25.2 Contract vessels complying with Marine Order for safe vessel operations, Marine Order 95 (Pollution prevention – garbage).	**PS 25.2** Vessels contracted whose practices comply with Marine Order as applicable to vessel size, type and class (Marine Order 94).	**MC 25.2.1** Marine verification records demonstrate compliance with standard maritime safety procedure (Marine Order 94).
	C 25.3 Storing, handling and transporting wastes in accordance with the Waste Management Plan for Offshore Facilities	**PS 25.3** Implementation of Waste Management Plan for Offshore Facilities, including: • waste segregation and storage • records of all waste to be disposed, treated or recycled shall be maintained, and shall include (though not limited to) quantity of waste, waste type and disposal/recycle location • waste streams shall be appropriately handled, tested, monitored and managed according to their hazard and recyclability class.	**MC 25.3.1** Records demonstrate implementation of Waste Management Plan for Offshore Facilities.
	C 25.4 If safe and practicable to do so, using MODU,	**PS 25.4** Material environmentally hazardous or non-	**MC 25.4.1** Records detail the recovery attempt

98 Defined in **Section 2.6.3**

EPOs, EPSs and MC for Angel Facility Operations			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	vessels, ROV or crane to attempt recovery of material[99] environmentally hazardous or non-hazardous solid object/waste container lost overboard.	hazardous solid waste object/container dropped to the marine environment will be recovered where safe and practicable to do so. Will consider: • risk to personnel to retrieve object • whether the location of the object is in recoverable water depth • object's proximity to subsea infrastructure • ability to recover the object (i.e., nature of object, lifting equipment or ROV availability and suitable weather).	consideration and status of material environmentally hazardous or non hazardous solid waste object/container lost to the marine environment.
	C 13.6 Refer to **Section 6.7.3**.	**PS 13.6** Refer to **Section 6.7.3**.	**MC 13.6** Refer to **Section 6.8.2**.

EPOs, EPSs and MC for Drilling and Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 25 Environmental risk from hazardous and non-hazardous waste management limited to Moderate[100] during the Petroleum Activities Program.	**C 25.1** Contract vessels complying with Marine Orders for safe vessel operations, Marine Order 94 (Marine pollution prevention – packaged harmful substances) 2014.	**PS 25.1** Vessels contracted whose practices comply with Marine Orders as applicable to vessel size, type and class (Marine Orders 94 and 95).	**MC 25.1.1** Marine verification records demonstrate compliance with standard maritime safety procedures (Marine Orders 94 and 95).
	C 25.2 Contract vessels complying with Marine Order for safe vessel operations, Marine Order 95 (Pollution prevention – garbage).	**PS 25.2** Vessels contracted whose practices comply with Marine Order as applicable to vessel size, type and class (Marine Order 94).	**MC 25.2.1** Marine verification records demonstrate compliance with standard maritime safety procedure (Marine Order 94).
	C 25.3 Storing, handling and transporting wastes in accordance with the Waste Management Plan for MODU/PIV.	**PS 25.3** Implementation of Waste Management Plan for MODU/PIV, including: waste segregation and storage records of all waste to be disposed, treated or recycled shall be	MC 25.3.1 Records demonstrate implementation of Waste Management Plan for MODU/PIV.

99 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.
100 Defined in **Section 2.6.3**

EPOs, EPSs and MC for Drilling and Tie-back Activities			
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 shall be appropriately handled, tested, monitored and managed according to their hazard and recyclability class.	
	C 25.4 If safe and practicable to do so, using MODU, vessels, ROV or crane to attempt recovery of material[101] environmentally hazardous or non-hazardous solid object/waste container lost overboard.	**PS 25.4** Material environmentally hazardous or non-hazardous solid waste object/container dropped to the marine environment will be recovered where safe and practicable to do so. Will consider: • risk to personnel to retrieve object • whether the location of the object is in recoverable water depth • object's proximity to subsea infrastructure • ability to recover the object (i.e., nature of object, lifting equipment or ROV availability and suitable weather).	**MC 25.4.1** 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.
	C 13.6 Refer to **Section 6.8.2**.	**PS 13.6** Refer to **Section 6.8.2**.	**MC 13.6** Refer to **Section 6.8.2**.
	C 25.5 Implement the Drilling and Completions Waste Management Plan, which requires: • dedicated space for waste segregation bins and skips shall be provided on the MODU • records of all waste to be disposed, treated or recycled • waste streams to be handled and managed according to their	**PS 25.5** Hazardous and non-hazardous waste will be managed in accordance with the Drilling and Completions Waste Management Plan.	**MC 25.5.1** Records demonstrate compliance against Drilling and Completions Waste Management Plan.

101 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 Drilling and Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	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.		

6.8.8 Physical Presence: Seabed Disturbance from Dropped Objects or Loss of Station Keeping Leading to Anchor Drag

Context		
Project Vessels – **Section 3.5** Holding Station: Mooring Installation and Anchor Hold Testing/Soil Analysis – **Section 3.5.6.4**	Marine Regional Characteristics – **Section 4**	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***
Dropped objects resulting in the disturbance of benthic habitat	✓			✓		✓	A	D	1	L	GP PJ	Broadly Acceptable	**EPO 26**
Loss of station keeping of the MODU leading to anchor drag and the disturbance of benthic habitat	✓			✓		✓							

Description of Source of Impact

During MODU and project vessel operations, the primary cause for unplanned seabed disturbance is through dropped objects from the MODU or project 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 for tie-back activities.

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 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

A moored MODU may be used for drilling the LDA-02 well, secured on station by an 8-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 3.5.6**), 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 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 & 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 & 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.

Impact 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 PAA are of low sensitivity and are broadly represented throughout the NWMR. As described in **Section 4.7**, the Glomar Shoals and the Ancient Coastline at 125 m depth contour KEFs overlaps the PAA. Benthic communities in the PAA are representative of the deep water 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 PAA. Furthermore, the PAA overlaps a relatively minor proportion of both KEFs (**Section 4.7**). 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 Ancient Coastline at the 125 m depth contour KEF is also an area where potential Indigenous archaeological material may exist on the seabed (**Section 4.9.1**), therefore dropped objects or mooring failure have the potential to impact cultural heritage sites if present within the PAA. While no cultural features have been identified in the PAA, further archaeological studies will be undertaken prior to the activity commencing to understand any potential cultural features.

Any unplanned seabed disturbance within the KEF would be minor and relatively small compared to the size of the KEF. There will be no substantial adverse effect on the KEF, communities or cultural heritage sites within it. On this basis, the magnitude of potential impacts to KEFs from unplanned seabed disturbance during activities is Minor. Receptor sensitivity for the KEF is high, leading to a Minor (D) risk consequence.

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.

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 PAA, 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.

Based on the detailed evaluation, the magnitude of potential impacts to epifauna and infauna from unplanned seabed disturbance during activities associated with the Petroleum Activities Program is evaluated to be slight. Sensitivity for epifauna and infauna is low, leading to a slight (E) risk consequence.

Summary of Potential Impacts to Environmental Values(s)
Given the adopted controls, the predicted small footprint of a dropped object and the 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 (i.e., Environment Impact – D).

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[102]***	***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 26.1**
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 26.2**
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	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 26.3**

102 Qualitative measure

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[102]***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
will not cause progressive failure of the 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 2.8**
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 26.4**
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 26.5**
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 uncrewed.	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 response times could be improved in the event of a loss of station keeping. (E,1).	Benefit outweighs cost/sacrifice.	Yes **C 26.6**
If safe and practicable to do so, vessel, ROV, or crane will be used to attempt recovery of solid object/waste lost overboard.	F: Yes. CS: Minimal cost. Standard practice.	Potentially reduces consequence by recovering equipment from the environment.	Benefit outweighs cost/sacrifice.	Yes **C 26.7**

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[102]***	***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 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.				
Demonstration of Acceptability				
Acceptability Statement: The impact assessment has determined that disturbance to seabed from dropped objects or 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 Angel Facility Operations			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
EPO 26 No incidents of dropped objects or anchor/chain hold drag to the marine environment inside the PAA greater than a consequence level of D[103] during the Petroleum Activities Program.	**C 26.5** 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 26.5** Notification to AMSA/ AHS/ potentially affected relevant persons to prevent activities interfering with other marine users.	**MC 26.5.1** Consultation records demonstrate that AMSA/ AHS/potentially affected relevant persons have been notified in the event of a significant equipment loss.
	C 26.7 If safe and practicable to do so, vessel, ROV, or crane will be used to attempt recovery of solid object/waste lost overboard.	**PS 26.7** Any hazardous solid waste dropped to the marine environment will be recovered where safe and practicable to do so. Where safe and practicable for this activity, consider: • risk to personnel to retrieve object • whether the location of the object is in recoverable water depths • the object's proximity to subsea infrastructure • ability to recover the object (i.e., nature of object, lifting equipment or ROV availability, and suitable weather).	**MC 26.7.1** Records detail the recovery attempt consideration and status of any hazardous waste lost to the marine environment.

103 Defined as "Minor, short-term impact (1-2 years)", as in **Table 2-3, Section 2.6.3**.

EPOs, EPSs and MC for Drilling and Tie-back Activities			
Outcomes	***Controls***	***Standards***	***Measurement Criteria***
EPO 26 No incidents of dropped objects or anchor/chain hold drag to the marine environment inside the PAA greater than a consequence level of D[104] during the Petroleum Activities Program.	**C 26.1** 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 26.1** All lifts conducted in accordance with applicable MODU/installation vessel work procedures to limit potential for dropped objects.	**MC 26.1.1** Records show lifts conducted in accordance with the applicable MODU/installation vessel work procedures.
	C 26.2 MODU, installation vessel and support vessel inductions include control measures for dropped object prevention.	**PS 26.2** To ensure awareness of requirements for dropped object prevention.	**MC 26.2.1** Records show dropped object prevention training is provided to the MODU/ installation vessel.
	C 26.3 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 26.3** MODU mooring system tested and in place to ensure no complete mooring failure.	**MC 26.3.1** Records demonstrate mooring system tests and inspection.
	C 2.8 See **Section 6.6.2**.	**PS 2.8.1** See **Section 6.6.2**.	**MC 2.8.1** See **Section 6.6.2**.
	C 26.4 Mooring system is tested to recommended tension as per API RP 2SK.	**PS 26.4** Monitoring compliant with ISO 19901-7:2013.	**MC 26.4.1** Records confirm mooring system is tested to recommended tension as per API RP 2SK.
	C 26.5 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 26.5** Notification to AMSA/ AHS/ potentially affected relevant persons to prevent activities interfering with other marine users.	**MC 26.5.1** Consultation records demonstrate that AMSA/ AHS/ potentially affected relevant persons have been notified in the event of a significant equipment loss.

104 Defined as “Minor, short-term impact (1-2 years)”, as in **Table 2-3**

	C 26.6 Moored MODU tracking equipment operational when the MODU uncrewed.	**PS 26.6** Tracking of the MODU is possible when the MODU is uncrewed.	**MC 26.6.1** Records show the moored MODU has functional tracking equipment for instances when MODU is uncrewed.
	C 26.7 If safe and practicable to do so, vessel, ROV, or crane will be used to attempt recovery of solid object/waste lost overboard.	**PS 26.7** Any hazardous solid waste dropped to the marine environment will be recovered where safe and practicable to do so. • Where safe and practicable for this activity, consider: • risk to personnel to retrieve object • whether the location of the object is in recoverable water depths • the object's proximity to subsea infrastructure • ability to recover the object (i.e., nature of object, lifting equipment or ROV availability, and suitable weather).	**MC 26.7.1** Incident records detail the recovery attempt consideration and status of any hazardous waste lost to the marine environment.

6.8.9 Physical Presence: Interactions with Marine Fauna

Context		
Facility Layout and Description – **Section 3.4** Project Vessels – **Section 3.5**	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 MODU/support vessels resulting in collision with marine fauna						✓		A	E	1	L	LCS PJ	Broadly Acceptable	**EPO 27**
Physical presence of bird proofing/exclusion devices resulting in injury to seabirds						✓		A	F	1	L	GP		**EPO 28**

Description of Source of Risk

Activities associated with the Petroleum Activities Program will require vessels for tie-back activities, support operations and supply/transport. 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. However, indicative timeframes for tie-back activities at Lambert West are anticipated for Q3 2024.

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.

Seasonally seabirds roost 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 facility by installing bird proofing/exclusion devices (e.g., work area humpies).

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 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 Petroleum Activities Program 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 nearest recognised BIAs for cetaceans (considered to be at risk due to relatively slow movement and proportion of time spent at or near the sea surface) is the humpback whale migration BIA, which lies 35 km south of the PAA

(refer to **Section 4.6.3**). The pygmy blue whale migration BIA also lies beyond the PAA (37 km north-west). Adverse interactions between vessels and humpback or pygmy blue whales are considered to be unlikely. Both humpback whales and pygmy blue whales 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).

The PAA is unlikely to represent important habitat for marine turtles, given the absence of potential nesting or foraging habitat (i.e., no emergent islands, reef habitat or shallow shoals) and the water depth (approximately 70 to 130 m). The closest identified marine turtle BIA or critical habitat to the PAA is an internesting buffer for flatback turtles, which lies 15 km from the PAA. The nearest potential turtle nesting habitats are the islands of the Dampier Archipelago (approximately 94 km south). As such, the presence of marine turtles within the PAA is likely to be restricted to individual turtles infrequently transiting the area. It is acknowledged that there are significant nesting sites along the mainland coast and islands of the region. As with cetaceans, the risk of collisions between turtles and vessels increases with vessel speed (Hazel et al., 2007). 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). Given the low speeds of vessels undertaking the Petroleum Activities Program, along with the expected low numbers of turtles within the PAA, interactions between vessels and turtles are considered to be highly unlikely.

It is not deemed credible that vessel movement associated with the Petroleum Activities Program 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.

Seabirds

While the presence of the facility provides an opportunistic resting location for seabirds, the installation of temporary bird proofing exclusion devices poses the potential risk of entanglement for individual birds. If deterrents are installed, birds will likely relocate to previous ranges (i.e., rather than landing on the Angel platform); therefore, no lasting effect is anticipated.

Cultural Values and Heritage

Through consultation and review of available literature (**Section 4.9.1**), Woodside understands that marine fauna that may be affected by a collision with a project vessel, such as marine mammals, whale sharks and turtles, are culturally important to Traditional Custodians. Traditional Custodians value these species both tangibly as well intangibly as they can be considered a resource or linked to songlines and dreaming stories. Traditional Custodians also have connection to many marine species through kinship and totemic systems; an individual may have obligation to care for a species to which they are kin. Traditional Custodians may also have a cultural obligation to care for the environmental values of Sea Country.

For example, activities that impact turtle populations and their marine environment may have an indirect impact on some Indigenous communities if they deplete hunting areas and threaten local food security (Delisle et al., 2018:251). Whale species may be subject of First Nations' increase ceremonies / rituals which are performed to enhance or maintain populations. As these 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, it is anticipated 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). 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, potential impacts to marine fauna are predicted to be at an individual level, which are not considered to be ecologically significant at a population level. 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.

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)[105]***	***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 4.1**
Good Practice				
Implement a Seabird management plan – to reduce likelihood of interaction with seabirds.	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**
Professional Judgement - Elimination				
Not using vessels.	F: No. No alternative to the use of vessels during the Petroleum Activities Program 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.				

105 Qualitative measure

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. 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 Angel Operations and Drilling and Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 27 No mortality of cetaceans resulting from interactions with support vessels for the riser platform.	**C 4.1** Refer to **Section 6.6.3**.	**PS 4.1** Refer to **Section 6.6.3**.	**MC 4.1.1** Refer to **Section 6.6.3**.
			MC 4.1.2 Refer to **Section 6.6.3**.
EPO 28 Undertake the Petroleum Activities Program in a manner that will prevent a substantial adverse effect to seabird populations.	**C 12.1** Refer to **Section 6.6.11**.	**PS 12.1** Refer to **Section 6.6.11**.	**MC 12.1.1.** Refer to **Section 6.6.11**.

6.8.10 Physical Presence: Introduction of Invasive Marine Species

Context		
Project Vessels – **Section 3.4.14** Project Vessel-based Activities – **Section 3.5.6** Subsea Installation and Pre-commissioning Activities – **Section 3.5.3**	Regional Context – **Section 4.2** Habitats and Biological Communities – **Section 4.5**	Consultation – **Section 5**

Impacts and Risks Evaluation Summary

	Environmental Value Potentially Impacted							*Evaluation*						
Source of Risk	***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					✓	✓	✓	A	E	1	L	LCS GP PJ	Broadly Acceptable	**EPO 29**

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. These project vessels may include the MODU, IMMR vessel, installation vessels or general support vessels (**Section 3.5**). 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 the *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, etc). 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 6-41** 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.

Approximately 0.89 km^2 of the Glomar Shoals KEF overlaps the PAA, in water depths between 65 to 72 m depth. This KEF contains regionally important habitat supporting high biological diversity and high localised productivity (Falkner et al. 2009). Benthic taxa including hard and soft corals, sponges and macroalgae is highest at depths <40 m, decreasing with depth within the KEF (Wahub, 2018). At depths of 60 to 80 m, benthic cover is low and approximately 2%; at depths greater than 80 m, benthic cover is barely present, with baseline survey data indicating 0.1% cover of benthic biota.

Discrete areas of hard substrate hosting sessile filter feeding communities such as sponges and gorgonians may also be associated within the Ancient Coastline at the 125 m Depth Contour KEF, of which ~84.6 km^2 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 Angel platform, which provides hard substrate for attachment (Jacobs, 2014).

While the MODU and project vessels have the potential to introduce IMS into the PAA, 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. **Table 6-41** provides an assessment of the IMS impacts and risks associated with the Petroleum Activity Program.

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 (see **Table 6-41**). 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. The results of this assessment are presented in **Table 6-41**.

As a result of this assessment, Woodside has presented the highest potential environment consequence as B 'a major long term impact on highly valued ecosystems' and a likelihood as Remote (0), resulting in an overall moderate risk following the implementation of identified controls.

Table 6-41: 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 70 to 130 m deep, are not conducive to the settlement and establishment of IMS.		
Transfer of IMS from infected vessel to and subsequent establishment on the Angel 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 Angel 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 Angel platform is considered Slight (E), localised and would relate to habitat directly on the Angel facility.	**Highly Unlikely (1)** Interactions between the Angel facility and support vessels is limited during the petroleum activity program, with a 500 m safety exclusion zone being adhered to. 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	**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,

		no credible environmental risk and the assessment is 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.	bunkering activities). There is also no direct contact (i.e., they are not 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 29.1**
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 29.2**
Good Practice				
Woodside's IMS risk assessment process[106] will be applied to the MODU, project vessels and relevant immersible equipment undertaking the Petroleum Activities Program. Assessment will consider these risk factors: For MODU and project vessels: • vessel/MODU/type	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 29.3**

106 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***
• 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 • 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.	Riser platform monitoring does not prevent the potential for translocation (i.e., only as a mitigation measure). Detection	Disproportionate. Interactions between the facility and support/subsea vessels posing IMS translocation risk is limited, and the	No

Demonstration of ALARP				
Control Considered	***Control Feasibility (F) and Cost/Sacrifice (CS)***	***Benefit in Impact/Risk Reduction***	***Proportionality***	***Control Adopted***
	CS: Significant. IMS inspections of in-water assets typically require 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.	may facilitate subsequent development of options to manage IMS. Subsequent success may be limited due to structure complexity and hazardous environment.	vessels involved will have been managed through the implementation of Woodside's Invasive Marine Species Management Plan (IMSMP), a verified process which provides Woodside confidence in the verification of environmental performance**.** 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 Petroleum Activities Program was identified, given vessels must be used to undertake the Petroleum Activities	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***
	Program. There is no feasible means to eliminate the source of risk. 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	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***
	vessel hire opportunities.			
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 Angel Operations and Drilling and Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
EPO 29 No introduction of IMS into the PAA as a result of the Petroleum Activities Program.	**C 29.1** 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	**PS 29.1** Compliance with Australian Ballast Water Management Requirements (as defined under the *Biosecurity Act 2015*) (aligned with the International Convention for the Control and	**MC 29.1.1** Ballast water exchange records maintained by vessels which verify compliance against Ballast Water

EPOs, EPSs and MC for Angel Operations and Drilling and Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	Ballast Water Management Requirements.	Management of Ships' Ballast Water and Sediments) to prevent the introduction of IMS.	Management requirements.
	C 29.2 Internationally sourced project vessels will manage their biosecurity risk associated with biofouling as specified in the Australian Biofouling Management Requirements.	**PS 29.2** Compliance with Australian Biofouling Management Requirements.	**MC 29.2.1** Records of implementation of biofouling management measure and pre-arrival reporting.
	C 29.3 Woodside's IMS risk assessment process[107] will be applied to the MODU, project 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, 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	**PS 29.3** Before entering the PAA, project vessels, MODU and relevant immersible equipment are determined to be low risk of introducing IMS of concern, and maintain this low risk status to mobilisation.	**MC 29.3.1** Records of IMS Vessel Risk Assessments maintained for all project vessels and relevant immersible equipment, as required by the management plan. **MC 29.3.2** Records maintained of management measures which have been implemented where identified through the IMS Vessel Risk Assessment process.

[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).

EPOs, EPSs and MC for Angel Operations and Drilling and Tie-back Activities			
Environmental Performance Outcomes	***Controls***	***Environmental Performance Standards***	***Measurement Criteria***
	• 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.		

6.9 Recovery Plan and Threat Abatement Plan Assessment

This section describes the assessment that Woodside has undertaken to demonstrate that the Petroleum Activities Program 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).
- Recovery Plan for the Grey Nurse Shark (Carcharias taurus) 2014 (Commonwealth of Australia, 2014b).
- 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 6-42 lists the objectives and (where relevant) the action areas of these plans, and 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 results of this assessment against relevant actions are presented in **Table 6-43** to **Table 6-46**.

Table 6-42: 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		
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		

EPBC Act Part 13 Statutory Instrument	Applicable to:		
	Government	***Titleholder***	***Petroleum Activities Program***
B. Enabling and measuring recovery			
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		
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***
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
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		

EPBC Act Part 13 Statutory Instrument	Applicable to:		
	Government	***Titleholder***	***Petroleum Activities Program***
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	
Improve community understanding and awareness in relation to sawfish and river shark conservation and management	Y		

EPBC Act Part 13 Statutory Instrument	Applicable to:		
	Government	***Titleholder***	***Petroleum Activities Program***
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 6-43: 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 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.	Refer **Section 6.8.7**. 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 25** **C 25.1** **PS 25.1**

Part 13 Statutory Instrument	Relevant action areas/objectives	Relevant actions	Evaluation	EPO, controls and PS
	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 & 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.	Refer **Sections 6.7 and 6.8**. **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.	Refer **Sections 6.7** and **6.8**. Detailed oil spill preparedness and response performance outcomes, standards and measurement criteria for the Petroleum Activities Program are present in **Appendix D**.
	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.	Refer **Section 6.6.11**. **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 12** **C 12.1, 12.2, 12.3** **PS 12.1, 12.2, 12.3**

Part 13 Statutory Instrument	Relevant action areas/objectives	Relevant actions	Evaluation	EPO, controls and PS
	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 Program 1.	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.	Refer **Sections 6.6.3** and **6.6.4**. **Not inconsistent assessment:** The assessment of acoustic emissions has considered the potential impacts to marine turtles. Noise related to the Petroleum Activities Program is not expected to result in behavioural response, injury or mortality of individuals, or any other lasting effect.	**EPO 4** **C 4.1** **PS 4.1**
Assessment Summary: The Marine Turtle Recovery Plan has been considered during the assessment of impacts and risks, and the Petroleum Activities Program is not considered to be inconsistent with the relevant actions of this plan.				

Table 6-44: 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.	Refer **Sections 6.6.3** and **6.6.4**. **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 pygmy blue whales within or adjacent to the PAA. If the Petroleum Activities Program 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 4** **C 4.1** **PS 4.1**
	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.	Refer **Section 6.8.9**. **Not inconsistent assessment:** The assessment of vessel collision with marine fauna has considered the potential risks to pygmy blue whales. If the Petroleum Activities Program 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 pygmy blue whales are highly unlikely to occur, given the low operating speed of support vessels.	**EPO 27** **C 4.1** **PS 4.1**
	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 Petroleum Activities Program is not considered to be inconsistent with the relevant actions of this plan.				

Table 6-45: 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.	Refer **Section 6.8.7**. **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
			Refer **Sections 6.7** and **6.8**. **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.	Refer **Sections 6.7** and **6.8**. Detailed oil spill preparedness and response performance outcomes, standards and measurement criteria for the Petroleum Activities Program are present in Appendix D.
Assessment Summary: The Grey Nurse Shark Recovery Plan has been considered during the assessment of impacts and risks, and the Petroleum Activities Program is not considered to be inconsistent with the relevant actions of this plan.				

Table 6-46: 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.	Refer **Sections 6.7** and **6.8**. **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.	Refer **Sections 6.7** and **6.8**. Detailed oil spill preparedness and response performance outcomes, standards and measurement criteria for the Petroleum Activities Program are presented in **Appendix D**.
	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.	Refer **Section 6.8.7**. **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 Petroleum Activities Program is not considered to be inconsistent with the relevant actions of this plan.				

Table 6-47: 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.	Refer **Section 6.8.7**: **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 Petroleum Activities Program is not considered to be inconsistent with the relevant actions of this plan.				

6.10 Cultural Values and Heritage Values Assessment

As described in Section 4, 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 (Woodside 2022), 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 / 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 described in Sections 6.6, 6.7 and 6.8 respectively and not further assessed below.

Aspect	Cultural Features and Heritage Values
Description of source impact/ risk (key aspects)	***Physical presence of vessels*** The PAP involves drilling LDA 02 and may also involve intervention or workover if required. The MODU will be present within the PAA for 50-60 days, including mobilisation, demobilisation and contingency. Installation of subsea infrastructure and pre-commissioning is anticipated to commence following drilling and is expected to have a cumulative duration of about four weeks (including mobilisation, demobilisation and contingency). When underway, activities will be 24 hours per day, seven days per week. Flowlines and subsea infrastructure will remain in place and be operated under this Operations EP. Safety exclusion zones will be established around the MODU and installation vessels. Refer to Section 6.6.1 for more details. ***Acoustic emissions from vessels*** MODUs, installation vessels and support vessels undertaking the PAP will generate noise both in the air and underwater, due to the operation of thrusters' engines, propeller movement, drilling operations, etc. During drilling operations, the MODU will produce low-intensity continuous sound. In addition, the PAP will be supported by a number of DP capable vessels including; installation and light well intervention vessels, and offshore support vessels (OSVs) used for standby and resupply services. 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. Refer to Section 6.6.3 for more details. ***Unplanned hydrocarbon release from loss of well containment (basis of EMBA)*** Woodside has identified a well blowout from operating wells as the scenario with the worst-case credible environmental outcome as a result of loss of well containment. Well intervention and workover activities may also result in a loss of well containment. 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, in the highly unlikely event of the worst-case credible spill modelled at the well location. The EMBA therefore covers a larger area than the area that would be affected during any one single spill event. In the event of a spill the EMBA would be much smaller and is intermittent e.g., plume travels away from the release location based on prevailing currents and winds directions. 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. Refer to 6.7.3 for more details.

Planned Activity Aspect	*The potential environmental impact from the PAP to species that have a cultural feature or heritage value have been summarised below to provide the context related cumulative impact on the cultural feature or heritage value.*						
	Impact Significance Level						
Environmental impact assessment to marine species	***Marine mammals***	***Marine reptiles***	***Fish***	***Seabirds***	***Coral***	***Seagrass***	***Mangroves***
6.6.3 Routine Acoustic Emissions	Negligible (F)	Negligible (F)	Negligible (F)	N/A	N/A	N/A	N/A
6.6.4 Acoustic Emissions during Tie-Back Activities	Slight (E)	Negligible (F)	Negligible (F)	N/A	N/A	N/A	N/A
6.6.11 Routine Light Emissions: Facility, External Lighting on MODU and Project Vessels	N/A	Negligible (F)	Negligible (F)	Negligible (F)	N/A	N/A	N/A

Unplanned Activity Aspect	*The potential environmental risk from the PAP to species that have a cultural feature or heritage value have been summarised below to provide the context related cumulative risk on the cultural feature or heritage value.*						
	Risk Rating						
Environmental risk assessment to marine species	***Marine mammals***	***Marine reptiles***	***Fish***	***Seabirds***	***Coral***	***Seagrass***	***Mangroves***
6.7.3 Hydrocarbon Release: Loss of Well Containment from Operating Wells	Moderate	Moderate	Moderate	Moderate	High	Moderate	Low
6.7.4 Hydrocarbon Release: Pipeline and Facility	Moderate	Moderate	Moderate	Moderate	Moderate	Low	Low
6.7.5 Hydrocarbon Release: Loss of structural integrity	Moderate	Moderate	Moderate	Moderate	Low	Low	Low
6.7.6 Hydrocarbon Release: Marine vessel separation	Moderate	Moderate	Moderate	Moderate	Low	Low	N/A
6.7.7 Hydrocarbon Release: Suspended load from platform	Low	Low	Low	Low	N/A	N/A	N/A
6.8.1 Hydrocarbon Release: Loss of Well Containment	Moderate	Moderate	Moderate	Moderate	Moderate	Low	Low
6.8.2 Topside Loss of Containment	Low	Low	Low	Low	N/A	N/A	N/A
6.8.3 Hydrocarbon Release – Vessel Collision	Low	Low	Low	Low	Low	Low	N/A
6.8.4 Hydrocarbon Release – Bunkering , Transfer or Storage	Low	Low	Low	Low	N/A	N/A	N/A
6.8.5 Discharge – Deck and Subsea Spills	Low	Low	Low	Low	N/A	N/A	N/A
6.8.6 Discharge – Project Fluids	Low	Low	Low	Low	N/A	N/A	N/A
6.8.7 Discharge – Hazardous and Non-Hazardous Solid Waste / Equipment	Low	Low	Low	Low	N/A	N/A	N/A
6.8.9 Physical Presence (Unplanned) – Interaction with Marine Fauna	Low	Low	Low	N/A	N/A	N/A	N/A

Impact and Risk Assessment

The PAP has the potential to 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.

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.

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 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. As described in Section 4.9.1 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

Onshore / intertidal archaeological sites

No coastal areas or islands exist within the PAA. A review of the of DPLH’s Aboriginal Heritage Inquiry System identified Registered Aboriginal Sites and 2 Other Heritage Places in the EMBA. These Other Heritage Places do exist within the EMBA boundary, however given the EMBA is driven by an unplanned hydrocarbon release 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 release, 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 release 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, in addition to the impact and risk assessment in Sections 6.6, 6.7 and 6.8 respectively.

Submerged archaeological sites

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. Consultation with Traditional Custodians has not identified cultural information about potential submerged cultural heritage or associated intangible cultural elements in the PAA or EMBA. Publicly available literature (Kearney et al.) identified a potential connection between a songline and submerged waterholes but these lay outside of the PAA and EMBA. No known submerged archaeological sites are anticipated to be impacted by the activity.

Given that the PAA intersects part of the Ancient Landscape but also extends beyond the furthest extent of the Ancient Landscape, submerged archaeological sites (locations undefined) may exist on the Ancient Landscape within the PAA and broader EMBA (Leach 2020). An archaeological desktop review has been undertaken and no archaeological sites were identified (refer to Section 4.9). A desktop assessment of submerged archaeological heritage and landscape features will be undertaken in the PAA as an additional control, by a maritime archaeologist, prior to starting work in water depths <130m, to further inform the cultural environment within the PAA. New cultural information will be assessed as part of the Change Management Procedure and Revision process in the EP (Section 7.2.5). Unexpected finds of potential underwater cultural heritage will also be adopted as an additional control in order to appropriately manage unknown impacts and risks to submerged archaeological sites to a level that is acceptable and ALARP. Given the EMBA is driven by an unplanned hydrocarbon release potential impact to the seabed or archaeological material on or within it would be confined to a localised area in the immediate vicinity of the release and shoreline accumulation. .

Rivers, waterholes, tidal channels and seeps

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.

It has been asserted in consultation that locations where saltwater and freshwater meet “are where the biggest energy lines are”. Energy lines are understood by Woodside to be the same as songlines which are addressed below. The EMBA is driven by an unplanned hydrocarbon release, potential impacts to the seabed or archaeological material on or within it would be confined to a localised area in the immediate vicinity of the release and shoreline accumulation. As such, impacts from this activity to submerged water sources in the broader EMBA are considered unlikely. 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 6.6, 6.7 and 6.8 respectively.

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 Activity.

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 PAA. 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 PAA or EMBA.

While the presence of songlines are 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 4.9), and these have been separately assessed in this section. Further assessment of intangible values and marine species are provided below, in addition to the impact and risk assessment in Sections 6.6, 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. Consultation with KAC has identified the presence of spiritual beings including belief in 'Yinta' that is associated with Sea Country but no further detail was specified and consultation has not identified the presence of Yinta as overlapping the EMBA. 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 (see Section 4.9.1.6.2). 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, Hayes v Western Australia [2008] FCA 1487, Water Corporation 2019, Zaunmayr 2016). In some versions, the serpent originates from 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 have 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 release that may affect them, as specified in **Appendix H.**

No impacts to water flows (either tidal movement or ocean currents) or depletion of water sources are anticipated from this PAP. Features of the landscape with the potential for connection to creation/dreaming stories and ancestral beings may exist on the Ancient Landscape. Given the EMBA is designed around an unplanned hydrocarbon release, potential impacts to the seabed or archaeological material on or within it would be confined to a localised area in the immediate vicinity of the release and shoreline accumulation. Desktop assessments will be undertaken to further inform the cultural environment in Section 4.9 including submerged cultural features and Change Management Procedure (Section 7.2.5) applied if new information is assessed to impact creation/dreaming stories and ancestral beings located on the Ancient Landscape.

Ceremonial sites

All mentions of active ceremonial sites were confined to onshore locations and no direct impacts to onshore ceremonial sites are anticipated from the PAP. 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.

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. 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 H.**

Knowledge of Country/ customary law and transfer of knowledge

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 Sections 6.6, 6.7 and 6.8 respectively.

Connection to Country

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 PAP. Access to Country is discussed below.

Access to Country

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 PAP 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 release that may affect them, as specified in **Appendix H.**

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). KAC, through consultation, identified secret habitat totems but no further detail or locations were identified. Regarding this EP, KAC did not identify any secret habitat totems overlapping the PAP or EMBA. Kinship 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. Refer to species specific assessment below for further information, in addition to the impact and risk assessment in **Sections 6.6, 6.7 and 6.8** respectively. In the highly unlikely event of a hydrocarbon release relevant cultural authorities will be engaged in the event of a release that may affect them, as specified in **Appendix H**.

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 in Section 6.6, 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, etc) are not expected. Impacts to potential resources within the EMBA, in the highly unlikely event of hydrocarbon release, are described and risk assessed in Sections 6.7 and 6.8 but 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 release that may affect them, as specified in **Appendix H**.

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 6.6.3, 6.6.4, 6.7.3 and 6.8.9.**

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; 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 PAP. 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 assessments in Section 6.6, 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.

Marine reptiles (turtles, sea snakes, crocodiles)

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 (Dortch et al. 2019, 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 assessments in Section 6.6 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.

Fish and Cephalopods

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 addition, 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 (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 preformed 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 assessment in Section 6.6, the potential impacts from planned activities on fish[108] 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.

Seabirds

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).

[108] 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.

As described in the relevant environmental impact assessments in Section 6.6 the potential impacts from planned activities 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 6.7.3 a change in marine fauna behaviour or injury/mortality to seabirds and migratory shorebirds may occur due to hydrocarbon contact as well as 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.

Benthic habitats (coral, seagrass)

Benthic habits are important environments that house marine fauna that may be considered to be culturally important, including corals attracting fish and seagrass providing shelters for fauna, as well as serving as an important habitat for dugongs. Through consultation, no First Nations group identified benthic habitats as valuable for their ecological values. The reviewed literature similarly did not reveal any new cultural values, features or interests related to benthic habitats for the relevant First Nations groups.

There is no overlap between the PAA and coral / seagrass habitats as water depth is more than 120 m, and no planned impacts to coral / seagrass habitats from planned activities.

In terms of risk, as described in Section 6.7.3, a change in habitat may occur following an unplanned hydrocarbon release. In the unlikely event of a hydrocarbon release may result in large-scale impacts to coral reefs within the EMBA, particularly at the Montebello and Muiron Islands. Potential impacts to benthic habitats are managed by controls listed in Sections 6.6,6.7 and 6.8. Relevant cultural authorities will be engaged in the event of a release that may affect them, as specified in **Appendix. H.**

Shoreline Habitats (mangroves / salt marshes)

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 PAA and mangrove / salt marsh habitat, and no planned impacts to mangroves from the PAP.

In terms of risk, as described in Section 6.7.3 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 to mangroves and saltmarshes . 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 and coastal reserves (e.g. Ningaloo Coastal Reserve) 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 PAA and any marine parks.

In terms of risk, as described in Sections 6.7 and 6.8, shoreline accumulation may occur in some of these marine parks. The relevant cultural authorities will be engaged in the event of a release that may affect them, as specified in Appendix H.

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). The highest risk is to coral from the unlikely event of an unplanned hydrocarbon release from operating wells.

ALARP Demonstration	*As marine ecosystems may hold both cultural and environmental value (see Section 4.9), 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, 6.7 and 6.8 will reduce impacts to cultural features and heritage values, including marine species and habitats.*				
	Control considered	Feasibility (F) & Cost/	Benefit in Impact/Risk Reduction	Proportionality	Adopted

		Sacrifice (Cs)			
	Apply a 'living heritage[109] 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 30.1
	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 30.2
	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 Adopted, see Appendix H
	Review of existing survey data by a suitably qualified maritime archaeologist to inform areas for laydown and/or installation of equipment to avoid or where not possible, minimise physical impacts to cultural heritage areas or prospective areas.	F: Yes. CS: Cost of paying an external consultant to undertake a desktop assessment.	Review of data by suitably qualified maritime archaeologist will inform potential exclusion or avoidance areas for seabed disturbance. Implementing this process will protect and minimise any physical impacts to underwater cultural heritage.	Benefits outweigh cost/ sacrifice.	Yes **C 3.1**

[109] 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.

			Additionally, this process is not inconsistent with the draft guidelines for working in the near and offshore environment to protect Underwater Cultural Heritage (DCCEEW, 2023).		
	Unexpected finds of potential Underwater Cultural Heritage[110] sites/features, including First Nations UCH are managed in accordance with the Unexpected Finds Procedure set out in **Section 7.6**	F: Yes CS: Costs of implementation	Allows management of Unexpected Finds in accordance with legislative requirements, (including *Underwater Cultural Heritage Guidance for Offshore Developments and the DRAFT Guidelines to Protect Underwater Cultural Heritage under the Underwater Cultural Heritage Act 2018* (Cth) (UCH Act), expert advice and community expectations	Benefits outweigh cost/sacrifice.	Yes **C 3.2**
	Report any potential UCH finds to relevant stakeholders and authorities in accordance with the Unexpected Finds Procedure, UCH Act and the *ATSIHP Act*.	F: Yes CS: Minimal costs associated with reporting process.	Meets legislative requirements and community expectations.	Benefits outweigh cost/sacrifice.	Yes **C 3.3**
	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 (**C 3.2**).	F: Yes. CS: Minimal cost.	Ensures workforce are suitably aware of legal and process requirements for managing cultural features and heritage values.	Benefits outweigh cost/sacrifice.	Yes **C 3.4**
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 planned activities are unlikely to result in an impact greater than negligible. Impacts to corals from an unplanned loss of well containment has been evaluated as having a 'high' risk rating. As per Section 2.6.3, 'high' (A1) risk ratings are considered acceptable if ALARP is demonstrated using good industry practice, company and societal values and risk based analysis are considered, if legislative requirements are met and societal concerns are				

[110] 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.

accounted for, and the alternative control measures are grossly disproportionate to the benefit gained. Refer to section 6.7.3 for a detailed description of acceptability.

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 4.9**. While the EMBA may overlap the Ancient Landscape impacts are predicted to be localised in the release area with the majority of hydrocarbons expected to remain within the upper water column. While the PAA overlaps the Ancient Landscape, Woodside has:

- consulted with Traditional Owners to identify concerns associated with activities of this EP in Commonwealth waters and none were identified, including no concerns raised over the PAA overlap on the Ancient Landscape (see **Appendix F, Table 2**).
- implemented additional controls **(C 30.1)** and performance standards (**30.1.1**) into the EP to further manage potential risks and impacts to cultural heritage.
- undertaken an archaeological desktop review (refer to **Section 4.9** and **C 3.1**) and implemented an unexpected finds procedure **(C 3.2).** Prior to starting work in water depths <130m, a desktop assessment will be undertaken by a suitably qualified marine archaeologist using existing survey data, to identify known or potential underwater cultural heritage in parts of the PAA. Therefore, the activity is not inconsistent with *Underwater Cultural Heritage Guidance for Offshore Developments* and the *DRAFT Guidelines to Protect Underwater Cultural Heritage* under the *UCH* Act.

In addition, 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 affect (**Appendix H**).

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[111]

EPO	Adopted Control(s)	EPS	MC
EPO 30 No impact to cultural features and heritage values, as stated in Table 4-21, greater than a consequence level of F from planned activities.	**C 30.1** Apply a 'living heritage management approach. Woodside seeks advice and incorporates Traditional Custodian cultural knowledge across our activities. Cultural safety considerations are factored for our workforce and the Traditional Custodian community.	**PS 30.1.1** Woodside will continue to give voice to Traditional Custodians to identify interests, transmit information and express concern.	**MC 30.1.1** Records demonstrate Change Management and Management of Knowledge processes have been followed where new controls or management measures identified.
		PS 30.1.2 Woodside will assess and where deemed practicable will implement appropriate cultural protocols where requested by Traditional Custodians.	**MC 30.1.2** Records demonstrate Woodside implemented cultural protocols as requested.
	C 30.2 Project inductions to all relevant marine crew, prior to the individual commencing the activity, will include information on cultural features and heritage values,	**C 30.2.1** All relevant marine crew have completed Project inductions that include information on cultural values, including tangible	**MC 30.2.1** Records demonstrate all relevant marine crew have completed inductions that include cultural material.

[111] As marine ecosystems may hold both cultural and environmental value (see Section 4.9), 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 Section 6.6, 6.7 and 6.8 will reduce impacts to cultural features and heritage values including marine species and habitats.

	including tangible and intangible cultural heritage.	and intangible cultural heritage for awareness.	
EPO 3 Refer Section 6.6.2	**C 3.1** Refer Section 6.6.2	**PS 3.1** Refer Section 6.6.2	**MC 3.1** Refer Section 6.6.2
	C 3.2 Refer Section 6.6.2.	**PS 3.2** Refer Section 6.6.2	**MC 3.2.1** Refer Section 6.6.2
	C 3.3 Refer Section 6.6.2	**PS 3.3.1** Refer Section 6.6.2	**MC 3.3.1** Refer Section 6.6.2
	C 3.4 Refer Section 6.6.2	**PS 3.4.1** Refer Section 6.6.2	**MC 3.4.1** Refer Section 6.6.2

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 Petroleum Activities Program 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 Petroleum Activities Program 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 carried out in accordance with relevant legislation and internal environment standards, management measures (i.e., controls) identified in this EP and internal environment standards and procedures (**Section 6**).

The systems, practices and procedures that are implemented are listed in the Performance Standards (PS) 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.

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 Petroleum Activities Program 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 to ensure production is carried out in a safe, efficient, reliable and economic manner, and that all required process variables are within allowable limits. This ensures 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 to ensure 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.

7.2.1.2 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.

7.2.1.3 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, to ensure 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 **7.2.6** 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 SCQs.

7.2.2 Process Safety Management

To ensure 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 to ensure that PSM is integrated through the organisation. There are twenty PSM requirements. The focus areas and requirements are shown in **Figure 7-1**.

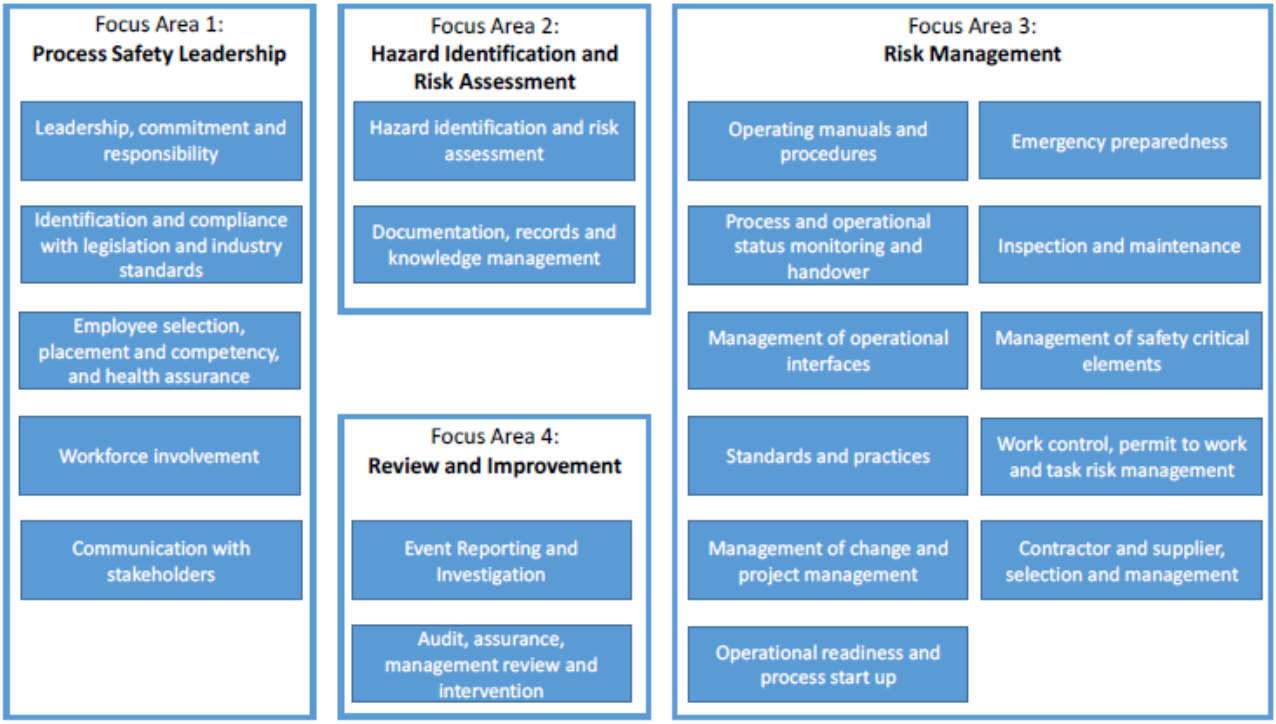


Figure 7-1: Process safety management focus area

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.

Theme	Everyone	Supervisors	Managers/Executives
Standards	Follow rules	Ensure compliance	Set high standards
Communication	Speak up	Encourage the team	Communicate openly
Risk management	Be mindful	Promote risk awareness	Confront risk
Involvement	Get involved	Involve the team	Involve the workforce

Figure 7-2: Woodside 'Our Safety Culture' framework

7.2.3 Woodside Invasive Marine Species Risk Assessment Process

7.2.3.1 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)112 or PAAs defined in environmental approvals
- 'new build' vessels launched less than 14 days prior to mobilisation
- vessels or immersible equipment which 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 zone113. Vessels, or 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 (AFC114).

7.2.3.2 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).

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.

112 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).
113 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).
114 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/50m water depth) did not exceed consecutive 7 days or the period of time the vessel or immersible equipment has spent within the locally sourced zone exceeds 1 year (i.e., the risk of introducing a species from a different location has already passed).

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).
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 nm 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 metres 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:

- having a suitably qualified and experienced IMS inspector inspect (desktop, in-water or dry dock) 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
- applying in-water or dry dock cleaning of the hull and other niche areas, typically applied where the risk assessment outcome is High risk driven by the age of the AFC on the vessel and its time spent in similar climatic region ports
- treating vessels. internal seawater systems, 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); applicable for Uncertain risk vessels only
- rejecting the vessel.

Project vessels and immersible equipment are required to be a low risk of introducing IMS prior to entering the PAA.

7.2.4 Risk Management

Risk management processes and practices are applied on an ongoing basis to design, production and maintenance activities at the Angel facility to manage risks to personnel, assets and the environment.

Potential environmental consequences and impacts from the Angel 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 Angel 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 Angel 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; e.g., Hazard Identification and Risk Assessments, Level 2 Risk Assessments, Operational Risk Assessments, the technical MoC system (Section 7.2.5), 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 Angel 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 Petroleum Activities Program 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 this section, ensure the environmental impacts and risks of the activity continue to be identified and reduced to a level that is ALARP.

7.2.4.1 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.

7.2.4.2 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 7.2.5.2**) 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).

7.2.4.3 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 7.2.5.2**) is undertaken to confirm if the level of environmental risk warrants revision and resubmission of an EP.

7.2.4.4 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 Well Operations Management Plan to demonstrate that well integrity risks are managed to ALARP levels. Wells tied back to the facility are managed under a WOMP.

7.2.4.5 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.

More details on vessel assurance and the communication of environment requirements to vessels are provided in **Section 7.8.2**.

Vessel masters are required to request clearance from the facility OIM delegate prior to entering the 500 m PSZ.

7.2.4.6 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 the 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 Change Strategy.

Implementation of the GHG Emissions and Energy Management Procedure assists in meeting external expectations, such as Woodside's 2025 (-15%) and 2030 (-30%) emissions reductions targets and aspiration to be net zero by 2050. It also aligns with corporate commitments, such as the Zero Routine Flaring Initiative for oil assets and the OGMP, OGCI Near-Zero and Methane

Guiding Principles. These methane reduction commitments aim to improve methane emissions inventorisation, materiality assessments, evaluation, reduction implementation and increased transparency through reporting. The Woodside Flare Framework is an optional 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 company 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. The requirement to set, measure and track fuel and flare targets for assets help manage the emissions to meet the EPS requirements in **Section 6.6.10**.

7.2.4.7 Production Optimisation and Opportunity Management

Woodside's Production and Opportunity Management Procedure 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 7-3**.

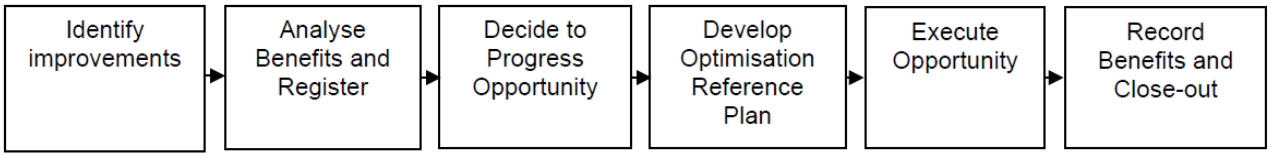


Figure 7-3: Opportunity management workflow

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.

7.2.4.8 Flare Target Setting

In demonstrating the risks and impacts relating to flaring have been reduced to ALARP, flare targets for the facility are set annually in accordance with Woodside's Greenhouse Gas, Energy and Flare Target Setting Guideline. Targets are estimated based on operating 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 EP flare estimates. If estimate is likely to be exceeded, an EP management of change assessment (see **Section 7.2.5**) is undertaken to determine if a revision and resubmission is required.

7.2.4.9 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 6.7.8**, 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.

7.2.5 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 7-4**. The hierarchy has been developed with sub-processes to address the different types of change performed at Woodside.

Figure 7-4: 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.

7.2.5.1 Technical Change Management

Technical changes within the Operations Division are managed using the Management of Change – 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 7.2.6** 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 management of change requirements contained in the Process Safety Management Procedure and Management System Performance Standard M05 Management of Change 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 Management of Change MSPS (M05) is in place to assure process safety risks arising from change (temporary and permanent) are systematically identified, assessed and managed.

7.2.5.2 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 regulation 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 regulation 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 regulation 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, etc), 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.

7.2.5.3 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 regulation 38 and 39 to determine if EP, including OPEP, resubmission is required (see **Section 7.2.5.2**). Changes with potential to influence minor or technical changes to

the OPEP are tracked in management of change records, project records and incorporated during internal updates of the OPEP or revisions to the EP.

7.2.6 Management of Safety and Environment Critical Element Technical Performance Standards and Management System Performance Standards

7.2.6.1 Management System Performance Standards

Woodside ensures safety critical management processes function as required through the application of management system performance standards. MSPS 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 Woodside Management System.

7.2.6.2 Safety and Environment 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, or 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 and verifies/optimises SCEs by applying SCE technical Performance Standards as described in the Safety and Environment Critical Element (SCE) Management Procedure. Key elements of the procedure are summarised in **Table 7-3**.

Table 7-3: Safety and environment critical element management procedure summary

Identify/Develop	**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	**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 7.2.1.3**).
Maintain/Assure	**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. **Response 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 7.1.4**). **Internal Reporting** – SCE failure/damage and SCE demands must be reported in accordance with the Health Safety and Environment Event Reporting and Investigation Procedure (**Section 7.11.4**). **External Reporting** – 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 7.11.5**). **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 in revealing failures and to allow predictive maintenance.
Verify/Optimise	**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 Change Management Procedure (**Section 7.2.5**).

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 carried out by the operator to confirm that the SCE meets, or will meet, its SCE technical 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 (defined as Technical Integrity). Management systems are in place to manage the completion of maintenance including that required for Technical Integrity assurance.

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 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 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 7.2.5**). 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.

7.3 Woodside’s Decommissioning Framework

Decommissioning is normal, 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 activity
- 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 is aligned 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. Planning for complete removal is generally the base case for offshore decommissioning operations. Section 572 (7) and Section 270 (3) of the OPGGS Act provide scope for in situ decommissioning or other arrangements to be made where it can be demonstrated that the risks and impacts are ALARP and acceptable. If complete removal or other arrangements for decommissioning are planned, the proposed alternative presented in an EP must comply with all other Acts and legislation.

7.3.1 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, as a base case, full removal.

7.3.2 Facility Decommissioning Planning

Decommissioning planning generally commences two to 10 years prior to cessation of production (**Figure 7-5**). The timeframe selected for decommissioning planning depends on the complexity of the facility and infrastructure requiring decommissioning.

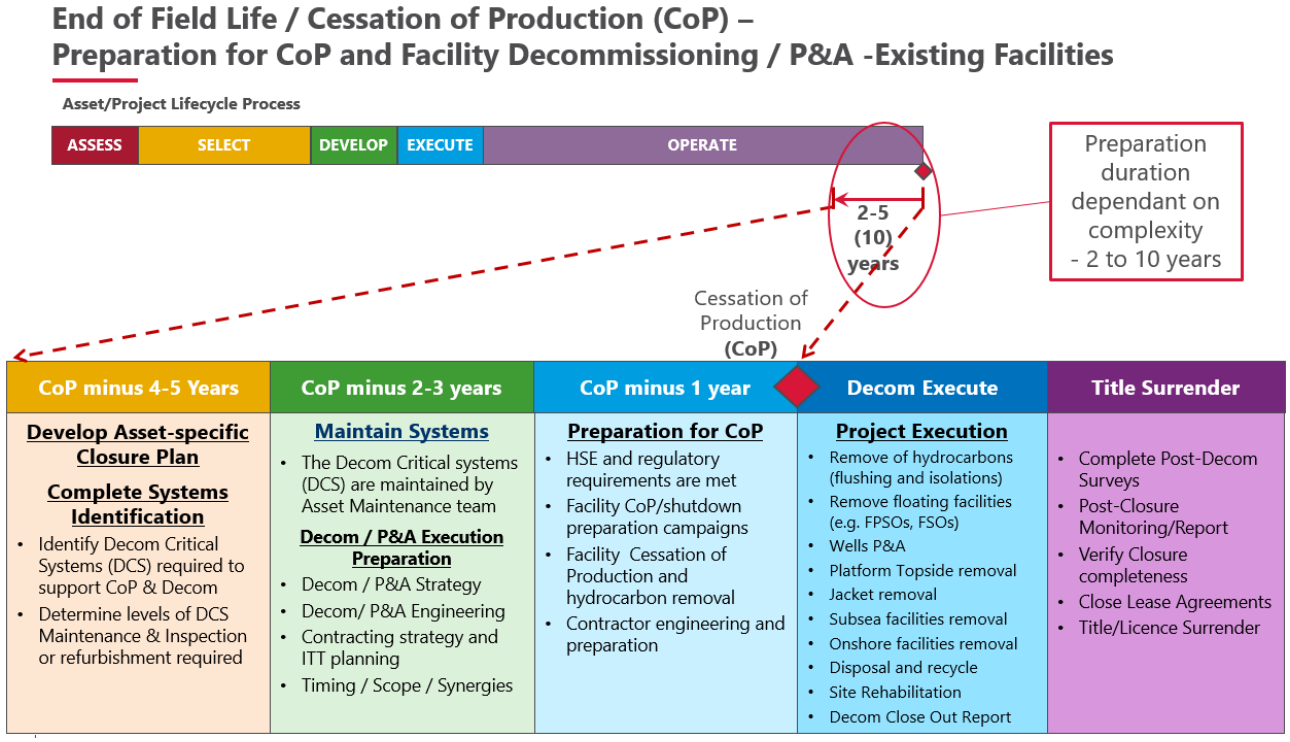


Figure 7-5: Woodside's process for decommissioning planning

7.3.3 Angel Field Inventory

The layout of Angel subsea infrastructure is shown in **Figure 7-6** and detailed in **Table 7-4**. Decommissioning planning for infrastructure no longer in use is described in **Section 7.3.4**.

Table 7-4: Inventory of subsea wells and key infrastructure, including status

Infrastructure	Quantity/length	Details	Status	Removed under this EP?	Subject to Future EP?
Stage 1 Decommissioning					
Wells	3 development wells (AP2, AP3, AP4)	Wellheads and trees	Maintained for decommissioning	No	Yes – NWS P&A EP
Rigid pipeline	3 14-inch with asphalt enamel coating (6.5 mm)	Total length = 6.5 km		No	Yes – Angel Flowline & Umbilical Removal EP
Rigid spools	8			No	
Umbilicals	3	Total length = 7.3 km		No	
Umbilical termination assembly (UTA)	3	Weight = 6740 kg each		No	
Hydraulic and electrical flying leads (HFL/EFL)	9			No	
Stage 2 Decommissioning					
Angel Export Pipeline	1 30-inch rigid pipeline 4 rigid spools 1 power umbilical 1 pig launcher/receiver 1 valve station	Total length 49 km	Maintained for production	No	Yes – future EP yet to be determined
Lambert Deep Subsea Equipment	3 14-inch rigid pipeline 8-inch flexible jumper 1 umbilical 2-slot manifold 1 UTA 3 HFL/EFL	Total length 14.9 km		No	Yes – future EP yet to be determined
Angel Platform	Topside Jacket Risers	Total weight = 16,405 tonnes		No	Yes – future EP yet to be determined

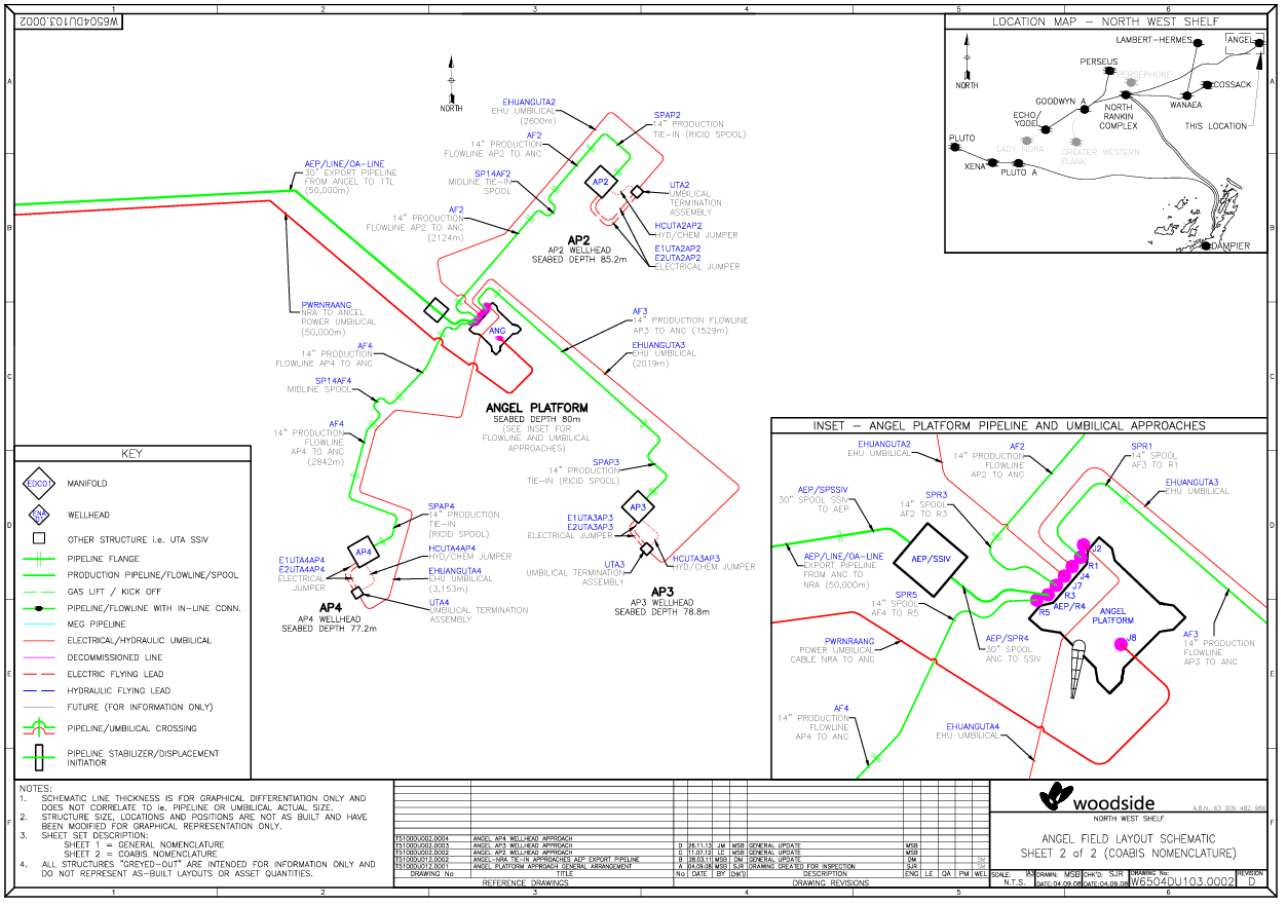


Figure 7-6: Angel subsea infrastructure layout

7.3.4 Angel Decommissioning Phasing

The decommissioning of the Angel asset is being considered in two stages:

- Stage 1: covers the decommissioning of the Angel subsea wells (AP2, AP3 and AP4) and the associated subsea infrastructure with these three wells.
- Stage 2: considers the decommissioning of the Angel platform and Lambert Deep and Lambert West wells and subsea infrastructure.

In December 2020, production ceased from the Angel subsea wells. The three wells and subsea system have been shut in, and their pressure integrity is being monitored to manage the risk of Loss of Containment. Woodside is progressing studies in support of the Stage-1 decommissioning of those subsea wells and associated subsea infrastructure.

The platform remains a production asset, with brownfield modifications undertaken to enable tie in of the Lambert Deep field. This stage is then being divided up into different phases.

The key milestones for Stage 1 in accordance with decommissioning planning process (**Figure 7-5**) are described below and in the following sections. An indicative overarching Angel decommissioning planning lifecycle and schedule is presented in **Figure 7-8**.

Stage 1 of Angel decommissioning has been incorporated into the North West Shelf (NWS) Gas Decommissioning Program to plug and abandon redundant wells and removal redundant equipment. Further information is outlined in the 2023 NWS Gas Offshore Asset Closure Management Plan.

Stage 1 (Angel subsea wells and subsea infrastructure) – Key Milestones

2022

- Systems Identification & Maintain Systems:
  - completed identification of decommissioning critical systems.
- Decommissioning Execution Preparation:
  - commenced Concept Definition for the permanent plug and abandonment of the Angel subsea wells (AP2, AP3 and AP4)
  - completed technical engineering studies in support of assessing removal options, timing and synergies with other planned decommissioning activities, including consideration of removal over live infrastructure.

2023/24

- Decommissioning Execution Preparation:
  - complete Concept Definition for the plug and abandonment of the Angel subsea wells (early 2024)
  - commenced contracting in support of target execution windows for both plug and abandonment of Angel subsea wells and Angel flowlines flushing (separate contracts)
  - develop NWS Phase 1 Plug and Abandonment EP (which includes the plug and abandonment of three Angel wells AP2, AP3 and AP4). Submission of this EP to NOPSEMA for assessment is currently scheduled for January 2025.

2024/25

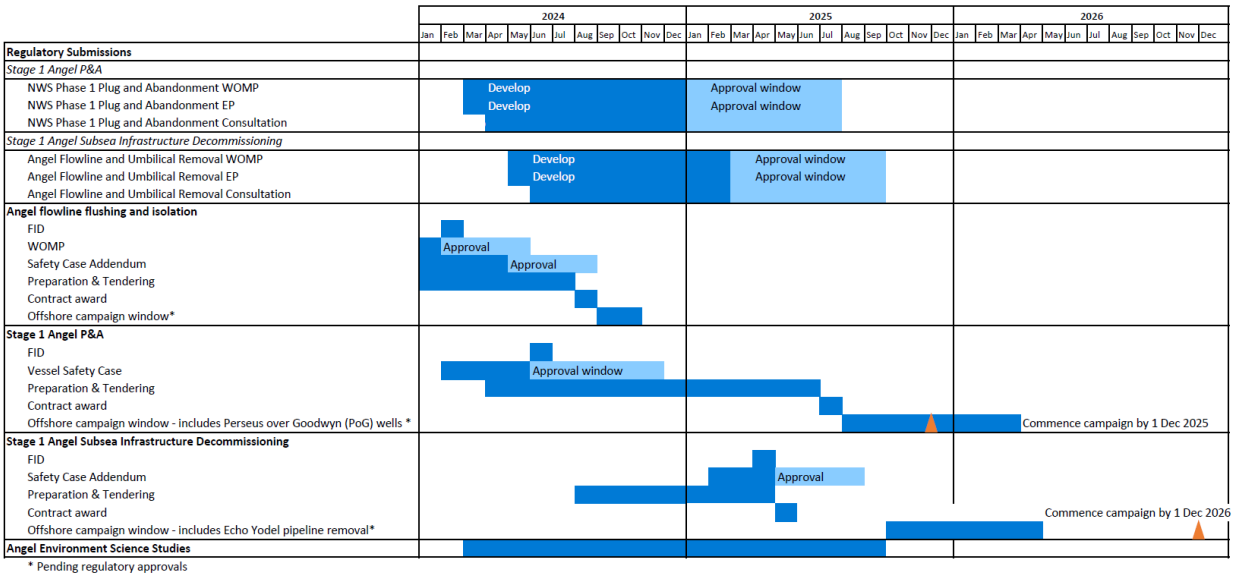
- Decommissioning Execution Preparation:
  - complete contracting for Angel flowline flushing and plug and abandonment of Angel subsea wells

    plan for executing subsea infrastructure removal and waste disposal
  - develop Angel Flowline and Umbilical Removal EP. Submission of this EP to NOPSEMA for assessment is currently scheduled for March 2025.
- Project Execution:
  - flush and preserve Angel flowlines (Section 3.4.15.8)
  - target execution window for plug and abandonment campaign for Angel wells AP2, AP3 and AP4, shown in Figure 7-7 below, currently planned to commence by 1 December 2025.

2025/26

- Decommissioning Execution Preparation:
  - complete contracting for NWS Rigid Flowline Removal Campaign, which includes Angel flowline and umbilical removal and Echo Yodel pipeline removal.
- Project Execution:
  - target execution window for Angel flowline and umbilical removal campaign shown in **Figure 7-7** below, currently planned to commence by 1 December 2026.

Figure 7-7: Current Angel Stage 1 decommissioning schedule (subject to change)



Stage 2 (Angel platform, Lambert Deep and Lambert West wells and associated subsea infrastructure and Angel Export Pipeline) – Early Milestones

It is anticipated the Develop/FEED phase for Stage 2 of Angel Decommissioning will commence in 2024, three years before expected cessation of production (**Section 3.3**), with the commencement of early studies (planned for 2023/24) to comprise of:

2022/23/24

- Systems Identification and Maintain Systems:
  - identified decommissioning critical systems and development of Angel Decommissioning Maintenance Plan.
- Decommissioning Execution Planning:
  - environmental and scientific studies on the impact of the infrastructure on the marine environment.
  - assessment of options in support of decommissioning activities including:
    - topsides removal
    - jacket decommissioning in-situ or removal
    - subsea equipment preservation and removal options
    - study for isolation, flushing, preservation and decommissioning of the Angel export pipeline (AEP)115.

115 If permanent isolation of the AEP from the 1TL could be safely achieved at 1TL Isolation Skid, then the decommissioning of the AEP will be included into the targeted Angel Subsea Infrastructure decommissioning campaign. If the permanent isolation to 1TL could not be safely achieved then the AEP will be flushed, preserved, capped and left in place for decommissioning with 1TL, after NRC cessation of production (CoP); the NRC CoP is estimated to be around 2038.

7.3.4.1 Stage 1 – Angel Plug and Abandonment Planning

Prior to ceasing production from the Angel wells (AP2, AP3 and AP4), Woodside initiated studies on the permanent plug and abandonment of the three wells. The following engineering and study outputs are underway to inform Concept Definition for Stage 1 – Angel plug and abandonment planning:

- Angel Environmental Science Program: demonstration and quantification of habitat retention to provide insights to inform Stage 2 decommissioning decisions
- Angel Facilities Removal studies: pre-assess scope to gain insights into decommissioning methodology, costs, schedule, risks and opportunities for removal of the Angel platform to support future project initiation
- North West Shelf Redundant Wells Plug and Abandonment Define (includes Angel and Perseus over Goodwyn wells): P&A of redundant wells planned as an option on the TransOcean Endurance campaign
- North West Shelf Redundant Equipment Flushing and Removal Define (includes Angel flowline and umbilical removal): flushing subsea ahead of redundant wells P&A, removal post P&A.

The subsurface studies in support of the abandonment design have been completed, along with technical well engineering studies for well re-entry and abandonment. The plug and abandonment project is currently in the Decommissioning Execution Preparation phase (**Figure 7-5**).

Execution of the Angel plug and abandonment campaign is anticipated to start no later than 1 December 2025, with options being assessed to accelerate this schedule. This timing is aligned with Industry Good Practice (OGA, 2018; OGUK, 2018, 2019), is supported by ongoing well integrity monitoring and consistent with previous decommissioning commitments. Permanent plugging of the Angel wells is expected to be part of a larger, five to seven well campaign. Exact timing of the activity will be determined by a number of factors including commercial negotiations and rig availability.

The wells are monitored and maintained in accordance with the Woodside Well Integrity Management Process for production wells, also described in **Section 3.4.15**. Monitoring of the three Angel wells continues as per the approved WOMP and well integrity management procedure (**Section 3.4.15**).

7.3.4.2 Stage 1 – Angel Subsea Infrastructure Decommissioning Planning

7.3.4.2.1 Systems Identification and Maintain Systems

In accordance with Section 572 (2) of the OPGGS Act, all infrastructure in the title area and used in connection with the operations must be maintained in good condition and repair. Equipment associated with the Angel wells and subsea system will continue to be inspected, monitored and maintained in accordance with the Woodside Asset Maintenance and Inspection regime for producing infrastructure, as described in **Section 3.4.15**.

The Angel subsea flowline system commenced operation in 2008 and has a design life of 20 years. The subsea system has been inspected regularly, based on the RBI procedure developed specifically for the Angel facility to facilitate a plan for full removal in accordance with Section 572 (3) of the OPGGS Act. Inspections undertaken in 2019 of the corrosion protection systems confirms that the three flowlines have sufficient integrity forecast until between 2030 to 2119.

7.3.4.2.2 Decommissioning Execution Planning

Woodside is in the early planning phase for decommissioning Angel subsea infrastructure: progressing technical engineering studies. These studies assess removal options, timing of removal options and synergies with other planned decommissioning activity (**Figure 7-7**). The decommissioning of redundant Angel subsea infrastructure is the subject of a separate

decommissioning EP, Angel Flowline and Umbilical Removal EP. Wells, wellheads and Xmas trees are expected to be covered by the NWS Phase 1 Plug and Abandonment EP. Inspection and maintenance regimes will continue until the timeframe for removal is agreed in a future EP.

7.3.4.2.3 Preparation for Cessation of Production

Preservation Activities

Flushing of Angel flowlines is planned to occur in late 2024 prior to Angel wells permanent plug and abandonment activities (**Figure 7-7**). Flowlines flushing is expected to be conducted from Angel topsides to the reservoir, leaving flowlines temporarily preserved with treated seawater. Although not planned, pigging activities, including provision for installation and recovery of a pig launcher/ receiver, are in scope of this EP if required (**Section 3.4.15.8**).

Flushing and cleaning the flowlines, prior to permanent plugging of the wells, leads to the internal fluid being replaced with preservation fluid. This typically consists of seawater treated with an oxygen scavenger (to inhibit corrosion and prevent chloride stress corrosion cracking (CSCC) in the CRA) and a biocide (to inhibit microbial growth which can lead to corrosion). The concentration of the fluids is calculated to provide internal corrosion protection for the flowlines for an extended duration so flowlines are maintained until they are decommissioned.

Leaving the Angel subsea infrastructure *in situ* under these conditions and meeting these maintenance requirements, satisfies the requirements of Section 572 of the OPGGS Act.

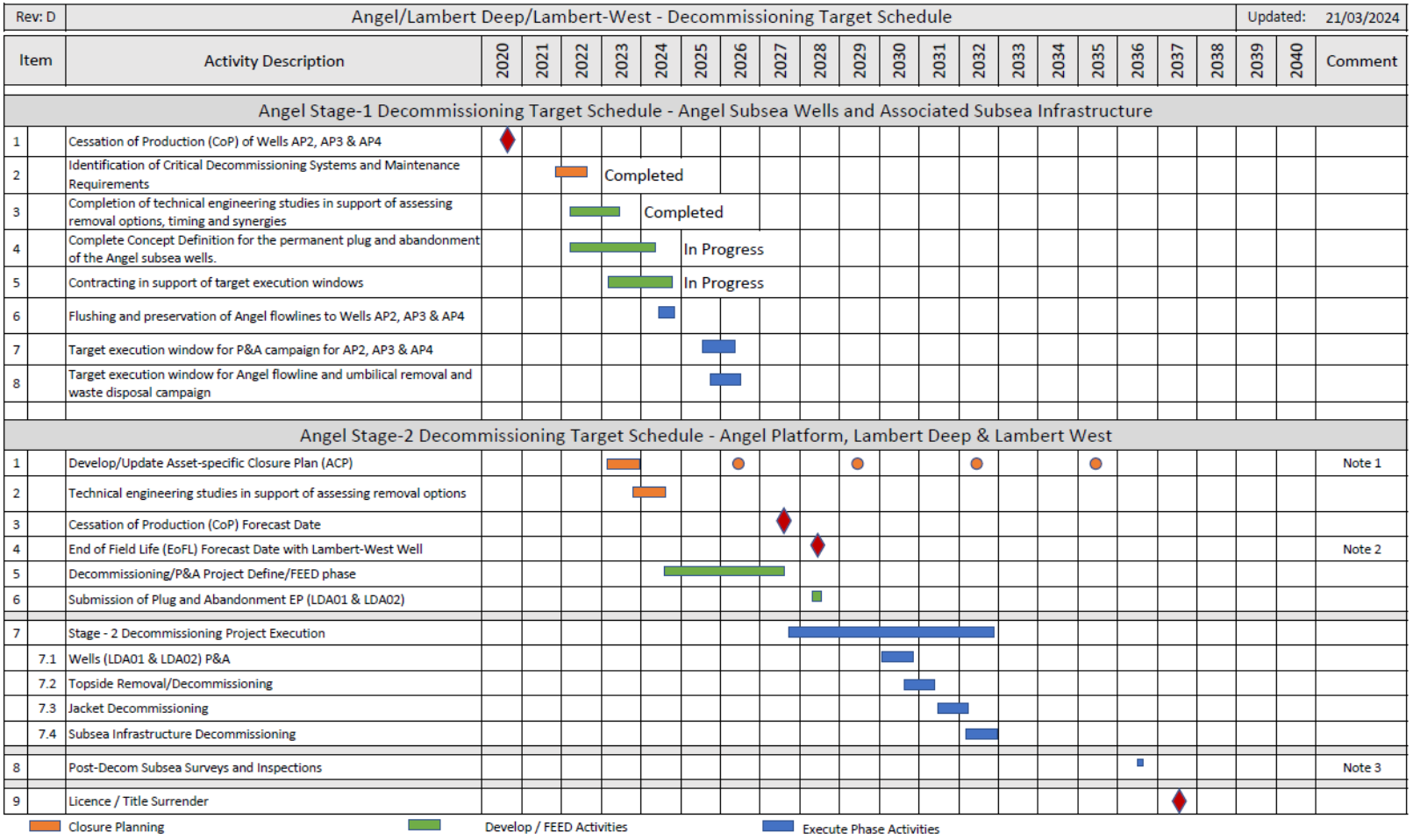
7.3.4.3 Stage 2 – Angel Facility Decommissioning Planning

Production from the Lambert Deep and Lambert West reservoirs is expected to continue until ~2027[116], thereby extending the life of the Angel Platform until that time (**Figure 7-8**). Woodside proposes to decommission the Angel Platform (including Lambert Deep and Lambert West infrastructure) with an indicative field implementation start date shortly after cessation of production. Decommissioning planning has commenced, which is four to five years prior to Lambert Deep and Lambert West reservoir cessation of production.

7.3.4.3.1 Systems Identification and Maintain Systems

Woodside is developing an Angel Decommissioning Maintenance Plan, to identify decommissioning critical systems as well as any additional maintenance and inspection requirements to comply with the requirements of Section 572(2), (3) and (7) and 270(3) of the OPGGS Act. The Angel Decommissioning Maintenance Plan will aim to ensure decommissioning critical systems and any additional maintenance and inspection requirements are in place until Angel facilities are decommissioned.

116 Expected end of field life will be updated post drilling of Lambert West, and is continuously reviewed during production life.



Notes:

1) The Angel Asset Closure Plan (ACP) is updated regularly, every three years, or more frequently if major changes to the Asset occur.
2) Project for Lambert-West development (1 Well) is in pre-FID phase. When developed it may slightly extend the Angel EoFL /CoP, to mid-2028.
3) Post closure monitoring plan assumes that final survey is completed within 2 to 5 years post completion of all decommissioning activities.

Figure 7-8: Holistic Angel decommissioning planning lifecycle and schedule

7.4 Organisation Structure

The following Woodside organisational structure provides leadership and direction for operation of the Angel facility and environmental performance:

- The Executive Vice President Operations (EVP) reports to the Chief Executive Officer.
- The NWS Vice President (VP) reports to the EVP Operations.
- The Asset Manager reports to the NWS VP.
- Angel PIC reports to the Asset Manager.
- The functional support teams report to the corresponding Functional VP.
- All production facilities are supported by a team of environmental professionals who report to the Environment 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.

7.5 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 7-5**. Roles and responsibilities for hydrocarbon spill preparation and response are outlined in **Table 7-5**, **Appendix D** and the *Woodside Oil Pollution Emergency Arrangements (Australia)*.

It is the responsibility of all Woodside employees and contractors to apply the Woodside *Corporate Health, Safety, Environment and Quality Policy* (**Appendix A**) in their areas of responsibility and that the personnel are suitably trained and competent in their respective roles.

Table 7-5: Roles and responsibilities

Title (role)	Environmental responsibilities
All Personnel	
All offshore-based personnel and onshore support 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, PSs 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 7.7.1 of 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 7.7.1 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 7.7.1 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.

Title (role)	Environmental responsibilities
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 preparation of 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.
Asset Manager	• Be accountable for ensuring all necessary regulatory approvals are in place to operate. • Approve (decide 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 is 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.
Asset Superintendent	• Be responsible for the operation of the facility in accordance with legislative/regulatory requirements (including this EP) and the WMS. • Decide on technical decisions where required based on assessed current level of risk. • Be accountable for aspects of integrity management. • Communicate changes relevant to the EP to the Production Environment team. • Be accountable for conformance to production Operations processes including ISSoW.
Technical Support Lead	• Be responsible for safeguarding process safety with respect to the asset. • Ensure technical integrity risks are identified, managed and reduced to ALARP. • Recommend technical decisions where required based on assessed current level of risk.

Title (role)	Environmental responsibilities
Integrity Authorities (Technical Integrity Custodians, Technical Authorities and Engineering Authorities)	• Agree technical integrity decision based on assessed current level of risk when discipline owner • Undertake process safety responsibilities as defined under the Woodside process safety framework.
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 revision to the EP 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.
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.
Corporate Affairs Adviser	• Prepare and implement the Consultation Plan for the Petroleum Activities Program. • Report on consultation. • Perform ongoing liaison and notification as required as per Section 7.9.
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, the Woodside CIMT Deputy Incident Commander shall: • 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.
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. Close out of actions is communicated to the Well Site Manager.

Title (role)	Environmental responsibilities
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.
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.

Title (role)	Environmental responsibilities
Offshore-based Personnel	
NRC Offshore Installation Manager (OIM)	• Be in charge of the Angel facility and the field. • Be accountable for implementation of the EP at the facility. • Ensure offshore personnel comply with regulatory/legislative requirements (including the EP) and the WMS. • Be responsible for Area Operations compliance with Technical Integrity requirements including Management of Change process, Permit to Work process and MOPO and process safety requirements. • Be the single point responsible person for the coordination of simultaneous activities. • 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. • Decide on technical decisions where required based on assessed current level of risk. • Communicate changes relevant to the EP to the Environment team. • Be accountable for the performance and development of direct reports, ensuring operator capability and competency across all shifts and ensuring the skill requirements of the Operations division are being met. • Lead response efforts (as Level 1 Incident Controller, refer Section 7.12) in managing emergency or crisis scenarios. • Ensure exercises and drills are conducted in a manner to assure the facility's ability to respond effectively to an emergency.
Angel Person in Charge (PIC) (offshore staffed mode)	• Manage work in accordance with the Offshore Safety Manual. • Control and execute all facility activities within the Angel PAA. • Provide and apply the EP for all work scopes. • Manage and coordinate the permit to work process and Work Permit Authority. • Be responsible for leading and coordinating a multi-disciplined team to perform specific duties required to support the technical integrity of the facility. • Be Level 1 Incident Controller during staffed mode (refer Section 7.12). • Manage and coordinate during emergencies.

Title (role)	Environmental responsibilities
Operations Advisor/ Operations Team Leader/ Execution Superintendent	• Be accountable for the day-to-day operations of the facility including 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 EP. • Be responsible for permitting and isolation for all frontline work activities. • Be responsible for leading and coordinating a multi-disciplined team performing specific duties required to support the facility, including helicopter operations, vessel movements and consumable controls. • Be responsible for following emergency response protocols in accordance with the emergency response procedure and fulfilling allocated emergency response roles.
Angel/NRC Operations 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.
NRC Health, Safety and Environment Coordinator (HSEC)	• 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 OIM 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
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 that 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.

It is the responsibility of all Woodside employees and contractors to implement the Woodside Corporate Health, Safety, Environment and Quality Policy (**Appendix A**) in their areas of responsibility and that the personnel are suitably trained and competent in their respective roles.

7.6 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 Principal Heritage Adviser.
- 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 Principal Heritage Adviser.
- Woodside's Principal Heritage Adviser 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 underwater cultural heritage, Woodside's Principal Heritage Adviser 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 Principal Heritage Advisor 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 Principal Heritage Adviser 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 Principal Heritage Adviser 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.

7.7 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 Petroleum Activities Program as part of the pre-mobilisation process. The assessment determines whether there is a clearly defined organisational structure that clearly defines the roles and responsibilities for key positions. The assessment also assesses 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 Angel facility and MODU personnel, detailing awareness and compliance with the Angel facility, MODU and project vessel Contractor's environmental policy and environmental management system.

7.7.1 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 Petroleum Activities Program 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, Safety and Environment Policy
- 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 7.6).

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.

7.7.2 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 Angel facility, MODU and project vessels which cover all crew. During these meetings, recent environmental incidents are regularly reviewed, and awareness material presented.

7.7.3 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 12 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 six 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 Facility 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.

7.7.4 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 licences 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.

7.7.5 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 7.12**.

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 to ensure 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.

7.7.6 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 Angel 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. This includes the identification and development of approved competency and non-competency-based courses, identification of relevant personnel required to undertake training and ensuring training records are maintained. Minimum Woodside capabilities will continue to be identified and documented.

7.7.7 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 the following environmental information:

- 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 presented.

7.7.8 Management of Training Requirements

All personnel on the Angel 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.

7.8 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.

This section of the EP outlines the measures undertaken by Woodside to regularly monitor the management of environmental risks and impacts of the Angel facility against the EPOs, EPSs and MCs, with a view to continuous improvement of environmental performance. The effectiveness of the implementation strategy is also reviewed periodically as part of the monitoring and assurance process.

7.8.1 Monitoring

Woodside and its contractors will perform a program of periodic monitoring during the Petroleum Activities Program – starting at mobilisation of each activity and continuing through the duration of each activity to activity completion. This information will be collected using the tools and systems outlined below, developed based on the EPOs, controls, standards and MC in this EP. The tools and systems will collect, as a minimum, the data (evidence) referred to in the MC in **Section 6** and **Appendix D**.

The collection of this data (against the MC) will form part of the permanent record of compliance maintained by Woodside and will form the basis for demonstrating that the EPOs and standards are met, which will be summarised in a series of routine reporting documents.

7.8.1.1 Source-based Impacts and Risks

The tools and systems to monitor environmental performance, where relevant, will include:

- daily reports which 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 and unplanned discharges downhole (in the well), to ocean and atmosphere
- monitoring of progress against the Drilling and Completions function and Operations Division scorecards for KPIs
- internal auditing and assurance program as described in **Section 7.8.2**.

Throughout this activity, Woodside will continuously identify new source-based risks and impacts through the Monitoring and Auditing systems and tools described above and in **Section 7.8.2**.

Other examples of assurance tasks implemented through the EP include (as an example):

- start of shift operator walk arounds
- 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)
- ongoing maintenance performance assurance (e.g., conformance dashboard)
- management system performance audits reviews (e.g., MSPSs) (Section 7.8.2)
- data gathering and governance dashboard presentations (e.g., Woodside Integrated Risk and Compliance System).

7.8.1.2 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.
- Socio-economic environment and stakeholder information – update checks conducted via desktop reviews: scientific literature, government publications and Woodside consultation; and,
- Environmental legislation – monitoring 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. Communication of relevant new knowledge is addressed at the EP Consolidation meetings where changes in knowledge prompt a consideration of management of change, this 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 Management of Change Process (refer to **Section 7.2.5**).

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.

7.8.1.3 Management of Newly Identified Impacts and Risks

New sources of receptor based impacts and risks identified through monitoring and auditing systems and tools and the Woodside Environment Knowledge Management System are assessed using the Change Management Process (**Section 7.2.5**).

Table 7-6: Summary of emissions and discharges monitoring for the Petroleum Activities Program

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 6.6.10**
	Fuel gas and flare intensity	Normally continuous process metering/monthly reviews	Fuel and flare flowmeters inform intensity profiles – tracked against optimisation targets	**Section 6.6.10**
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 6.6.4**
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 6.6.4**
Discharge of produced water	Volume discharged overboard	Normally continuous process indication/monthly review	PW flow meter(s), process estimation	**Section 6.6.7**
	OIW concentration of discharged PW	Normally continuous process indication/monthly review	Normally continuous process metering/monthly review	
	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 6.8.7**
Unplanned Emissions and Discharges				
Unplanned emissions and discharges	Nature of release	As required	HSEQ Event Reporting System (First Priority)	**Sections 6.7 and 6.8**

7.8.2 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 that 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 auditing will be performed to cover each key project activity as summarised.

7.8.2.1 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 environment audits quarterly during the Petroleum Activities Program, 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 tracked through the MODU or vessel compliance action register, a contractor register between the MODU operator or vessel contractor and Woodside.

7.8.2.2 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 operational 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, etc).
- Annual inspection of Woodside's long term hire subsea support vessels are undertaken to ensure compliance with both the EP and the approved Contractor Management system.

The internal audits and reviews, combined with the ongoing monitoring described in **Section 7.8.1**, 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 7.8.3**.

7.8.2.3 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.

7.8.2.4 Annual Offshore Inspection/Desktop Review

An inspection/review of the Angel facility is undertaken every calendar year by the Production 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).

7.8.2.5 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., <3 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
- 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, and are not limited to:

- 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 7.8.2.6**).

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 Angel 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.

7.8.2.6 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.

7.8.3 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.

7.8.4 Review

7.8.4.1 Management Review

Within the Environment Function, 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 team environment KPIs (leading and lagging)
- tools and systems to monitor environmental performance (detailed in Section 7.8.1)
- lessons learned about implementation tools and throughout each campaign.

Reviews of oil spill arrangements and testing are performed in accordance with **Section 7.12.7**.

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 (detailed in **Section 7.8.1**)

Reviews of oil spill arrangements and testing are performed in accordance with **Section 7.12.7**.

7.8.4.2 Program of Ongoing Engagement with Traditional Custodians

Woodside will undertake an annual review of the Program of Ongoing Engagement with Traditional Custodians (**Appendix I**) 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.

7.8.4.3 Learning and Knowledge Sharing

Learning and knowledge sharing occurs via a number of 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.

In the event that activities described in this EP do not occur continuously or sequentially, before recommencing activities after a cessation period greater than 12 months, impacts, risks and controls will be reviewed.

The process will identify or review impacts and risks associated with the newly-commencing activity, and will identify or review controls to ensure impacts and risks remain/are reduced to ALARP and acceptable levels. Information learned from previous activities conducted under this EP will be considered. Controls which have previously been excluded on the basis of proportionality will be reconsidered. Any required changes will be managed by the MOC process outlined below (**Section 7.2.5**).

7.8.4.4 Continuous Improvement

Continuous improvement (CI) 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 CI 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 CI 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 CI Project, if relevant.

7.9 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.

7.10 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 7-7**. Relevant new information identified during ongoing consultation will be assessed using the EP Management of Knowledge (refer to **Section 7.8** and Management of Change Process (refer to **Section 7.2.5**).

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 7.8.1.2**) and Management of Change process (refer to **Section 7.2.5**), as appropriate.

Woodside has developed a Program of Ongoing Engagement with Traditional Custodians (**Appendix I**)**,** 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 O&G 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 specific activities as part of ongoing consultation regarding the activity are planned with Traditional Custodian Relevant Persons. These are described in **Appendix I**. Where Traditional Custodian relevant persons have requested information or further engagement considered as ongoing consultation, but have not requested a framework agreement,

these requests have been captured in **Table 7-7**. However, a framework agreement may still be initiated by these groups at any time.

Table 7-7: Ongoing consultation engagements

Report/ information	Recipient	Purpose	Frequency	Content
Notification (email)	AHO	As requested by AMSA during consultation	No less than 4 weeks prior to commencement.	**PS 1.9** (**Section 6.6.1**) 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** (**Section 6.6.1**) Date of activity start.
Update (email)			Provide updates to the AHO and JRCC should there be changes to the activity.	Changes to planned activities.
Notification (email) Updates (email)	AFMA, DAFF – Fisheries, DPIRD, CFA, WAFIC, Recfishwest, Searcher Seismic, and Wanparta	As requested during consultation	No less than 10 days prior to commencement and on completion of activities.	**PS 1.11** (**Section 6.6.1**) Date of activity start and end.
			As required.	Changes to planned activities.
Notification (email)	Other relevant persons	Notification of significant change	As required.	Notification of significant change.
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 (**Section 7.8**) and Management of Change Process (refer to **Section 7.2.5**).
Notification (email)	Australasian Underwater Cultural Heritage Database Any other stakeholders as required in the Unexpected Finds Procedure (**Section 7.6**)	Report any unexpected finds of potential Underwater Cultural Heritage	If triggered by Unexpected Finds Procedure (**Section 7.6**).	Refer to Unexpected Finds Procedure (**Section 7.6** and **C 3.2**).

Report/ information	Recipient	Purpose	Frequency	Content
Program of ongoing engagement with Traditional Custodians (**Appendix I**)	Relevant cultural authorities (**Appendix I**)	Ongoing engagement	Ongoing. Responses to any feedback received by Traditional Custodian groups will be provided by Woodside within four weeks of receipt. Progress on the Program will be reported in line with annual sustainability reporting via the Woodside website.	Assessment of cultural values. Any relevant new information on cultural values will be assessed using the EP Management of Knowledge (**Section 7.8**) and Management of Change Process (refer to **Section 7.2.5**).

7.11 Reporting

7.11.1 Overview

To meet the EPOs and EPSs outlined in this EP, Woodside reports at a number of levels, as outlined in the next sections.

7.11.2 Routine Reporting (Internal)

7.11.2.1 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.

7.11.2.2 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.

7.11.2.2.1 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.

7.11.3 Routine Reporting (External)

7.11.3.1 Start and End Notifications of the Petroleum Activities Program

7.11.3.1.1 Angel Operations

In accordance with regulation 54, Woodside will notify NOPSEMA within ten days of the completion of the Petroleum Activities Program.

The EP will end when Woodside notifies NOPSEMA that the Petroleum Activities Program 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.

7.11.3.1.2 Lambert West Drilling and Tie-back

In accordance with regulation 54, Woodside will notify NOPSEMA of the commencement of the Petroleum Activities Program at least ten days before the activity commences, and will notify NOPSEMA within ten days of completing the activity.

7.11.3.2 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 7-8**.

Table 7-8: 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 Petroleum Activities Program for previous month (if applicable).
Annual Environment Plan 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.
National Pollutant Inventory (NPI) Report	DAWE	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.

7.11.3.3 End of the Petroleum Activities Program Notification

In accordance with regulation 54, Woodside will notify NOPSEMA within ten days of the completion of the Petroleum Activities Program.

7.11.3.4 End of the Environment Plan

The EP will end when Woodside notifies NOPSEMA that the Petroleum Activities Program 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.

7.11.4 Incident Reporting (Internal)

The process for reporting environmental incidents is described in **Section 7.8.3** of this EP. It is the responsibility of the Woodside Project Manager to ensure reporting of environmental incidents meets

Woodside and regulatory reporting requirements as detailed in the Woodside HSE Event Reporting and Investigation Procedure and this section of this EP.

7.11.5 Incident Reporting (External) – Reportable and Recordable

7.11.5.1 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 Petroleum Activities Program 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 Petroleum Activities Program 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:

- loss of well containment (MEE-01)
- pipeline and riser loss of containment (MEE-02)
- loss of structural integrity (MEE-03)
- loss of marine vessel separation (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.

7.11.5.1.1 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 (Appendix E) 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.

7.11.5.2 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 7.10**.

7.11.5.2.1 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 (**Appendix E**) 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.

7.11.5.3 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 7-9** describes the incident reporting requirements that also apply in the PAA.

Table 7-9: External incident reporting requirements

Event	Responsibility	Notifiable party	Notification requirements	Contact	Contact details
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

7.12 Emergency Preparedness and Response

7.12.1 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 7-10**.

Table 7-10: 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 (**Appendix D**).
Describes the OPEP	Regulation 22 (8)	EP: Woodside's oil pollution emergency plan has the following components: • Woodside Oil Pollution Emergency Arrangements (Australia) • Angel Operations Oil Pollution First Strike Plan (Appendix G) • Lambert West Drilling Oil Pollution First Strike Plan (Appendix H) • Oil Spill Preparedness and Response Mitigation Assessment (**Appendix D**). In accordance with Regulation 56 of the Environmental Regulations the Woodside Oi Pollution Emergency Arrangements (Australia) was provided with the Scarborough Drilling and Completions EP, accepted by NOPSEMA on 1 December 2023.
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 (**Appendix D**). Angel Operations Oil Pollution First Strike Plan (**Appendix G**). Lambert West Drilling Oil Pollution First Strike Plan (**Appendix H**).
Details the arrangements for updating and testing the oil pollution response arrangements	Regulation 22(8)(12),(13)(14)	Environment Plan: **Section 7.12.7**. Oil Spill Preparedness and Response Mitigation Assessment (**Appendix D**).
Details provisions for monitoring impacts to the environment from oil pollution and response activities	Regulation 22(10)	Oil Spill Preparedness and Response Mitigation Assessment (**Appendix D**).
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).

7.12.2 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 7-11**).

Table 7-11: 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 is responsible for collating and maintaining personnel training records. The HSP Dashboard reflects the competencies required for each oil spill role (IMT/operational).	

7.12.3 Emergency Response Preparation

The Corporate Incident Management Team (CIMT) 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 and ensures 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.

7.12.3.1 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.

7.12.3.2 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 Angel Emergency Response Plan. This plan covers health, safety, asset and environmental risks (including fire, structural integrity, sabotage, etc) to ensure 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 Angel Operations Oil Pollution First Strike Plan provides immediate actions required to commence a response (**Appendix G**). 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 Angel 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 MCs to be used for hydrocarbon spill response during the Petroleum Activities Program, as detailed in **Appendix D**.

7.12.4 Oil and Other Hazardous Materials Spill

A significant hydrocarbon spill during the Petroleum Activities Program 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 (**Appendix G** and **Appendix H**), and Oil Spill Preparedness and Response Strategy Selection and Evaluation (**Appendix D)** of this EP, cover spill response for this Petroleum Activities Program.

The Security and Emergency Management Function is responsible for the management of Woodside's hydrocarbon spill response equipment and for the maintenance of hydrocarbon spill preparedness and response documentation. In the event of a major spill, Woodside will request that AMSA (administrator of the National Plan) provides support to Woodside through advice and access to equipment, people and liaison. The interface and responsibilities, as defined under the National Plan, are described in the Oil Pollution Emergency Arrangements (Australia). AMSA and Woodside have a Memorandum of Understanding in place to support Woodside in the event of a hydrocarbon spill.

The Oil Pollution First Strike Plan provides immediate actions required to commence a response (**Appendix G** and **Appendix H**).

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, as detailed in (**Appendix D**).

7.12.5 Emergency and Spill Response

Woodside categorises incidents in relation to response requirements as follows:

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.

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.

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.

7.12.6 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 7-12**. 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 7-12: 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 activity and then at least every 6-month hire period thereafter.	Two comprehensive Level 1 'First Strike' drills conducted per year, per asset. Additional Level 1 emergency drills routinely conducted (approximately one per fortnight).	**Operations:** Comprehensive exercises test elements of the Oil Pollution First Strike Plan (**Appendix G**). **Tie-back activities:** Comprehensive exercises test elements of the Oil Pollution First Strike Plan (**Appendix H**). Emergency drills are scheduled to test other aspects of the Emergency Response Plan.
Level 2 Response	Exercises are facility-/ vessel-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 vessel 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.

7.12.7 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. In order to ensure 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 to ensure the controls are consistent. The overall objective of testing these arrangements is to ensure that Woodside maintains an ability to respond to a hydrocarbon spill, specifically to:

- ensure relevant responders, contractors and key personnel understand and practise their assigned roles and responsibilities
- test response arrangements and actions to validate response plans
- ensure 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 7-11**, up to eight formal exercises are planned annually, across Woodside, to specifically test arrangements for responding to a hydrocarbon spill to the marine environment.

7.12.7.1.1 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 International Petroleum Industry Environmental Conservation Association Good Practice Guide and the Australian Institute for Disaster Resilience (AIDR) 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.

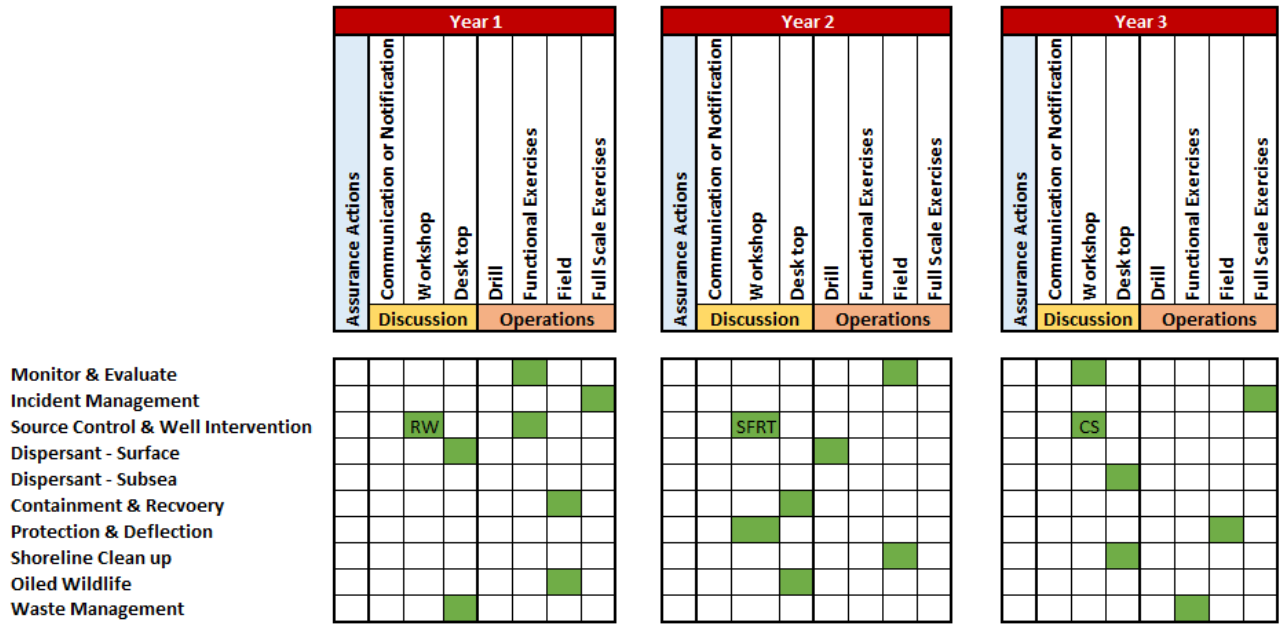


Figure 7-9: Indicative three-yearly testing of arrangements schedule

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).

7.12.8 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

ABARES, 2021. ABARES Fisheries Status Report map data: All Fisheries combined (ALLFSY): fishing intensity and maximum area fished, annual map data for 2010 to 2020. ABARES, Canberra, October. CC BY 4.0. https://doi.org/10.25814/42hd-fe35.

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.

Aichinger Dias, L., Litz, J., Garrison, L., Martinez, A., Barry, K. and 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.

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.

APASA, 2012. Angel Spill Risk Assessment. Report prepared for Woodside Energy. Revision 0, 12December 2012. Perth, WA.

Australian Institute of Marine Science, 2014a. AIMS 2013 biodiversity survey of Glomar Shoals and Rankin Bank (Report prepared by the Australian Institute of Marine Science for Woodside Energy Ltd.). Australian Institute of Marine Science, Townsville.

Australian Institute of Marine Science, 2014b. AIMS 2013 biodiversity survey of Glomar Shoals and Rankin Bank (Report prepared by the Australian Institute of Marine Science for Woodside Energy Ltd.). Australian Institute of Marine Science, Townsville.

Australian Transport Safety Bureau, 2011. ATSB Annual Report 2010-2011. Commonwealth of Australia 2011.

Baker, C., Potter, A., Tran, M. and 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. and 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.

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.

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.

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 toulene 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., and Richardson, B., 1994. Environmental implications of offshore oil and gas development in Australia Coastal Facilities (pp. 460–492). Australian Petroleum Exploration Association (APEA).

BMT, 2021. Goodwyn Alpha Produced Water Ecotoxicity and Chemical Characterisation Assessment 2020. 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.

Bond, T., Partridge, J.C., Taylor, M.D., Langlois, T.J., Malseed, B.E., Smith, L.D. and McLean, D. L., 2018. Fish associated with a subsea pipeline and adjacent seafloor of the North West Shelf of Western Australia. Marine environmental research, 141, 53–65.

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. and 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.

Cai, W. and Cowan, T., 2006. SAM and regional rainfall in IPCC AR4 models: Can anthropogenic forcing account for southwest Western Australian winter rainfall reduction? Geophysical Research Letters 33. https://doi.org/10.1029/2006GL028037.

Catry, T., Ramos, J., Le Corre, M. and 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. and 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.L. and 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. and 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., 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.

Cohen, A., Gagnon, M.M. and 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, 2012. Conservation Management Plan for the Southern Right Whale A Recovery Plan under the *Environment Protection and Biodiversity Conservation Act 1999* 2011–2021. Department of Sustainability, Environment, Water, Population and Communities.

Commonwealth of Australia, 2013. Recovery Plan for the White Shark (*Carcharodon carcharias*). Department of Sustainability, Environment, Water, Population and Communities.

Commonwealth of Australia, 2014a. Streamlining offshore petroleum environmental approvals Program Report. Australian Government.

Commonwealth of Australia, 2014b. 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. and 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.

Dean, T.A., Stekoll, M.S., Jewett, S.C., Smith, R.O. and 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.

Delisle, A., Kim, M., Stoeckl, N., Lui, F.W. and Marsh, H., 2018. The socio-cultural benefits and costs of the traditional hunting of dugongs Dugong dugon and green turtles Chelonia mydas in Torres Strait, Australia. Oryx, 52(2), 250–261.

Department of Agriculture, Water and the Environment, 2021. Species Profile and Threats Database – Key Ecological Features. Commonwealth of Australia, Canberra.

Department of Climate Change, Energy, the Environment and Water (DEECCW), 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-of-habitat-caused-by-greenhouse-gases#:~:text=The%20'Loss%20of%20climatic%20habitat,human%20activities%20of%20greenhouse%20gases.

Department of Climate Change, Energy, the Environment and Water (DEECCW), 2022. Australia's emissions projections 2022. https://www.dcceew.gov.au/climate-change/publications/australias-emissions-projections-2022.

Department of Climate Change, the Environment, Energy and Water (DCCEEW), 2023. Indigenous Protected Areas. Accessed at https://www.dcceew.gov.au/environment/land/indigenous-protected-areas.

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.

Department of Environment and Conservation, 2007. Management plan for the Montebello/Barrow Islands Marine Conservation Reserves. Marine Parks and Reserves Authority, Perth.

Department of Environment, 2015. Wildlife Conservation Plan for Migratory Shorebirds. Commonwealth of Australia, 2015.

Department of Primary Industries and Regional Development (DPIRD), 2020. Fish Cube WA – Commercial Collector Component Public Cube. Department of Primary Industries and Regional Development, Western Australia, Perth.

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*.

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-whale-recovery-plan-under-environment.

Department of Sustainability, Environment, Water, Population and Communities, 2013. Environmental Protection and Biodiversity Conservation Act 1999 (Cth) Policy Statement - "Indirect Consequences" of an Action: Section 572E of the EPBC Act. Canberra, Australian Capital Territory: Department of Sustainability, Environment, Water, Population and Communities, Australian Government.

Department of the Environment and Energy (DOEE). 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.

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.

Department of Industry, Science and Resources (DISER), 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).

Department of Industry, Science and Resources (DISER), 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.

Dix, G.R., James, N.P., Kyser, T.K., Bone, Y. and 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.

Director of National Parks (DNP), 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-management-plan-2018.pdf.

DNV, 2019. Integrity management of submarine pipeline systems, DNVGL-RP-F116. Oslo, Norway.

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.

Double, M., Gales, N., Jenner, K. and 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 Mammals 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: e93578.

Dunlop, M., Hilbert, D., Ferrier, S., House, A., Liedloff, A., Prober, S., Smyth, A., Martin, T., Harwood, T., Williams, K., Fletcher, C. and 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.

Energy Institute, 2009. Guideline for Management of Integrity of Subsea Facilities, London, UK.

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. and 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. and Dooling, R., 2015. Communication masking in marine mammals: A review and research strategy. Marine Pollution Bulletin. 103 1-2: pp. 15–38.

ERM, 2013. Scarborough Marine Studies – Environmental Characterisation Report. Report prepared for Esso Australia Pty Ltd, by Environmental Resources Management Australia. Report Reference: 0177357.

Field, C.D., 1995. Impact of expected climate change on mangroves. Hydrobiologia 295, 75–81. https://doi.org/10.1007/BF00029113.

Fijn, N., 2021. Donald Thomson: Observations of Animal Connections in Visual Ethnography in Northern Australia. Ethnos, 86(1), 44–68.

Finneran, J., Henderson, E., Houser, D., Jenkins, K., Kotecki, S. and 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. and 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. and 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. and George, K.P., 2001. Dilution Models for Effluent Discharges, 4th Edition (Visual Plumes) Draft. US Environmental Protection Agency, Georgia. July 2001.

Fugro Survey Pty Ltd, 2002. Angel Field Development Project Geophysical Survey Services Site Survey, Field Report. Report prepared for Woodside Energy Ltd, Report No. HY16462-1, February 2002.

Furnas, M. and Mitchell, A., 1999. Wintertime carbon and nitrogen fluxes on Australia's Northwest Shelf. Estuarine, Coastal and Shelf Science 49: 165–175.

Gagnon, M.M. and 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. and Davies, T.W., 2014. Human alteration of natural light cycles: causes and ecological consequences. Oecologia 176: 917–931.

Geiling, N., 2014. Arctic Shipping: Good For Invasive Species, Bad For the Rest of Nature. Smithsonian. Available at: http://www.smithsonianmag.com/science-nature/global-warmingsunexpected-consequence-invasivespecies-180951573/?no-ist. Accessed 3 May 2021.

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. and Cook, K., 2013. Discovering Scott Reef: 20 years of exploration and research. Australian Institute of Marine Science, Townsville.

Gilmour, J., Speed, C.W. and Babcock, R., 2016. Coral reproduction in Western Australia. PeerJ 4, e2010. https://doi.org/10.7717/peerj.2010.

Gophen, M., 2015. Ecological devastation in Lake Victoria: Part B: Plankton and fish communities. Open Journal of Ecology, 5(07), 315.

Gotz, T., Hastie, G., Hatch, L.T., Southall, B.L., Tasker, M. and Thomason, F., 2009. Overview of the impacts of anthropogenic underwater sound in the marine environment, OSPAR Commission Biodiversity Series. London (UK): OSPAR Commission. 133 pp.

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.

Hannay, D.E., MacGillivray, A.O., Laurinolli, M. and Racca, R., 2004. Sakhalin Energy: source level measurements from 2004 acoustics program, Ver. 1.5. Technical report by JASCO Research, Victoria, BC, for Sakhalin Energy Investment Company, Yuzhno-Sakhalinsk.

Hart, A., Murphy, D. and Wright, L., 2021. Pearl Oyster Managed Fishery Resource Status Report. In: Status Reports of the Fisheries and Aquatic Resources of Western Australia 2020/21: 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. 167–170.

Hassan, A. and 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. and Robson, S., 2007. Vessel speed increases collision risk for the green turtle Chelonia mydas. Endangered Species Research 3: 105–113.

Heatwole, H. and 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. and 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. and 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. and 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. and 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. and 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.

International Energy Agency (IEA), 2022. World Energy Outlook 2022, IEA, Paris https://www.iea.org/reports/world-energy-outlook-2022, License: CC BY 4.0 (report); CC BY NC SA 4.0 (Annex A).

International Energy Agency (IEA), 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. and Ansari, Z. A., 2005. Recovery of Deep-sea Meiofauna after Artificial Disturbance in the Central Indian Basin. Marine Georesources & Geotechnology Vol. 23(4).

International Association of Oil and Gas Producers, 2016. Environmental fates and effects of ocean discharge of drill cuttings and associated drilling fluids from offshore oil and gas operations (Report No. 543). International Association of Oil and Gas Producers, London.

International Panel on Climate Change (IPCC), 2021a. 'Summary for Policymakers' 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, 3–32. Cambridge, United Kingdom and New York: Cambridge University Press. doi: 10.1017/9781009157896.001.

International Panel on Climate Change (IPCC), 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.

International Panel on Climate Change (IPCC), 2021c. 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., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 2391 pp. doi:10.1017/9781009157896.

International Petroleum Industry Environmental Conservation Association (IPIECA), 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. 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. doi:10.1111/j.1365-3091.2004.00666.x.

Jarman, S. and 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. and 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. and Wyatt, R., 2017. Review on Existing Data on Underwater Sounds Produced by the Oil and Gas Industry. Prepared by Seiche Ltd. E&P Sound & Marine Life (JIP). August 2017.

Johansen, J.L., Allan, B.J., Rummer, J.L. and Esbaugh, A.J., 2017. Oil exposure disrupts early life-history stages of coral reef fishes via behavioural impairments. Nature Ecology & Evolution 1: 1146–1152. doi:10.1038/s41559-017-0232-5.

Jones, R., Wakeford, M., Currey-Randall, L., Miller, K. and 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.

King, D., Lyne, R., Girling, A., Peterson, D., Stephenson, R. and 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. and 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. 'Australasia.' 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.

Longcore, T. and Rich, C., 2004. Ecological light pollution. Frontiers in Ecology and the Environment 2: 191–198.

Lutcavage, M., Lutz, P., Bossart, G. and Hudson, D., 1995. Physiologic and clinicopathologic effects of crude oil on loggerhead sea turtles. Archives of Environmental Contamination and Toxicology 28: 417–422.

MAC, 2021 Cultural Values of the Environment for Scarborough DSDMP: Consultation Report on Mermaid Sound.

Martin, S.B., Kowarski, K.A., Maxner, E.E. and 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. and 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., 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. 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.

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.

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. and 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. and Koessler, M., 2019. Scarborough US4AB Noise Modelling Study. Acoustic modelling for assessing marine fauna sound exposures. JASCO Applied Sciences (Australia) Pty Ltd.

Milton, S.L. and 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. and 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.

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 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 Marine Fisheries Service (US), 2014. *Marine mammals acoustic thresholds guidance*. National Marine Fisheries Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce. Viewed online on 24 February 2019 at http://www.westcoast.fisheries.noaa.gov/protected_species/marine_mammals/threshold_guidance.html.

National Oceanic and Atmospheric Administration (US), 2019. ESA Section 7 Consultation Tools for Marine Mammals on the West Coast (webpage), 27 Sep 2019. https://www.fisheries.noaa.gov/westcoast/endangered-species-conservation/esa-section-7-consultation-tools-marine-mammals-west.

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 & response considerations. National Oceanic and Atmospheric Administration, Washington.

National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), 2019. Oil spill modelling bulletin.

National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), 2020. Section 572 Maintenance and removal of property, Policy, N-00500-PL1903 A720369, 20 November 2020.

Nedwed, T., Smith, J.P. and 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., 2002. Bioaccumulation in Marine Organisms - Effect of Contaminants from Oil Well Produced Water. Elsevier, Amsterdam.

Neff, J., Lee, K. and 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. and 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 effecrs 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, J.M., 2008. Estimation of bioavailability of metals from drilling mud barite. Integrated Environmental Assessment and Management 4, 184–193.

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.

Negri, A.P. and 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.

Newell, R. C., Seiderer, L.J. and 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.

Newman, S.J., Wise, B.S., Santoro, K.G. and Gaughan, D.J. (eds)., 2021. Status Reports of the Fisheries and Aquatic Resources of Western Australia 2020/21: The State of the Fisheries. Department of Primary Industries and Regional Development, Western Australia.

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.

Offshore: Risk and Technology Consulting Inc., 2002. Post mortem failure assessment on MODUs during Hurricae 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. 9 pp.

Oxford Economics, 2010. Potential impact of the Gulf oil spill on tourism. Oxford Economics, Oxford.

Pangerc, T., Robinson, S. and 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.

Paterson, A., Anderson, R., Mulvaney, K., de Koning, S., Dortch, J. and 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. and 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.

PENV, 2020b. 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. and 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. and 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.

Richardson, W.J., Greene Jr, C.R., Malme, C.I. and 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. and 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., and 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. and 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.

Ross, D., 1993. 'On ocean underwater ambient noise,' Inst. Acoust. Bull. 18, 5–8.

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.

Runcie, J., Macinnis-Ng, C. and 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. and 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. and 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. and Reiners, R., 1995b. Behavior of loggerhead sea turtles on an urban beach. II. Hatchling orientation. Journal of Herpetology 568–576.

Salmon, M. and Witherington, B.E., 1995. Artificial lighting and seafinding by loggerhead hatchlings: evidence for lunar modulation. Copeia 931–938.

Salmon, M., Wyneken, J., Fritz, E. and Lucas, M., 1992. Seafinding by hatchling sea turtles: role of brightness, silhouette and beach slope as orientation cues. Behaviour 122:56–77.

Schianetz, K., Jones, T., Kavanagh, L., Walker, P.A., Lockington, D. and Wood, D., 2009. The practicalities of a Learning Tourism Destination: a case study of the Ningaloo Coast. International Journal of Tourism Research 11: 567–581. doi:10.1002/jtr.729.

SGS Economics & 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. and Weilgart, L., 2004. Oceans of noise, WDCS Science Report. Whale and Dolphin Conservation Society, Chippenham.

Sinclair Knight Merz (SKM), 2006. Marine Survey for Proposed Angel Pipeline Route – Survey Report. Report prepared for Woodside Australian Energy. Sinclair Knight Merz, Perth.

Sinclair Knight Merz (SKM), 2013. Offshore Marine Discharges Study – Modelling and Sedimentation Analysis. Report prepared for Woodside Energy Ltd.

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).

Smallwood, C.B., Beckley, L.E., Moore, S.A. and 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.

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.

Solomon, S., Qin, D., Manning, M., Chen, Z., Marquis, M., Averyt, K.B., Tignor, M. and Miller, H.L., 2007. Contribution of working group I to the fourth assessment report of the intergovernmental panel on climate change. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

Southall, B.L., Finneran, J.J., Reichmuth, C., Nachtgall, P.E., Ketten, D.R., Bowles, A.E., Ellison, W.T., Nowacek, D.P. and Tyack, P.L., 2019. Marine mammal noise exposure criteria: updated scientific recommendations for residual hearing effects.

Spalding, M.D. and 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. and 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.

Stroot, D.H., Koessler, M.W. and 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. and 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. and 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. 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: https://www.frontiersin.org/articles/10.3389/fmars.2021.631449.

Threatened Species Scientific Committee (TSSC), 2015a. Conservation Advice Balaenoptera Borealis (Sei Whale). Canberra, Australian Capital Territory: Threatened Species Scientific Committee, Department of the Environment. http://www.environment.gov.au/biodiversity/threatened/species/pubs/34-conservation-advice-01102015.pdf.

Threatened Species Scientific Committee (TSSC), 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.

Thums, M., Ferreira, L. C., Jenner, C., Jenner, M., Harris, D., Davenport, A., ... and 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.

Twachtman Snyder & Byrd, Inc. and Center for Energy Studies, Louisiana State University, 2004. Operational and Socioeconomic Impact of Nonexplosive Removal of Offshore Structures. U.S. 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.

United States Environmental Protection Agency, 2000. Development document for final effluent limitations guidelines and standards for synthetic-based drilling fluids and other non-aqueous drilling fluids in the oil and gas extraction point source category (Report No. EPA-821-B-00-013). United States Environmental Protection Agency, Washington, DC.

United Nations Educational, Scientific and Cultural Organisation (UNESCO), 2003. 2003 Convention for the Safeguarding of the Intangible Cultural Heritage, United Nations Educational, Scientific and Cultural Organisation. Available at: https://ich.unesco.org/en/convention.

University of Western Australia (UWA), 2021. Scarborough Pipeline Cultural Heritage Assessment: Establishing Archaeological Potential and Significance. Technical report by UWA for Woodside Energy Limited.

University of Western Australia (UWA), 2021. Scarborough Pipeline Cultural Heritage Assessment: Establishing Archaeological Potential and Significance. Technical report by UWA for Woodside Energy Limited.

Vanderlaan, A.S.M. and 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., 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.

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.

Vik, E.A., Bakke, D.R. and Verburgh, J., 1996. The N-octanol/water partition coefficient: a critical parameter in environmental risk assessment of offshore EandP chemicals, in Ray, JP and Engelhardt FR., (eds), Produced Water: Technological/Environmental Issues and Solutions, Plenum Press, New York.

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.

Warne, M.S.T.J., Batley, G.E., van Dam, R.A., Chapman, J.C., Fox, D.R., Hickey, C.W. and 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.

Warner, G., McCrodan, A., MacDonnell, J. and Lumsden, E. 2012, JASCO Applied Sciences, 2305-4464 Markham St., BC, Canada.

Wecker, H., Koessler, M.W., Connell, S.J. and 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. and Hamann, M., 2014. Inter-nesting distribution of flatback turtles.

Whittock, P.A., Pendoley, K.L. and 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.

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.

Woodside Energy Limited, 2008. Torosa South-1 (TS-1) Pilot appraisal well, environmental monitoring program - development of methodologies Part 1 (Pg 51). Report produced by Environmental Resource Management (ERM) and Sinclair Knight Merz (SKM).

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, 2019. WA-34-L Pyxis Drilling and Subsea Installation Environment Plan. Woodside Burrup Pty Ltd.

Woodside Energy Limited, 2023a. Climate Report 2022. Perth, Western Australia: Woodside Energy Limited. https://www.woodside.com/docs/default-source/investor-documents/major-reports-(static-pdfs)/2022-climate-report/climate-report-2022.pdf?sfvrsn=240783fc_16.

Woodside Energy Limited, 2023b. Scarborough, Dredging and Spoil Disposal Management Plan. SA0006AH0000002.

Yender, R., Michel, J. and Lord, C., 2002. Managing seafood safety after and oil spill. National Oceanic and Atmospheric Administration, Seattle.

Zieman, J.C., Orth, R., Phillips, R.C., Thayer, G. and 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
AC	alternating current
AEP	Angel export pipeline
AFMA	Australian Fisheries Management Authority
AHV	anchor handling vessel
AHO	Australian Hydrographic Office
AIMS	Australian Institute of Marine Science
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
AP	Angel production
APPEA	Australian Petroleum Production and Exploration Association
ATSIHP Act	Aboriginal and Torres Strait Islander Heritage Protection Act 1984
AUSREP	Australian Ship Reporting System
AUV	autonomous underwater vehicles
AW	abandoned wells with wellhead
BDV	blowdown valve
BIA	biologically important area
BoM	Bureau of Meteorology
BTEX	benzene, toluene, ethylbenzene and xylenes
CAES	Catch and Effort System
CAPEX	capital expenditure
CCR	central control room
CDU	control distribution unit
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
CEO	Chief Executive Officer
CFA	Commonwealth Fisheries Association
CI	continuous improvement
CIMT	Corporate Incident Management Team
CMMS	Computerised Maintenance Management System
CMT	Crisis Management Team
CoP	cessation of production
CRA	corrosion-resistant alloy
CS	cost/sacrifice

Acronym	Description
CV	company values
CVS	Contractor Verification Service
DAA	Department of Aboriginal Affairs
DAWE	Department of Agriculture, Water and the Environment
D&C	drilling and completions
DC	direct current
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DCS	NRC control 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
DoT	Department of Transport
DP	dynamic positioning
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
EPO	environmental performance outcome
EPS	environment performance standard
EoFL	end of field life
ERP	Emergency Response Plan
ESD	ecologically sustainable development
ETA	exploration wells temporarily abandoned
EVP	Executive Vice President
FEED	front-end engineering and design
FFS	fit for service
FPSO	floating production, storage and offloading
GHG	greenhouse gas
GP	good industry practice
GWA	Goodwyn Alpha
HAZID/ENVID	hazard identification studies
HCR	hydraulic control router
HFL	hydraulic flying lead
HLV	heavy lift vessel

Acronym	Description
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
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 Organisation of Standardisation
ISQG	interim sediment quality guideline
ISSoW	integrated safe system of work
ISV	IMMR support vessel
JRCC	Joint Rescue Coordination Centre
KBSF	King Bay Supply Facility
KGP	Karratha Gas Plan
KEF	key ecological feature
km	kilometre
KPI	key performance indicator
L	litres
LAT	lowest astronomical tide
LBL	long baseline
LCS	legislation, codes and standards
LD	Lambert Deep
LDA	
LNG	liquefied natural gas
LOT	leak off testing
LP	low pressure
LTO	licence to operate
LW	Lambert West
MAEs	major accident events
MAH	monocyclic aromatic hydrocarbons
MBES	multibeam echo sounder
MEEs	major environmental events

Acronym	Description
MEG	monoethylene glycol
METL	Maintenance Engineering Team Leader
MFO	Marine Fauna Observer
MC	measurement criteria
MNES	matters of environmental significance
MoC	management of change
MODU	mobile offshore drilling unit
MOPO	Manual of Permitted Operation
MoU	Memorandum of Understanding
MPPE	macro porous polymer extraction
MSIN	Maritime Safety Information Notification
MSPS	Management System Performance Standards
MW	megawatts
NDC	nationally determined contributions
NDT	non-destructive testing
NGA	Nganhurra
NGERS	National Greenhouse and Energy Reporting Scheme
NIMS	non-indigenous marine species
NLPG	National Light Pollution Guidelines
NMFS	National Marine Fisheries Service
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
NRC	North Rankin Complex
NTM	Notice to Mariners
NWBM	non-water based muds
NWMR	North West Marine Region
NWS	North West Shelf
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

Acronym	Description
OPGGS Act	*Offshore Petroleum and Greenhouse Gas Storage Act 2006* (Cth)
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
PAA	Petroleum Activities Area
PAH	polycyclic aromatic hydrocarbon
PBA	pre-emptive baseline areas
PCR	power and communication router
PCS	process control system
PFTIMF	Pilbara Fish Trawl Interim Managed Fishery
PHD	Process Historian Database
PJ	professional judgement
PLF	Pilbara Line Fishery
PLONOR	pose little or no risk
PLR	pig launch receivers
PMST	Protected Matters Search Tool
PEC	predicted effects concentration
PNEC	predicted no-effect concentration
POB	personnel on board
PoW	octanol-water partition
PSM	process safety management
PSRA	process safety risk assessment
PSV	pressure safety valves
PSZ	petroleum safety zone
PTMF	Pilbara Trap Managed Fishery
PTS	permanent threshold shift
PW	produced water
PWCS	primary water/condensate separators
RBA	risk based analysis
RBI	risk based inspection
RCC	Rescue Coordination Service
RESDV	riser emergency shutdown valves
rms SPL	root square mean sound pressure level
ROV	remotely operated vehicle
SCC	safety and environment critical component
SCE	safety and environment critical element
SCE	solids control equipment
SCEW	Standing Council on Environment and Water

Acronym	Description
SCM	subsea control module
SCQ	safety and environmental critical equipment
SCSSV	surface controlled sub-surface safety valves
SDU	subsea distribution unit
SEL	sound exposure level
SIMAP	Spill Impact Mapping and Analysis Program
SMP	Scientific Monitoring Program
SOPEP	Ship Oil Pollution Emergency Plan
SSIV	subsea isolation valve
SSPL	subsea pipeline
SSS	side scan sonar
SV	societal values
SVP	Senior Vice President
TAP	Threat Abatement Plan
TEG	triethylene glycol
TFCFD	Taskforce on Climate-Related Financial Disclosures
TPH	total petroleum hydrocarbon
TTS	temporary threshold shift
UK	United Kingdom
UPS	uninterruptable power system
USBL	ultra-short baseline
USEPA	United States Environmental Protection Agency
USV	uncrewed surface vessel
UTA	umbilical termination assemblies
VOC	volatile organic compound
VP	Vice President
WA	Western Australia
WAFIC	Western Australian Fishing Industry Council
WBM	water-based muds
WET	whole effluent toxicity
WHA	World Heritage Area
WMS	Woodside Management System
WOMP	Well Operations Management Plan

APPENDIX A: WOODSIDE ENVIRONMENT AND BIODIVERSITY, CLIMATE AND RISK MANAGEMENT POLICIES

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 exploration or development of hydrocarbons within the boundaries of natural sites on the UNESCO World Heritage List (as specified at 1 December 2022). Existing activity may continue if compatible with maintenance of the listed outstanding universal values.
- Not undertaking new exploration or development of hydrocarbons within IUCN Protected Areas (as specified at 1 December 2022) unless compatible with management plans in place for the area. Existing activity may continue if compatible with management plans in place for the area.
- Achieving net zero deforestation1 associated with new projects that take a Final Investment Decision (FID) after 1 December 2022.
- Developing Biodiversity Action Plans for all new major projects (CAPEX >USD$2 billion) that take a FID after 1 December 2022.
- Supporting positive biodiversity outcomes in regions and areas in which we operate.
- 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.

Approved by the Woodside Energy Group Ltd Board in December 2022.

[1] Definition of Forest: 'trees higher than 5 meters and a canopy cover of more than 10 percent on the land to be cleared'

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 2023.

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 2023.

APPENDIX B: RELEVANT REQUIREMENTS

The below table refers to Commonwealth Legislation related to the project.

Commonwealth Legislation	Legislation Summary
Air Navigation Act 1920 Air Navigation Regulations 1947 Air Navigation (Aerodrome Flight Corridors) Regulations 1994 Air Navigation (Aircraft Engine Emissions) Regulations 1995 Air Navigation (Aircraft Noise) Regulations 1984 Air Navigation (Fuel Spillage) Regulations 1999	This Act relates to the management of air navigation.
Australian Maritime Safety Authority Act 1990	This Act establishes a legal framework for the Australian Maritime Safety Authority (AMSA), which represents the Australian Government and international forums in the development, implementation and enforcement of international standards including those governing ship safety and marine environment protection. AMSA is responsible for administering the Marine Orders in Commonwealth waters.
Australian Radiation Protection and Nuclear Safety Act 1998	This Act relates to the protection of the health and safety of people, and the protection of the environment from the harmful effects of radiation.
Biosecurity Act 2015 Quarantine Regulations 2000 Biosecurity Regulation 2016 Australian Ballast Water Management Requirements 2017 Biosecurity Amendment (Biofouling Management) Regulations 2021	This Act provides the Commonwealth with powers to take measures of quarantine, and implement related programs as are necessary, to prevent the introduction of any plant, animal, organism or matter that could contain anything that could threaten Australia's native flora and fauna or natural environment. The Commonwealth's powers include powers of entry, seizure, detention and disposal. This Act includes mandatory controls on the use of seawater as ballast in ships and the declaration of sea vessels voyaging out of and into Commonwealth waters. The Regulations stipulate that all information regarding the voyage of the vessel and the ballast water is declared correctly to the quarantine officers. The Biofouling Management Regulations requires ships to report information about biofouling management and the voyage history of the ship in the past 12 months through a pre-arrival report.
Environment Protection and Biodiversity Conservation Act 1999 Environment Protection and Biodiversity Conservation Regulations 2000	This Act protects matters of national environmental significance (NES). It streamlines the national environmental assessment and approvals process, protects Australian biodiversity and integrates management of important natural and culturally significant places. Under this Act, actions that may be likely to have a significant impact on matters of NES must be referred to the Commonwealth Environment Minister.
Environment Protection (Sea Dumping) Act 1981 Environment Protection (Sea Dumping) Regulations 1983	This Act provides for the protection of the environment by regulating dumping matter into the sea, incineration of waste at sea and placement of artificial reefs.
Industrial Chemicals (Notification and Assessment Act) 1989 Industrial Chemicals (Notification and Assessment) Regulations 1990	This Act creates a national register of industrial chemicals. The Act also provides for restrictions on the use of certain chemicals which could have harmful effects on the environment or health.

Commonwealth Legislation	Legislation Summary
National Environment Protection Measures (Implementation) Act 1998 National Environment Protection Measures (Implementation) Regulations 1999	This Act and Regulations provide for the implementation of National Environment Protection Measures (NEPMs) to protect, restore and enhance the quality of the environment in Australia and ensure that the community has access to relevant and meaningful information about pollution. The National Environment Protection Council has made NEPMs relating to ambient air quality, the movement of controlled waste between states and territories, the national pollutant inventory, and used packaging materials.
National Greenhouse and Energy Reporting Act 2007 National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015	This Act and associated Rule establishes the legislative framework for the NGER scheme for reporting greenhouse gas emissions and energy consumption and production by corporations in Australia.
Navigation Act 2012 Marine order 12 – Construction – subdivision and stability, machinery and electrical installations Marine order 30 - Prevention of collisions Marine order 47 – Offshore Industry units Marine order 57 - Helicopter operations Marine order 91 - Marine pollution prevention—oil Marine order 93 - Marine pollution prevention—noxious liquid substances Marine order 94 - Marine pollution prevention—packaged harmful substances Marine order 96 - Marine pollution prevention—sewage Marine order 97 - Marine pollution prevention—air pollution	This Act regulates navigation and shipping including Safety of Life at Sea (SOLAS). The Act will apply to some activities of the MODU and project vessels. This Act is the primary legislation that regulates ship and seafarer safety, shipboard aspects of marine environment protection and pollution prevention.
Offshore Petroleum and Greenhouse Gas Storage Act 2006 Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 Offshore Petroleum and Greenhouse Gas Storage (Resource Management and Administration) Regulations 2011 Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations 2009	This Act is the principal Act governing offshore petroleum exploration and production in Commonwealth waters. Specific environmental, resource management and safety obligations are set out in the Regulations listed.
Ozone Protection and Synthetic Greenhouse Gas Management Act 1989 Ozone Protection and Synthetic Greenhouse Gas Management Regulations 1995	This Act provides for measures to protect ozone in the atmosphere by controlling and ultimately reducing the manufacture, import and export of ozone depleting substances (ODS) and synthetic greenhouse gases, and replacing them with suitable alternatives. The Act will only apply to Woodside if it manufactures, imports or exports ozone depleting substances.
Protection of the Sea (Powers of Intervention) Act 1981	This Act authorises the Commonwealth to take measures for the purpose of protecting the sea from pollution by oil and other noxious substances discharged from ships and provides legal immunity for persons acting under an AMSA direction.
Recycling and Waste Reduction (Mandatory Product Stewardship—Mercury-added Products) Rules 2021 (Minamata Convention on Mercury 2017)	This Convention is an agreement to protect human and environmental health from the effects of releases of mercury and mercury-containing compounds to the environment. The Convention was ratified by Australia in December 2021 and is implemented in Commonwealth law under the *Recycling and Waste Reduction (Mandatory Product Stewardship – Mercury added Products) Rules 2021*).

Commonwealth Legislation	Legislation Summary
Protection of the Sea (Prevention of Pollution from Ships) Act 1983 Protection of the Sea (Prevention of Pollution from Ships) (Orders) Regulations 1994 Marine order 91 - Marine pollution prevention—oil Marine order 93 - Marine pollution prevention—noxious liquid substances Marine order 94 - Marine pollution prevention—packaged harmful substances Marine order 95 - Marine pollution prevention—garbage Marine order 96 - Marine pollution prevention—sewage *Maritime Legislation Amendment (Prevention of Air Pollution from Ships) Act 2007* MARPOL Convention	This Act relates to the protection of the sea from pollution by oil and other harmful substances discharged from ships. Under this Act, discharge of oil or other harmful substances from ships into the sea is an offence. There is also a requirement to keep records of the ships dealing with such substances. The Act applies to all Australian ships, regardless of their location. It applies to foreign ships operating between 3 nautical miles (nm) off the coast out to the end of the Australian Exclusive Economic Zone (200 nm). It also applies within the 3 nm of the coast where the State/Northern Territory does not have complementary legislation. All the Marine Orders listed, except for Marine Order 95, are enacted under both the *Navigation Act 2012* and the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983*. This Act is an amendment to the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983*. This amended Act provides the protection of the sea from pollution by oil and other harmful substances discharged from ships.
Protection of the Sea (Harmful Antifouling Systems) Act 2006 Marine order 98—(Marine pollution—anti-fouling systems)	This Act relates to the protection of the sea from the effects of harmful anti-fouling systems. It prohibits the application or reapplication of harmful anti-fouling compounds on Australian ships or foreign ships that are in an Australian shipping facility.
Aboriginal and Torres Strait Islander Heritage Protection Act 1984	This Act seeks “to preserve and protect places, areas and objects of particular significance” to Aboriginal people. Under the Section 9 and 10 provisions of the Act, the Minister for the Environment may declare significant Aboriginal areas temporarily or permanently protected if they are considered under threat. Similar declarations regarding Aboriginal objects can be made under Section 12. Under Section 22 of the Act, the contravention of any of these declarations is an offence. Additionally, the discovery of any Aboriginal remains must be reported to the Minister under Section 20. Damage or interference with Aboriginal objects or places is not an offence under the ATSIHO Act except within Victoria under Section 21U.
Underwater Cultural Heritage Act 2018 Underwater Cultural Heritage Guidance for Offshore Developments DRAFT Guidelines to Protect Underwater Cultural Heritage	The Act prescribes penalties for damage to protected Underwater Cultural Heritage without a permit under Section 30 or in contravention of a permit under Section 28. Protected Underwater Cultural Heritage is prescribed in Section 16 to automatically include the remains and associated artefacts of any vessel or aircraft that has been in Australian waters for 75 years, whether known or unknown. This protection is also extended to Underwater Cultural Heritage in Commonwealth waters specified by the Environment Minister under Section 17. Without a declaration under this section, Aboriginal Underwater Cultural Heritage is not protected under the UCH Act.

APPENDIX C-1: WOODSIDE MASTER EXISTING ENVIRONMENT DOCUMENT

Description of the Existing Environment

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1. INTRODUCTION

1.1 Purpose

This document applies, where indicated in the relevant Environment Plan, 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 Commonwealth Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 in order 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 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 Agriculture, Water and the Environment (DAWE) 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* (EPBC Act) Species Profile and Threats Database (SPRAT), 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, where relevant, on at least an annual basis to address any relevant changes, which includes but is not limited to the status of EPBC Act listed species, Part 13 Instruments, policies and guidelines 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—NWMR, SWMR and NMR (**Table 1-1)**. The NWMR is the focal marine bioregion for the Description of the Existing Environment as this is currently the location of most of Woodside's activities.

Table 1-1. Description of the Marine Bioregions

Marine Bioregion	Description
North-west	The NWMR includes all Commonwealth waters (from 3 nautical mile [nm] from the Territorial Sea Baseline [TSB] to the 200 nm Exclusive Economic Zone [EEZ] boundary) extending from the WA/Northern Territory (NT) border to Kalbarri, south of Shark Bay in WA, covering an area of approximately 1.07 million square kilometres 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	The SWMR comprises Commonwealth waters from the eastern end of Kangaroo Island in SA to Shark Bay in WA. The region spans approximately 1.3 million square kilometres of temperate and subtropical waters and abuts the coastal waters of SA and WA.
North	The NMR comprises Commonwealth waters from west Cape York Peninsula to the NT/WA border). The region covers approximately 625,689 square kilometres of tropical waters in the Gulf of Carpentaria and Arafura and Timor seas, and abuts the coastal waters of Queensland and the NT.

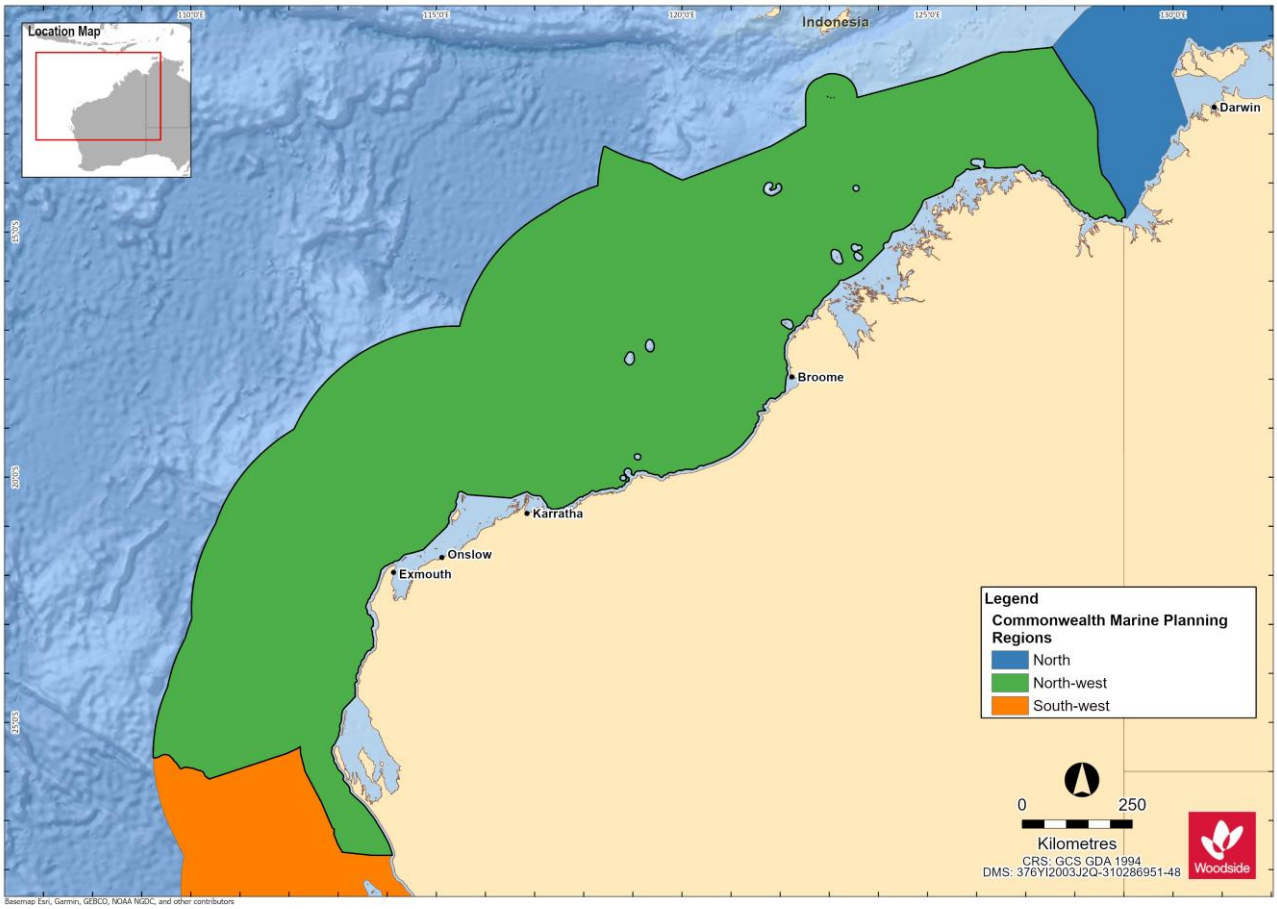

Figure 1-1. Marine Bioregions: North-west (NWMR), South-west (SWMR) and North (NMR)

2. PHYSICAL ENVIRONMENT

2.1 Regional Context

The key physical characteristics of the NWMR, SWMR and NMR are presented in **Table 2-1**.

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.

The NWMR can be 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 below in **Table 2-2**.

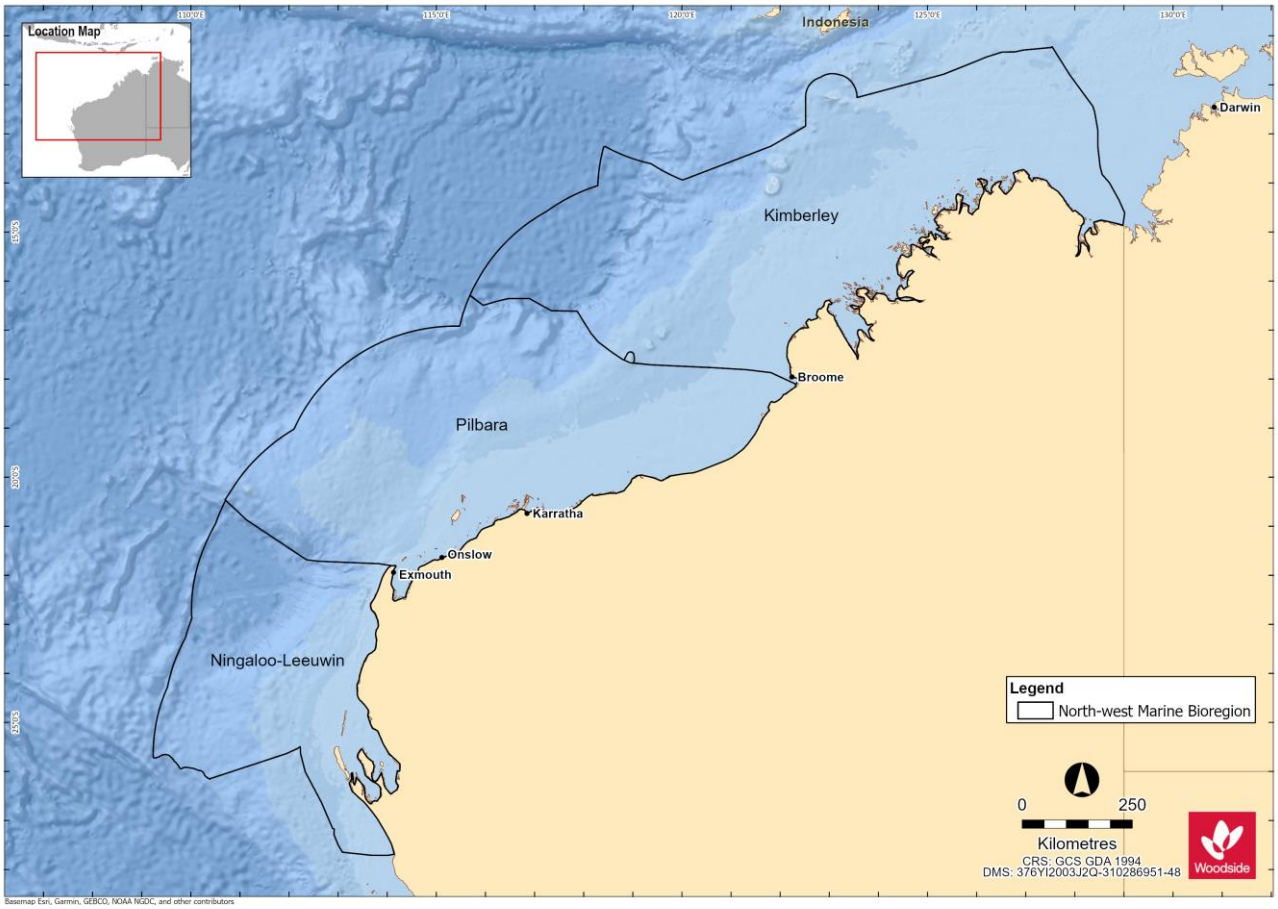

Figure 2-1. The marine systems of the North-west Marine Region (NWMR)

Table 2-2. Key characteristics of the Marine Systems of the NWMR

Note: Woodside areas align with the marine systems as described in DEWHA (2007a)

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. 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).

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 31ºC to 33ºC. During winter (May to July), mean daily temperatures range from 18ºC to 31ºC (BOM[1]), refer to **Figure 2-2a** and **b**. 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 2-3a** and **b**.
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 ~17°C in winter to ~31°C in summer (Chevron Australia, 2010). Refer to **Figure 2-5a** and **b**.
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).
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 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.

[1] http://www.bom.gov.au/jsp/ncc/climate_averages/temperature/index.jsp, accessed 21 January 2021.

Receptor	Description
	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).

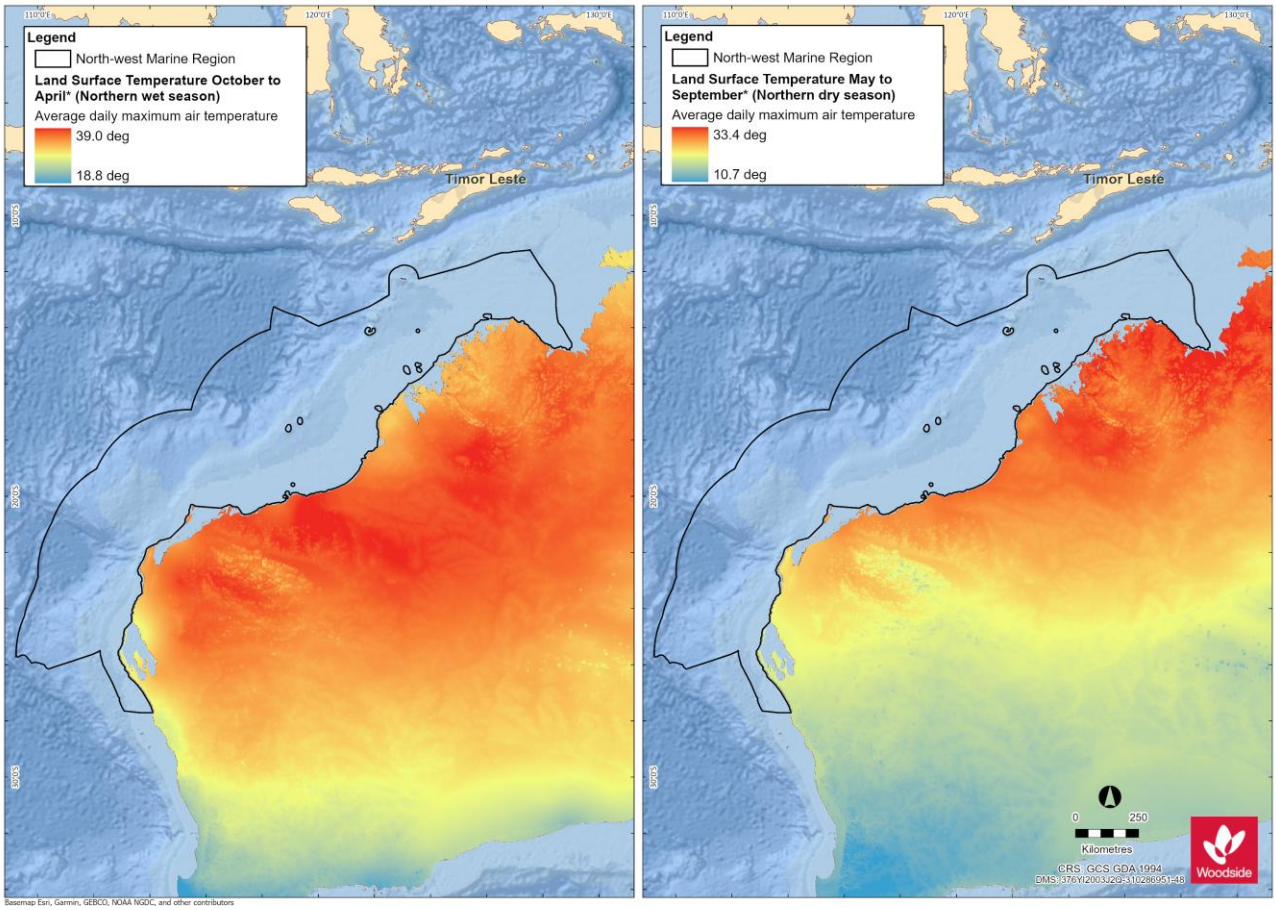

Figure 2-2. Average daily maximum air temperature for land surface adjacent to NWMR: (a) summer (northern wet season) and (b) winter (northern dry season)

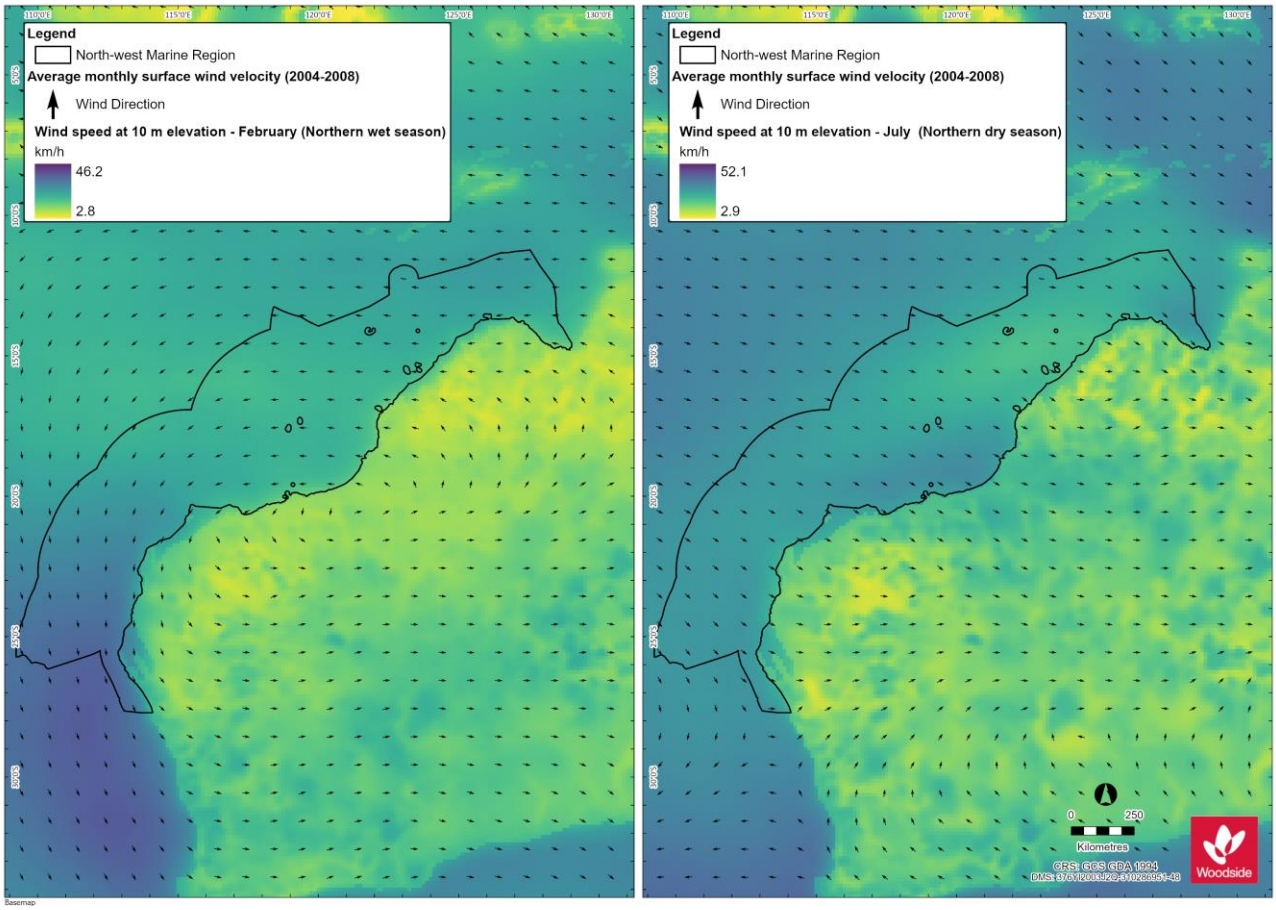

Figure 2-3. Average monthly surface wind direction and velocity for NWMR: (a) summer (February, northern wet season) and (b) winter (July, northern dry season)

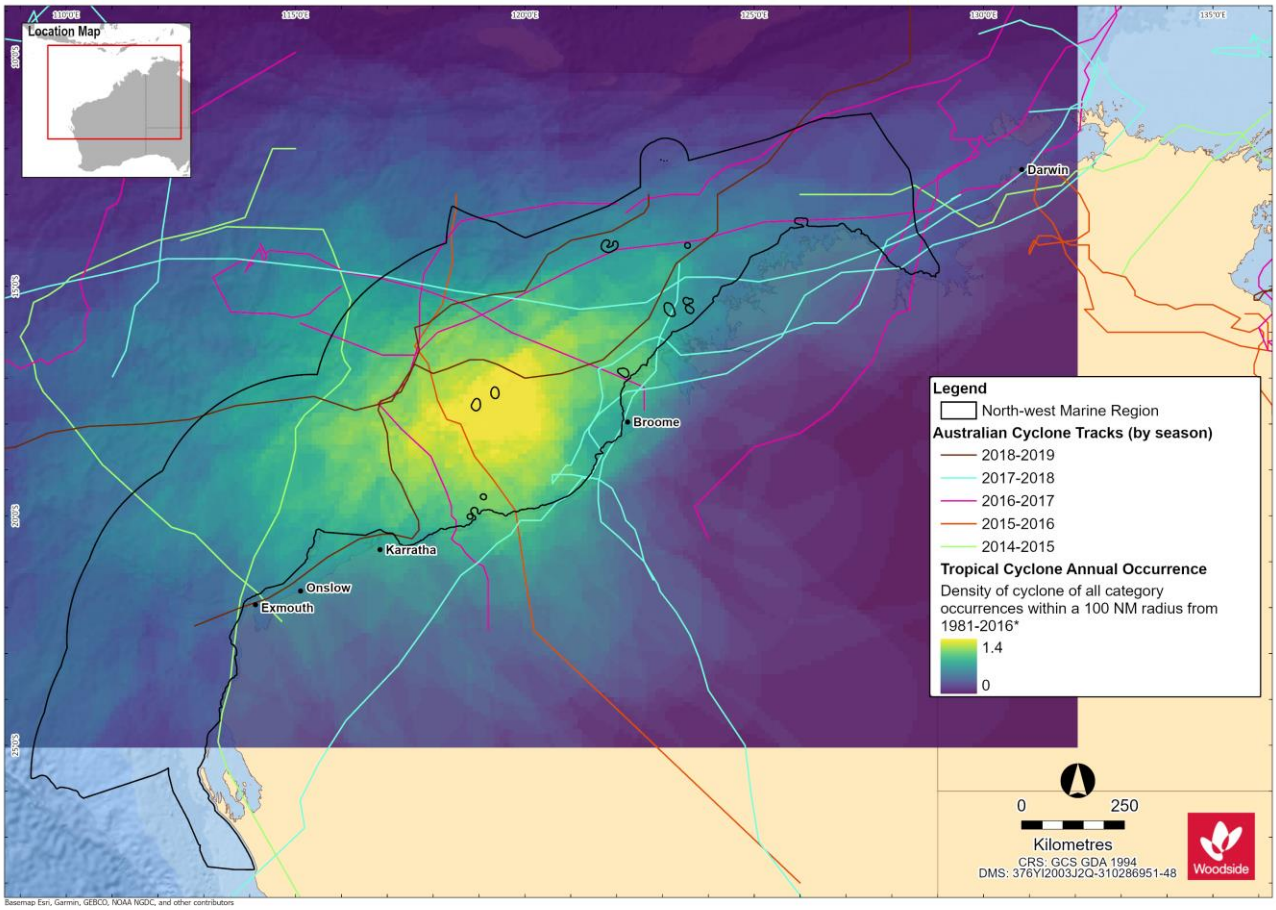

Figure 2-4. Tropical cyclone annual occurrence and cyclone tracks for NWMR

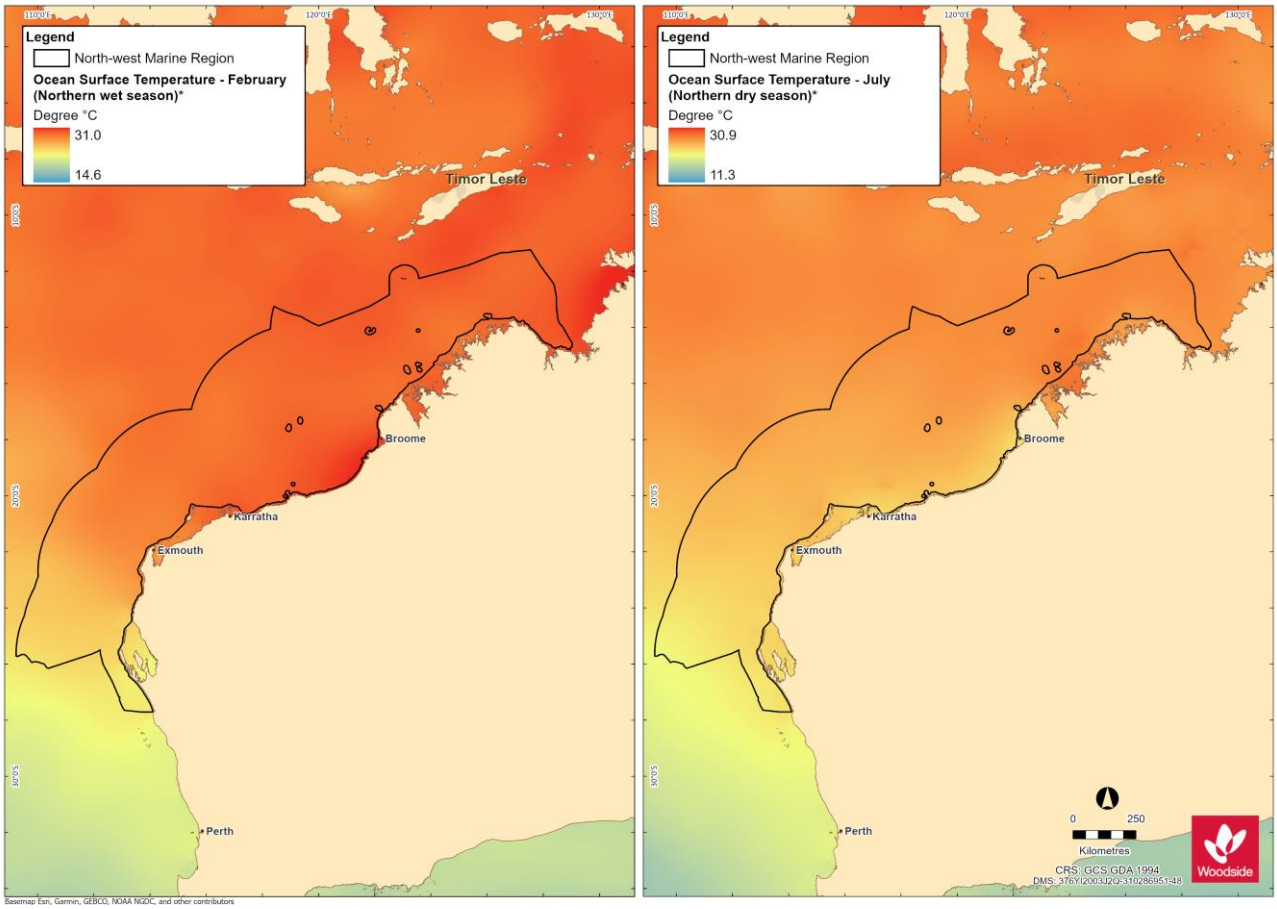

Figure 2-5. Ocean surface temperature for NWMR: (a) summer (February, northern wet season) and (b) winter (July, northern dry season)

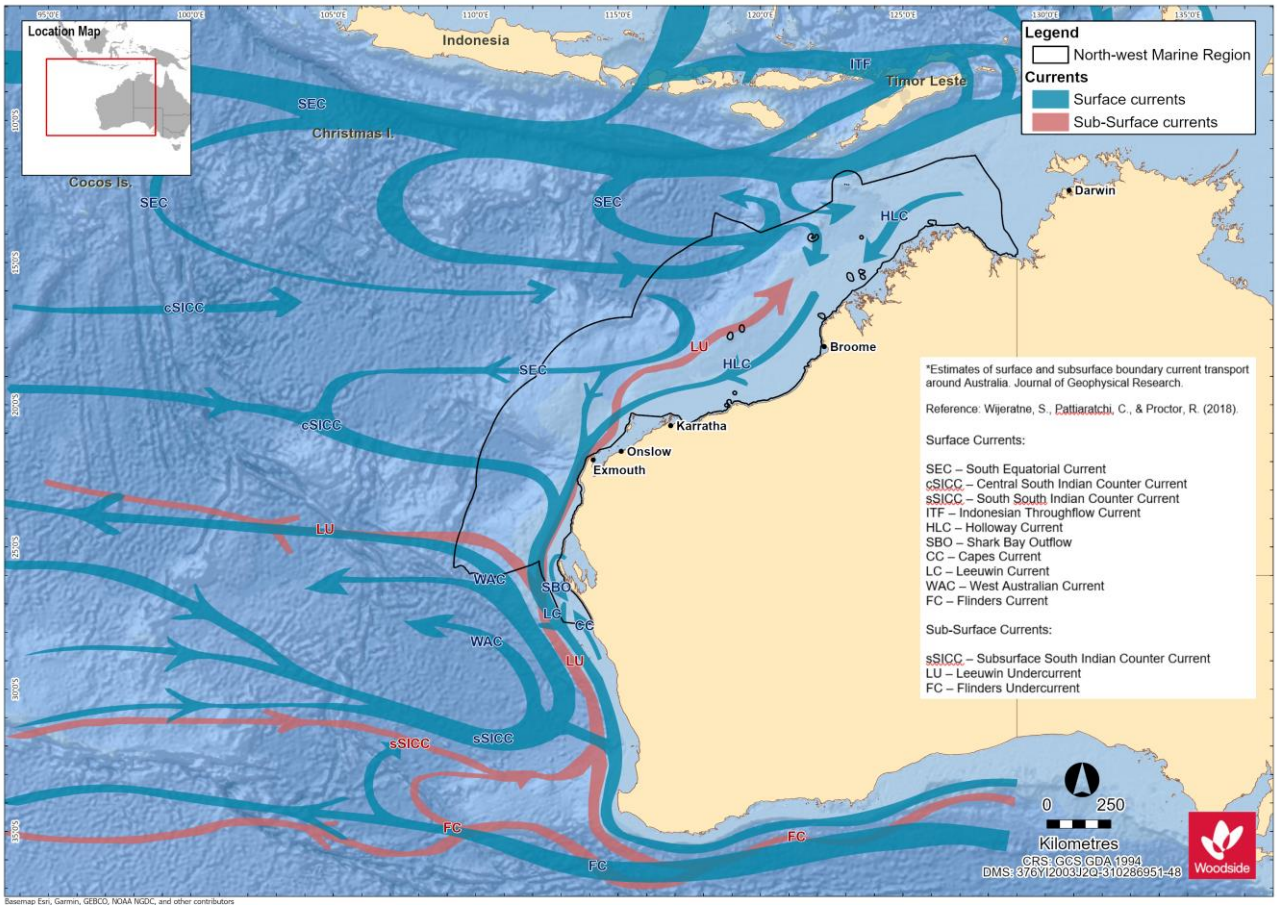

Figure 2-6. Ocean surface and sub-surface currents of the NWMR and wider region

2.3.1 Browse

Table 2-4 Summary meteorology and oceanography for Browse (refer to Appendix B for supporting metocean figures)

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 30.1ºC in 2011 to 32.6ºC in 2016 and highest mean monthly air temperatures were recorded for the months of November and December (BOM, 2021b).
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, 2021c).
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/hr and maximum wind gusts of 65 km/hr. In contrast the wet season brings predominately westerly winds with average wind speeds approximately 17 km/hr and maximum gusts exceeding 100 km/hr (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)

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 NWS ranged from a maximum average of 39.5ºC in summer to a minimum average temperature of 15.6ºC in winter (Woodside, 2012).
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).
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).
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 ITF 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 and 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)

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 37.5ºC) and mild winter temperatures (minimum average of 12.2ºC).
Rainfall	Rainfall typically occurs during the summer, with highest rainfall during later summer and autumn, often associated with the passage of tropical low-pressure systems and cyclones. Rainfall is typically low in winter.
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, 2016). 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 more than five kilometres. 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.

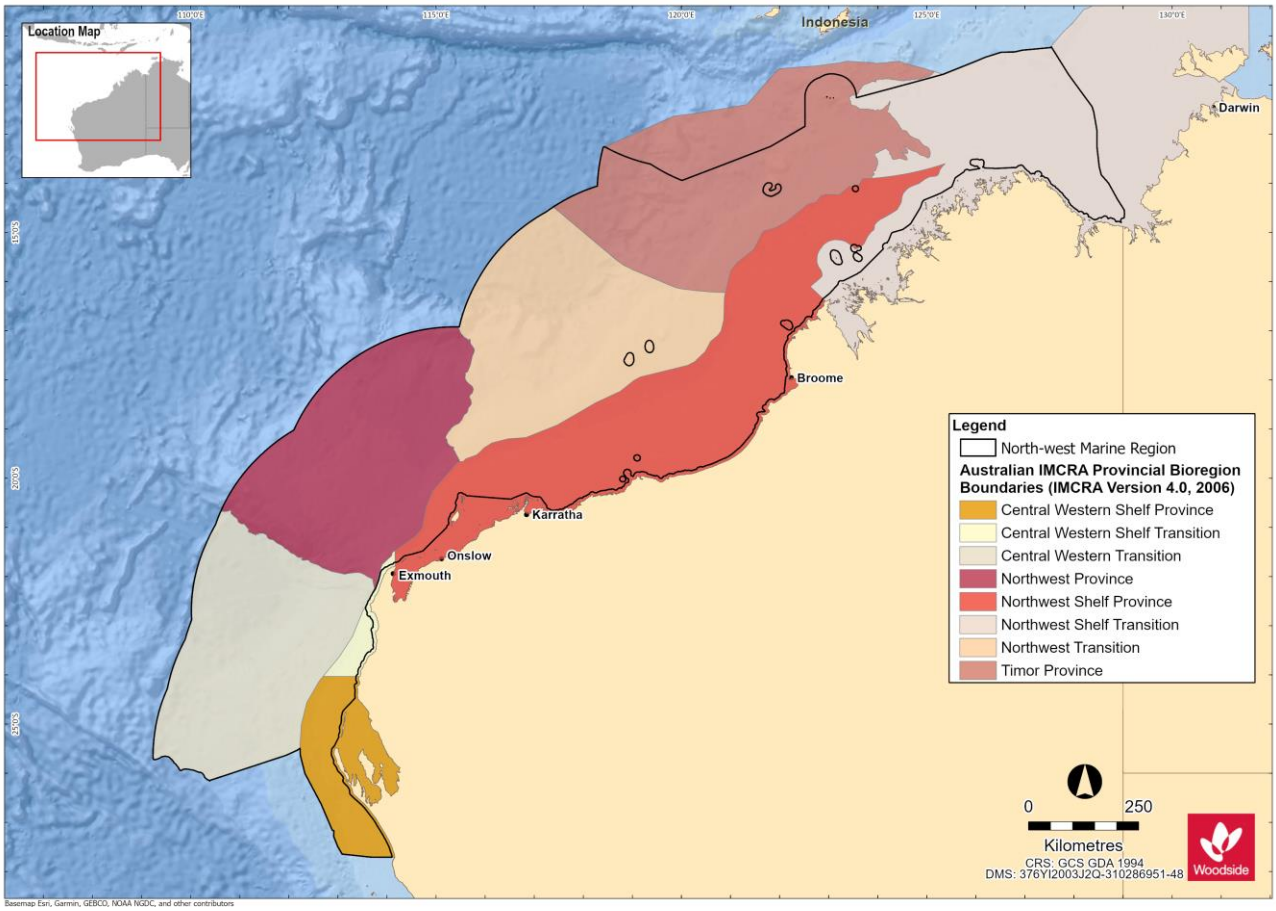

Figure 2-7. The eight provincial bioregions of the NWMR (Commonwealth of Australia, 2006)

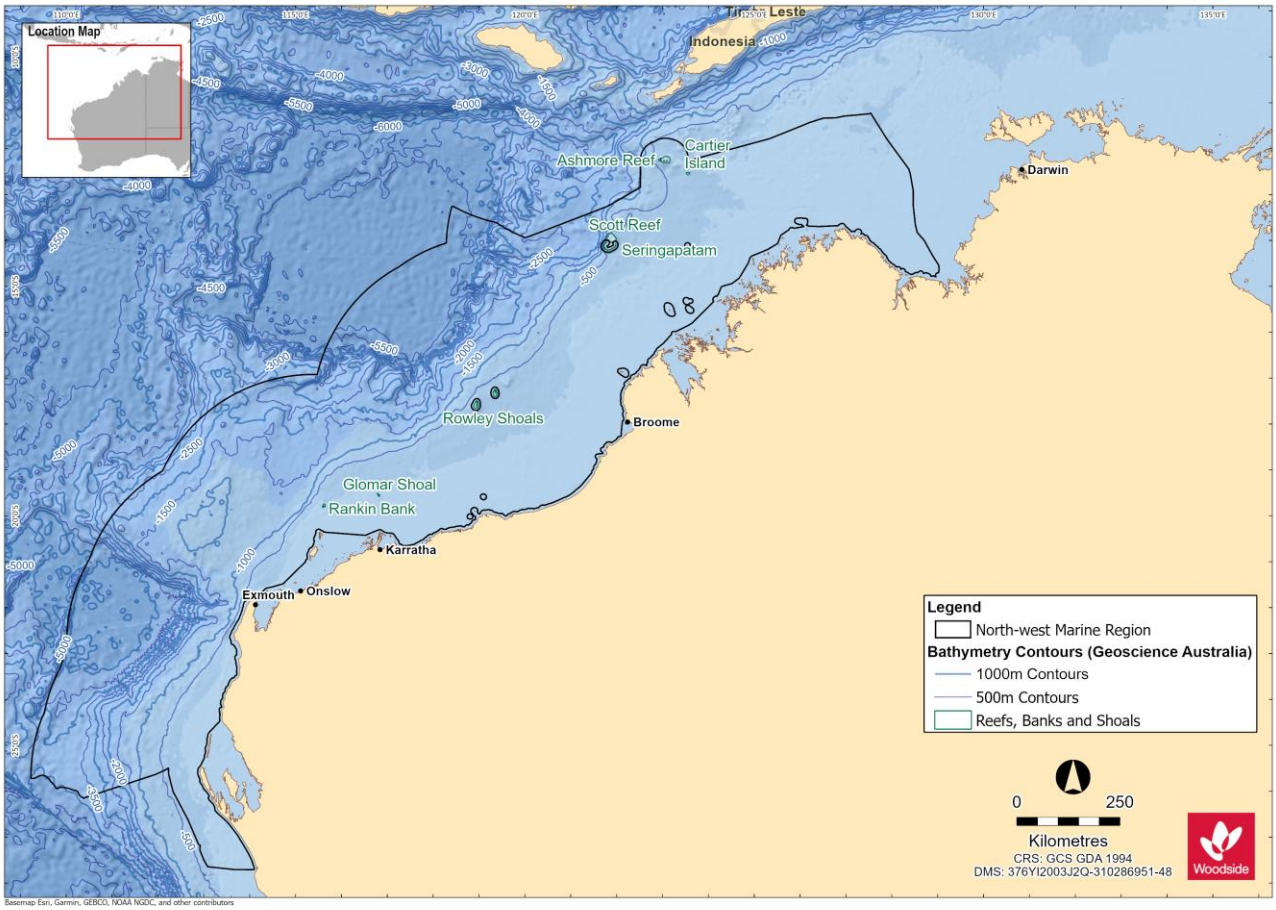

Figure 2-8. Bathymetry of the NWMR

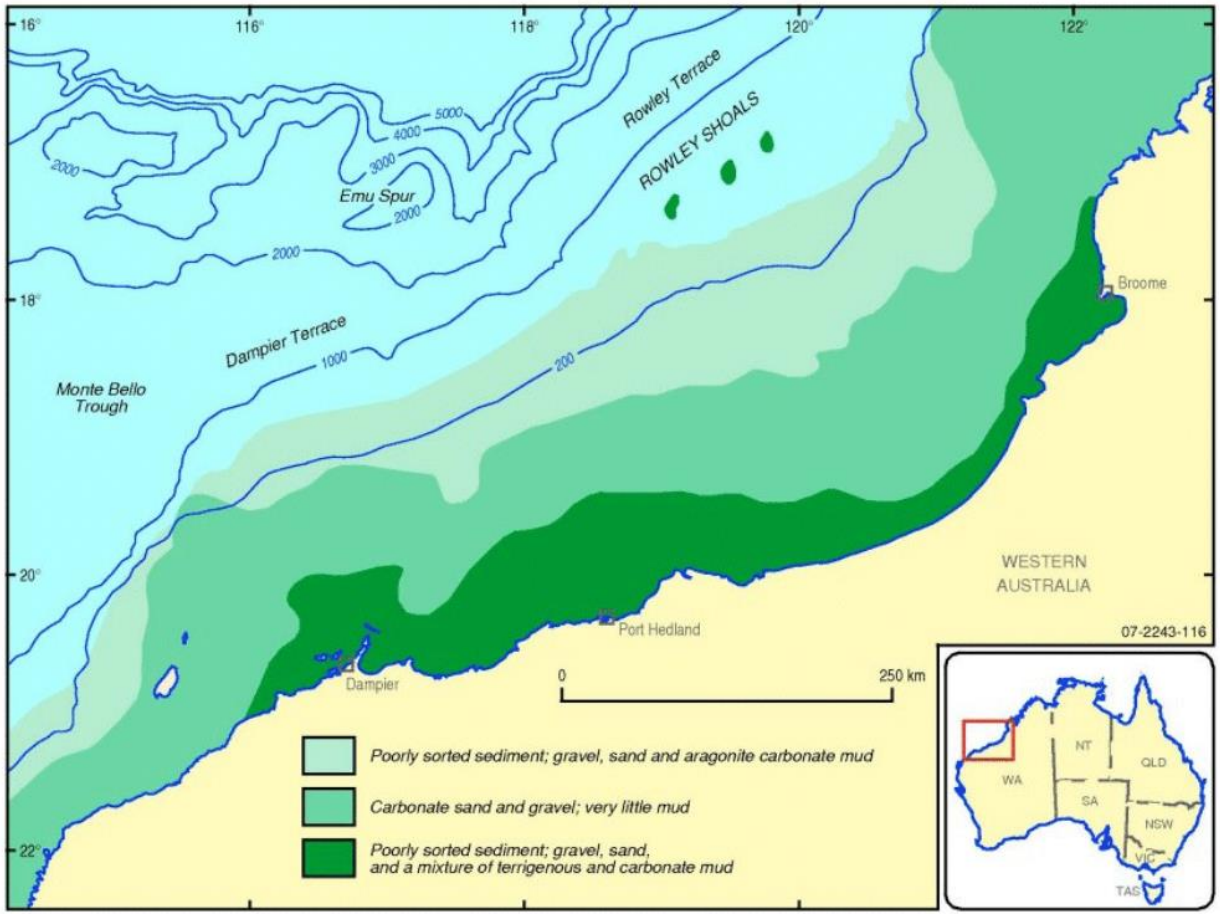

Figure 2-9. Overview of the seabed sediments of the NWMR (Baker *et al*., 2008)

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 are provided in subsequent sections (referenced below).

Table 3-1 Summary of MNES identified by the EPBC Act Protected Matters Search Tool (PMST) as potentially occurring within the NWMR

MNES	Number	Description	Section of this Document
World Heritage Properties	2	Shark Bay The Ningaloo Coast	**Section 10**
National Heritage Places	5	Shark Bay The Ningaloo Coast The West Kimberley The Dampier Archipelago (including Burrup Peninsula) Dirk Hartog Landing Site 1616	**Section 10**
Wetlands of International Importance (Ramsar)	3	Ashmore Reef National Nature Reserve Eighty Mile Beach Roebuck Bay[1]	**Section 10**
Commonwealth Marine Area	2	EEZ and Territorial Sea Key Ecological Features (KEFs) Australian Marine Parks (AMPs) Australian Whale Sanctuary Extended Continental Shelf	**Section 9** **Section 10**
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	70	Refer NWMR PMST report (**Appendix A**)	**Section 5 – Section 8**
Listed Migratory Species	84	Refer NWMR PMST report (**Appendix A**)	**Section 5 – Section 8**

[1] *Roebuck Bay is a designated Wetland of International Importance (Ramsar site), which was not included in the PMST Report (**Appendix A**).*

Table 3-2 Summary of MNES identified by the EPBC Act Protected Matters Search Tool (PMST) as potentially occurring within the SWMR

MNES	Number	Description	Section of this Document
World Heritage Properties	0	N/A	N/A
National Heritage Places	3	Cheetup Rock Shelter Batavia Shipwreck Site and Survivor Camps Area 1629 – Houtman Abrolhos HMAS Sydney II and HSK Kormoran Shipwreck Sites	**Section 10**
Wetlands of International Importance (Ramsar)	4	Becher Point Wetlands Forrestdale and Thomsons Lakes Peel-Yalgorup System Vasse-Wonnerup System	**Section 10**
Commonwealth Marine Area	2	EEZ and Territorial Sea KEFs AMPs Australian Whale Sanctuary Extended Continental Shelf	**Section 9** **Section 10**
Listed Threatened Ecological Communities	3	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	Terrestrial communities and not considered further
Listed Threatened Species	65	Refer SWMR PMST report (**Appendix A**)	N/A
Listed Migratory Species	67	Refer SWMR PMST report (**Appendix A**)	N/A

Table 3-3 Summary of MNES identified by the EPBC Act Protected Matters Search Tool (PMST) as 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 Area	2	EEZ and Territorial Sea KEFs AMPs Australian Whale Sanctuary Extended Continental Shelf	**Section 9** **Section 10**
Listed Threatened Ecological Communities	0	N/A	N/A
Listed Threatened Species	33	Refer NMR PMST report (**Appendix A**)	N/A
Listed Migratory Species	70	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, SWMR and 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, using the following criteria:

- overlap between the Woodside activity areas with habitat critical for the survival of marine turtles, and with BIAs (overlapping the marine environment) for any listed threatened 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 behaviours (e.g. breeding, nesting, calving, resting, foraging, migration); and
- environmental aspects associated with petroleum activities 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 EPBCA Act listed species for each marine bioregion refer to the PMST reports (**Appendix A**).

Table 3-4 Summary of MNES identified by the EPBC Act Protected Matters Search Tool (PMST) 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	Conservation Management Plan for the Southern Right Whale: A Recovery Plan under the *Environment Protection and Biodiversity Conservation Act 1999* 2011–2021 (DSEWPAC, 2012d)
Sei whale	Conservation Advice *Balaenoptera borealis* sei whale (Threatened Species Scientific Committee, 2015a)
Humpback whale	Conservation Advice *Megaptera novaeangliae* humpback whale (Threatened Species Scientific Committee, 2015b)
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) (due to expire in October 2023) 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)
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	Draft Wildlife Conservation Plan for Migratory Seabirds (Commonwealth of Australia, 2019)
Southern giant petrel	National recovery plan for threatened albatrosses and giant petrels 2011–2016 (DSEWPAC, 2011c)
Indian yellow-nosed albatross	National recovery plan for threatened albatrosses and giant petrels 2011–2016 (DSEWPAC, 2011c)
Abbott's booby	Conservation Advice for the Abbott's booby - *Papasula abbotti* (Threatened Species Scientific Committee, 2020b)
Australian fairy tern	Approved Conservation Advice for *Sterna nereis nereis* (Fairy Tern) (DSEWPAC, 2011d)
Australian lesser noddy	Conservation Advice *Anous tenuirostris melanops* Australian lesser noddy (Threatened Species Scientific Committee, 2015e)
Soft-plumaged petrel	Conservation Advice *Pterodroma mollis* soft-plumaged petrel (Threatened Species Scientific Committee, 2015f)
Shorebirds	
Migratory shorebird species	Wildlife Conservation Plan for Migratory Shorebirds (Commonwealth of Australia, 2015c)
Eastern curlew, far eastern curlew	Conservation Advice *Numenius madagascariensis* eastern curlew (DOE, 2015a)
Curlew sandpiper	Conservation Advice *Calidris ferruginea* curlew sandpiper (DOE, 2015b)
Great knot	Conservation Advice *Calidris tenuirostris* Great knot (Threatened Species Scientific Committee, 2016a)
Red knot, knot	Conservation Advice *Calidris canutus* Red knot (Threatened Species Scientific Committee, 2016b)
Bar-tailed godwit (*menzbieri*)	Conservation Advice *Limosa lapponica menzbieri* Bar-tailed godwit (northern Siberia) (Threatened Species Scientific Committee, 2016c)
Greater sand plover	Conservation Advice *Charadrius leschenaultii* Greater sand plover (Threatened Species Scientific Committee, 2016d)
Lesser sand plover	Conservation Advice *Charadrius mongolus* Lesser sand plover (Threatened Species Scientific Committee, 2016e)

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 and 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) play a role in making nutrients available in the photic zone. 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. Within the Pilbara system of the NWMR (approximately equates to the NWS / Scarborough activity area). 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 kilometres) 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 coral reefs and limestone pavement.

The key habitats and biological communities 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**.

4.4.2 Shoreline habitats and biological communities

The NWMR encompasses offshore and coastal waters, islands and mainland shoreline habitats typified by mangroves, tidal flats, saltmarshes, 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, etc.) 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**.

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 9**
	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 9**
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 10**
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 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 10**
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	Glomar Shoal Rankin Bank	Cape Range canyon system	**Section 10**

Habitat/Community	Browse	NWS / Scarborough	North-west Cape	Reference
	systems such as Scott Reef	Ancient coastline at 125 m depth contour KEF		
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 10**
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 10**
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 10**
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 are 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	

Habitat/Community	Browse	NWS / Scarborough	North-west Cape	Reference
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	
Saltmarshes	Saltmarshes 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	
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	

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 90-120 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 90-120 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
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

Habitat/Community	Location
	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 is 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
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

Habitat/Community	Location
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.
	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 fish fauna in the NWMR is diverse. 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 11**.

Table 5-1 outlines the threatened and migratory fish species that may occur within the NWMR, with their conservation status and relevant recovery plans and/or conservation advice. **Table 5-2** provides information for species of fish that are listed as conservation dependent that may occur within the NWMR, NMR and SWMR. Note that currently there are no approved Conservation Advices in place for any of these five species.

Table 5-1 Fish species (including sharks and rays) identified by the EPBC Act PMST for the NWMR

Species Name	Common Name	*Environment Protection and Biodiversity Conservation Act 1999*			WA *Biodiversity Conservation Act 2016*	EPBC Act Part 13 Statutory Instrument
		Threatened Status	Migratory Status	Listed	Conservation Status	
Rhincodon typus	Whale shark	Vulnerable	Migratory	Marine	Other specially protected fauna	Conservation Advice *Rhincodon typus* whale shark. (Threatened Species Scientific Committee, 2015d)
Carcharias taurus	Grey nurse shark (west coast population)	Vulnerable	N/A	Marine	Vulnerable	Recovery Plan for the Grey Nurse Shark (*Carcharias taurus*) (DOE, 2014a)
Carcharodon carcharias	White shark	Vulnerable	Migratory	Marine	Vulnerable	Recovery Plan for the White Shark (*Carcharodon carcharias*) (DSEWPAC, 2013b)
Isurus oxyrinchus	Shortfin mako	N/A	Migratory	Marine	N/A	N/A
Isurus paucus	Longfin mako	N/A	Migratory	Marine	N/A	N/A
Lamna nasus	Porbeagle shark Mackerel shark	N/A	Migratory	Marine	N/A	N/A
Carcharhinus longimanus	Oceanic whitetip shark	N/A	Migratory	Marine	N/A	N/A
Anoxypristis cuspidata	Narrow sawfish	N/A	Migratory	Marine	N/A	N/A
Pristis clavata	Dwarf sawfish	Vulnerable	Migratory	Marine	Priority	Sawfish and River Sharks Multispecies Recovery Plan (Commonwealth of Australia, 2015b)
Pristis pristis	Largetooth (Freshwater) sawfish	Vulnerable	Migratory	Marine	Priority	
Pristis zijsron	Green sawfish	Vulnerable	Migratory	Marine	Vulnerable	
Glyphis garricki	Northern river shark	Endangered	N/A	Marine	Priority	
Manta alfredi	Reef manta ray	N/A	Migratory	Marine	N/A	N/A
Manta birostris	Giant manta ray	N/A	Migratory	Marine	N/A	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
Thunnus maccoyii	Southern bluefin tuna	NWMR and SWMR	Threatened Species Scientific Committee (2010)
Sphyrna lewini	Scalloped hammerhead	NWMR, NMR and SWMR	Threatened Species Scientific Committee (2018)
Centrophorus zeehaani	Southern dogfish, Endeavour dogfish, Little gulper shark	SWMR	Threatened Species Scientific Committee (2013)
Galeorhinus galeus	School shark, Eastern school shark, Snapper shark, Tope, Soupfin shark	SWMR	Threatened Species Scientific Committee (2009)

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 (refer **Table 5-2**).

5.2.1 Sharks and Sawfishes

The shark species known to occur within the NWMR include: the whale shark, grey nurse shark, white shark, shortfin mako, and longfin mako (**Table 5-2**).

Five species of river shark or sawfish known to occur in the NWMR and include: the narrow sawfish, northern river shark, freshwater sawfish, green sawfish and dwarf sawfish (**Table 5-2**).

There are identified BIAs within the NWMR for the whale shark, freshwater sawfish, green sawfish, and dwarf sawfish (refer **Section 5.3.2**).

Table 5-2 Information on the threatened shark and sawfish species 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, both oceanic and coastal (Last and Stevens, 2009). The species is widely distributed in Australian waters. Diet: Whale sharks are planktivorous sharks and feed on a variety of planktonic organisms 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). Refer **Table 5-3** for the BIA summary for the whale shark.
Grey nurse shark (west coast population)	Preferred habitat: Most commonly 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). 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.

Species	Preferred Habitat and Diet	Habitat Location
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 in 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, most likely has a broad distribution within the NWMR. No BIAs identified for NWMR.
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). 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, 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 oceanic distribution in tropical and temperate seas (Mollet *et al.*, 2000). 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). 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 on the NWS in the 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. Target 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, 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). Diet: Variety of fish and crustaceans (Stevens *et al.*, 2005)	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).	Refer **Table 5-3** for the BIA summary for the 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). Diet: Schools of baitfish and prawns (Poganoski *et al.*, 2002), molluscs and small crustaceans (Cliff and Wilson, 1994).	Refer **Table 5-3** for the BIA summary for the green sawfish.
Dwarf sawfish	Preferred habitat[1]: Shallow (2 to 3 m) silty coastal waters and estuarine habitats, occupying relatively restricted areas and moving only small distances (Stevens *et al.*, 2008) Diet: Shoaling fish such as mullet, molluscs, and small crustaceans (Cliff and Wilson, 1994).	Refer **Table 5-3** 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 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 5-3 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). 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	The Ningaloo Coast is an important area for giant manta rays from March to August (Preen *et al.*, 1997).

Species	Preferred Habitat and Diet	Habitat Location
	to be seasonal visitors to coastal or offshore sites including offshore island groups, offshore pinnacles and seamounts (Marshall *et al.*, 2011). Diet: Feed on planktonic organisms including krill and crab larvae.	No BIAs identified for NWMR.

5.3 Fish, Shark and Sawfish Biological Important Areas in the NWMR

A review of the National Conservation Values Atlas identified Biologically Important Areas (BIAs) for four species of shark and sawfish (whale shark, freshwater sawfish, green sawfish and dwarf sawfish) within the NWMR. The BIAs for the whale shark and the sawfish species include foraging, nursing and pupping areas. These are described in **Table 5-4**.

Table 5-4 Fish, whale shark and sawfish BIAs within the NWMR

Species	Woodside Activity Area			BIAs		
	Browse	NWS/S	NWC	Pupping	Nursing	Foraging
Whale shark	✓	✓	✓	No pupping BIA identified within the NWMR	No nursing BIA identified within the NWMR	Foraging (high density) in Ningaloo Marine Park and adjacent Commonwealth waters (March–July) Foraging northward from Ningaloo along the 200 m isobath (July – 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	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 (January to May) Roebuck Bay (Jan – May) Pupping likely in waters adjacent to Eighty Mile Beach	Nursing (likely) in King Sound Roebuck Bay (Jan – May)	Foraging in the mouth of the Fitzroy River (January to 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	Foraging in King Sound Foraging in Camden Sound Foraging in waters adjacent to Eighty Mile Beach

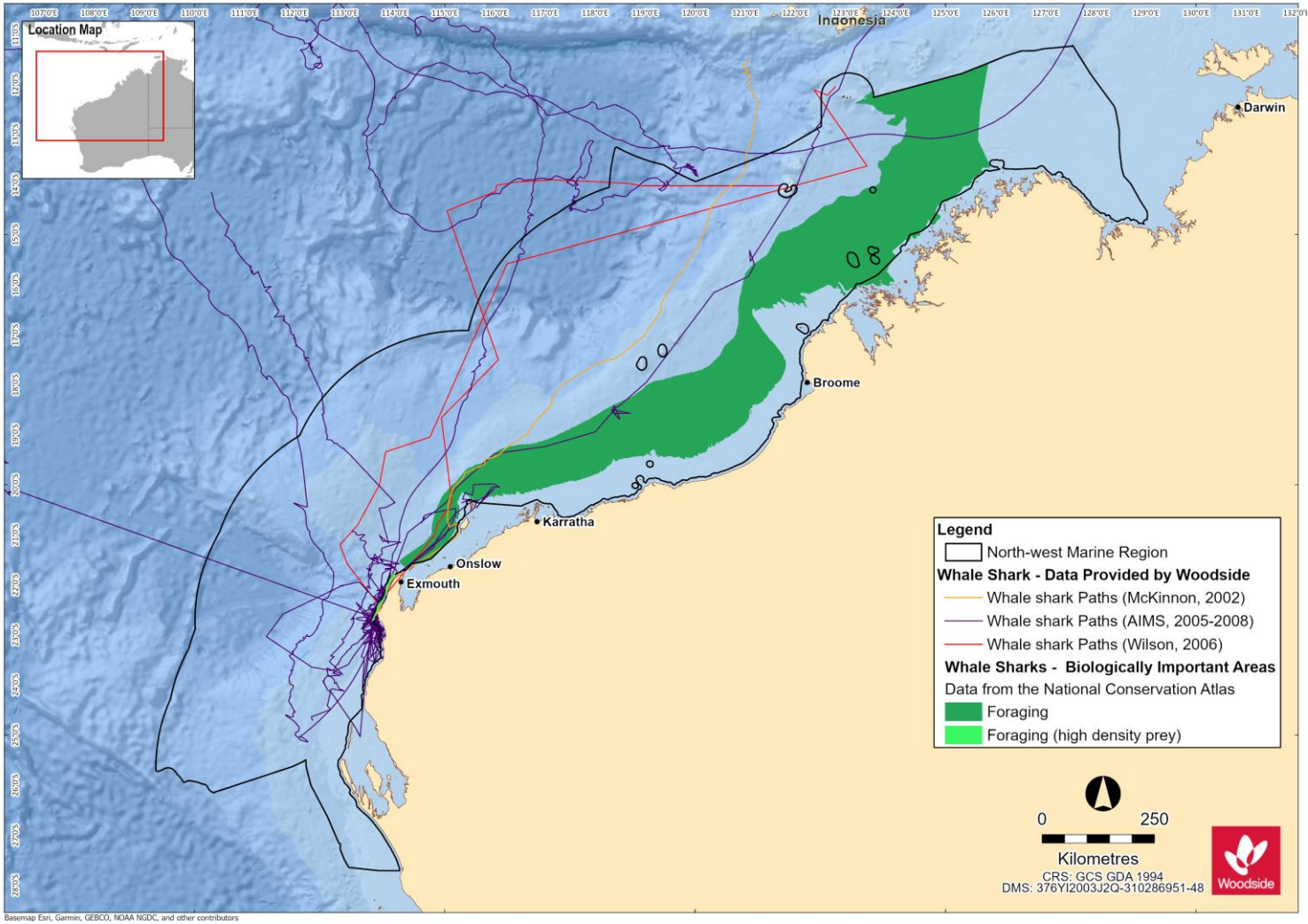

Figure 5-1 Whale shark BIAs for the NWMR and tagged whale shark tracks

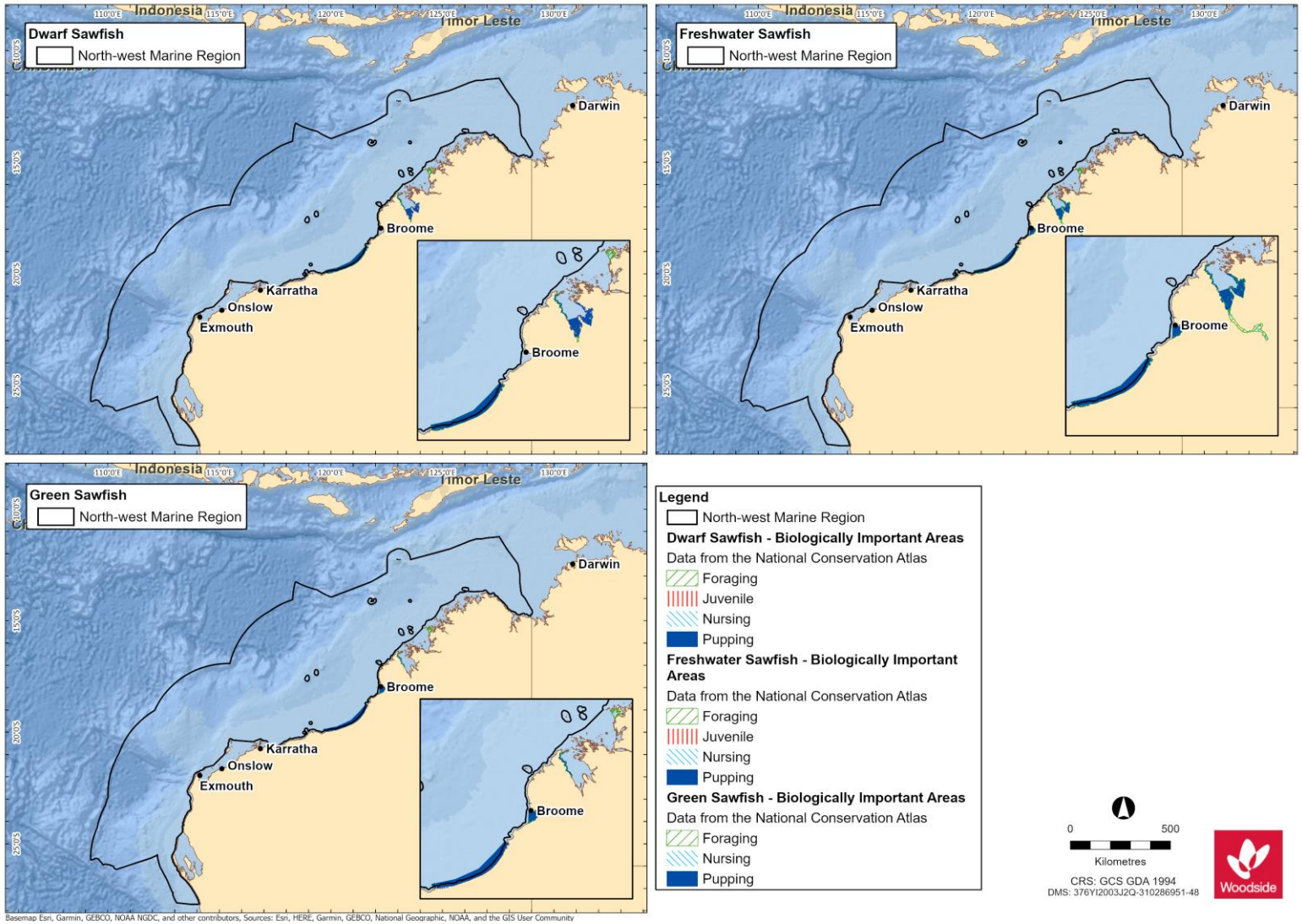

Figure 5-2 Sawfish BIAs for the NWMR

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.

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, 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 9**.

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).

5.4.2 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 44 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.

5.4.3 Browse

The proposed Browse activity area includes biologically important habitat for the whale shark and three sawfish species:

- whale shark (foraging northward from Ningaloo along the 200 m isobath (July – Nov),
- freshwater sawfish (pupping, nursing and foraging areas),
- green sawfish (pupping, nursing and foraging areas); and
- dwarf sawfish (pupping, nursing and foraging areas).

BIAs for the shark and sawfish species are outlined in **Table 5-4** and **Figure 5-1**.

The proposed Browse activity area has partial overlap with the Continental slope demersal fish communities KEF.

5.4.4 NWS / Scarborough

The NWS / Scarborough activity area includes biologically important habitat for the whale shark and three sawfish species:

- whale shark (foraging northward from Ningaloo along the 200 m isobath (July – Nov),
- freshwater sawfish (pupping, nursing and foraging areas),
- green sawfish (pupping, nursing and foraging areas); and
- dwarf sawfish (pupping, nursing and foraging areas).

BIAs for the whale shark and sawfish species are outlined in **Table 5-4** 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).

5.4.5 North-west Cape

The North-west Cape activity area includes biologically important foraging habitat for the whale shark:

- whale shark, including:
  - Foraging (high density) in Ningaloo Marine Park and adjacent Commonwealth waters (March–July); and
  - Foraging northward from Ningaloo along the 200 m isobath (July – Nov).

BIAs for the whale shark are outlined in **Table 5-4** 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.

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. Nineteen (19) listed sea snake species are known to occur in the NMR, as reported in the Protected Matters search (**Appendix A**).

There are significantly fewer marine reptile species that frequently occur within the SWMR and presently include three species of listed marine turtle and one sea snake species. Other species of sea snake may occur because of the southward-flowing Leeuwin Current, as vagrants in the region (DSEWPAC, 2012b).

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 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 as potentially occurring within or utilising habitats in the NWMR for key life cycle stages

Species Name	Common Name	*Environment Protection and Biodiversity Conservation Act 1999*			WA *Biodiversity Conservation Act 2016*	EPBC Act Part 13 Statutory Instrument
		Threatened Status	Migratory Status	Listed	Conservation Status	
Caretta caretta	Loggerhead turtle	Endangered	Migratory	Marine	Endangered	Recovery Plan for Marine Turtles in Australia 2017-2027 (Commonwealth of Australia, 2017)
Chelonia mydas	Green turtle	Vulnerable	Migratory	Marine	Vulnerable	
Dermochelys coriacea	Leatherback turtle	Endangered	Migratory	Marine	Vulnerable	
Eretmochelys imbricata	Hawksbill turtle	Vulnerable	Migratory	Marine	Vulnerable	
Natator depressus	Flatback turtle	Vulnerable	Migratory	Marine	Vulnerable	
Lepidochelys olivacea	Olive ridley turtle	Endangered	Migratory	Marine	Vulnerable	
Aipysurus apraefrontalis	Short-nosed sea snake	Critically endangered	N/A	Marine	Critically endangered	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	Approved Conservation Advice for *Aipysurus foliosquama* (Leaf-scaled Sea Snake) (DSEWPAC, 2011b)
Crocodylus porosus	Salt-water crocodile	N/A	Migratory	Marine	Other protected fauna	N/A

6.2 Marine Turtles in the NWMR

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*) turtle (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.

Three marine turtle species; the green, loggerhead, 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. Majority of their lives are spent in the ocean, but the adult female marine turtles will come 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).

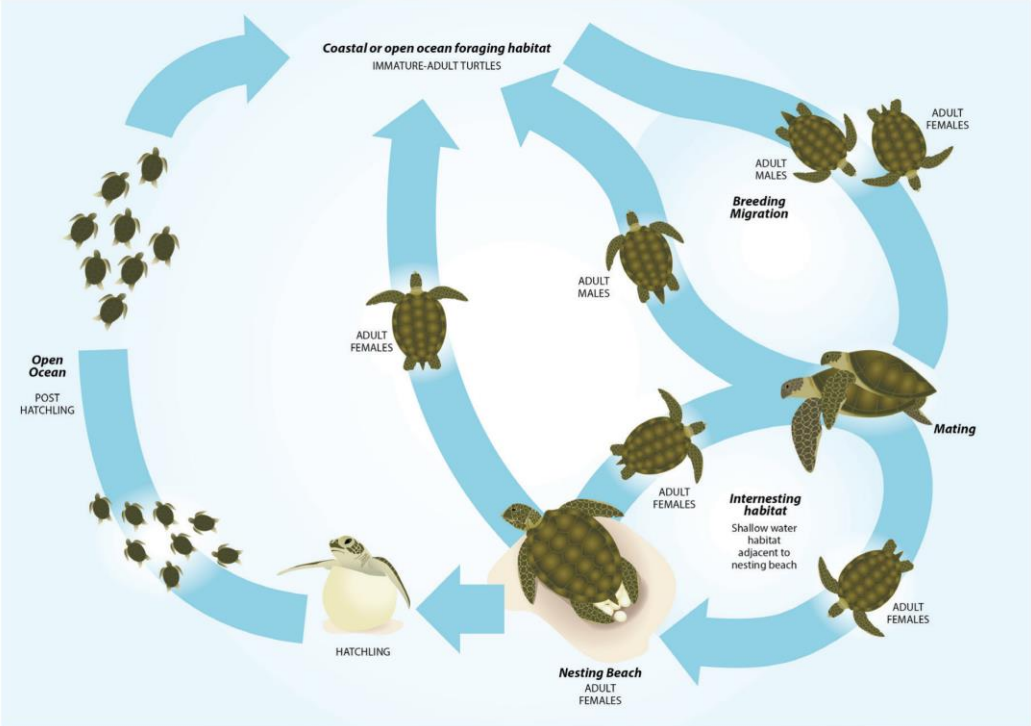

Figure 6-1 Generalised life cycle of marine turtles (Commonwealth of Australia, 2017)

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; and
- 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	
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.

Species	Woodside Activity Area			Habitat Critical to Survival			
	Browse	NWS/S	NWC	Nesting (* Major Rookery[1])	Internesting Buffer	Seasonality-Nesting	Preferred Habitat[2]
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	
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	

Species	Woodside Activity Area			Habitat Critical to Survival			
	Browse	NWS/S	NWC	Nesting (* Major Rookery[1])	Internesting Buffer	Seasonality-Nesting	Preferred Habitat[2]
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)*

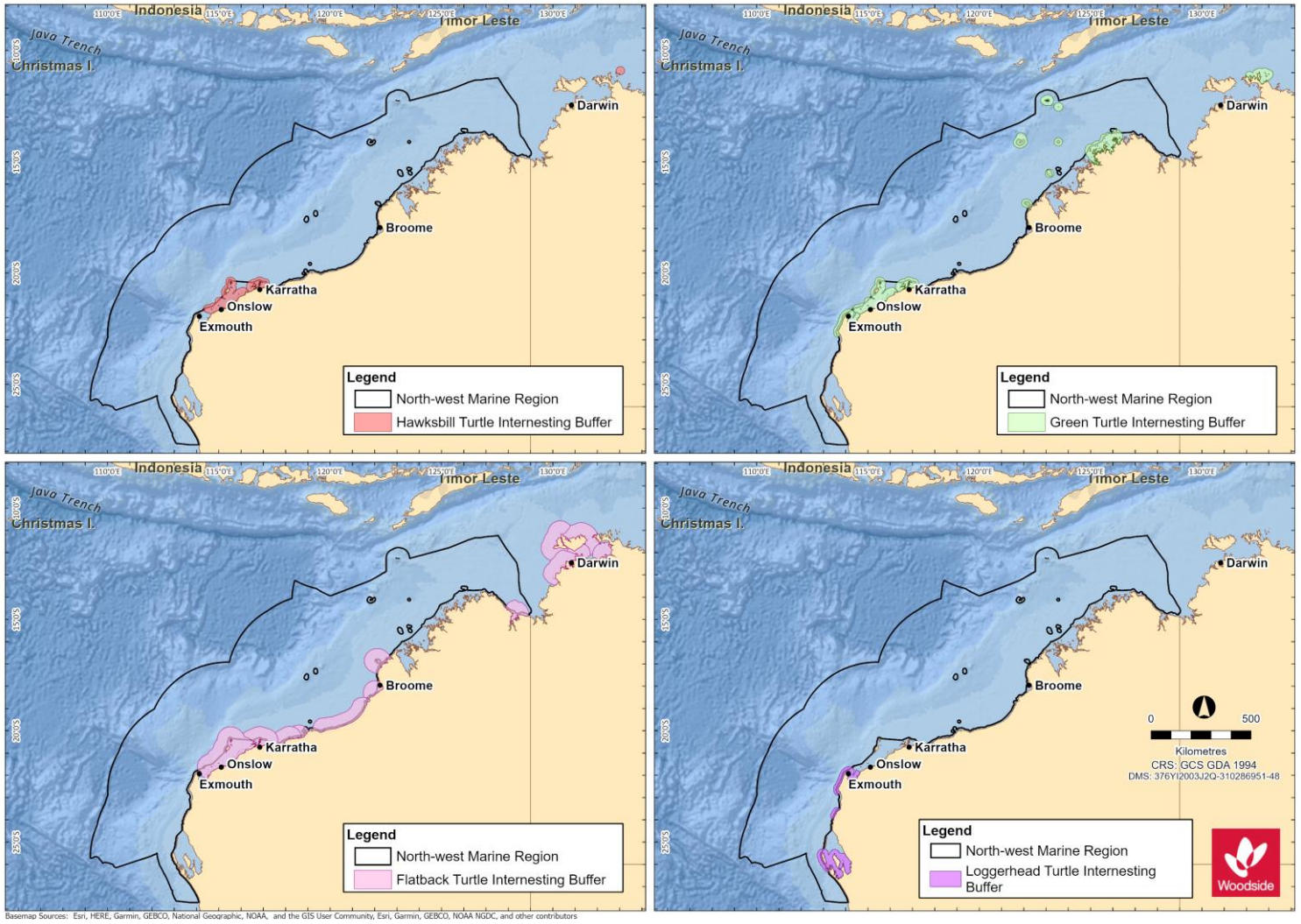

Figure 6-2 Marine turtle species habitat critical to survival (nesting beaches and internesting buffers) for the NWMR

6.3 Marine Turtle Biological Important Areas in the NWMR

A review of the National Conservation Values Atlas (DAWE, 2020[2]) identified BIAs for the four marine turtle species that occur within the NWMR. These are described in **Table 6-3**. Note that nesting and internesting BIAs are not listed in **Table 6-3** as they are defined as in the Recovery Plan as habitat critical to survival for marine turtles nesting beaches and internesting areas (refer **Table 6-2**).

[2] http://www.environment.gov.au/webgis-framework/apps/ncva/ncva.jsf

Table 6-3 Marine turtle BIAs within the NWMR

Species	Woodside Activity Area			BIAs		
	Browse	NWS/S	NWC	Mating	Foraging	Migration[3]
Green turtle	✓	✓	✓	No mating BIA identified within the NWMR.	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 Foraging in waters adjacent to James Price Point	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, including the NT and Queensland.
Hawksbill turtle	✓	✓	✓	No mating BIA identified within the NWMR.	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	Individuals may migrate up to 2400 km between their nesting and foraging grounds (DSEWPAC, 2012a).

[3] Migration BIA does not exist for Marine Turtles – general information provided.

Species	Woodside Activity Area			BIAs		
	Browse	NWS/S	NWC	Mating	Foraging	Migration[3]
					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	
Flatback turtle	✓	✓	-	Lacepede Islands Mating at Montebello Islands Mating at Dampier Archipelago (islands to the west of the Burrup Peninsula) Mating at Barrow Island A year-round internesting buffer biologically important area (BIA) of 80 km is located north and north-west of the Montebello Islands, extending 20 km further than the habitat critical to survival. However, use level for this BIA has been defined as very low (Commonwealth of Australia, 2017) and the habitat critical to survival internesting buffer is the legally recognised area of protection under the EPBC Act *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance* Refer to the Marine Bioregional Plan for the North-west Marine Region (DSEWPAC, 2012a) for locations of seasonal 80 km internesting buffer BIAs for flatback turtles	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	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).

Species	Woodside Activity Area			BIAs		
	Browse	NWS/S	NWC	Mating	Foraging	Migration[3]
Loggerhead turtle	✓	✓	-	No mating BIA identified within the NWMR	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	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, 2012).
Olive ridley turtle	✓	✓	-	No mating BIA identified within the NWMR	Foraging in the Western Joseph Bonaparte Depression and Gulf Foraging in the Dampier Archipelago (islands to the west of the Burrup Peninsula)	Migration routes and distances between nesting beaches and foraging areas are not known for Australian olive ridley turtles.

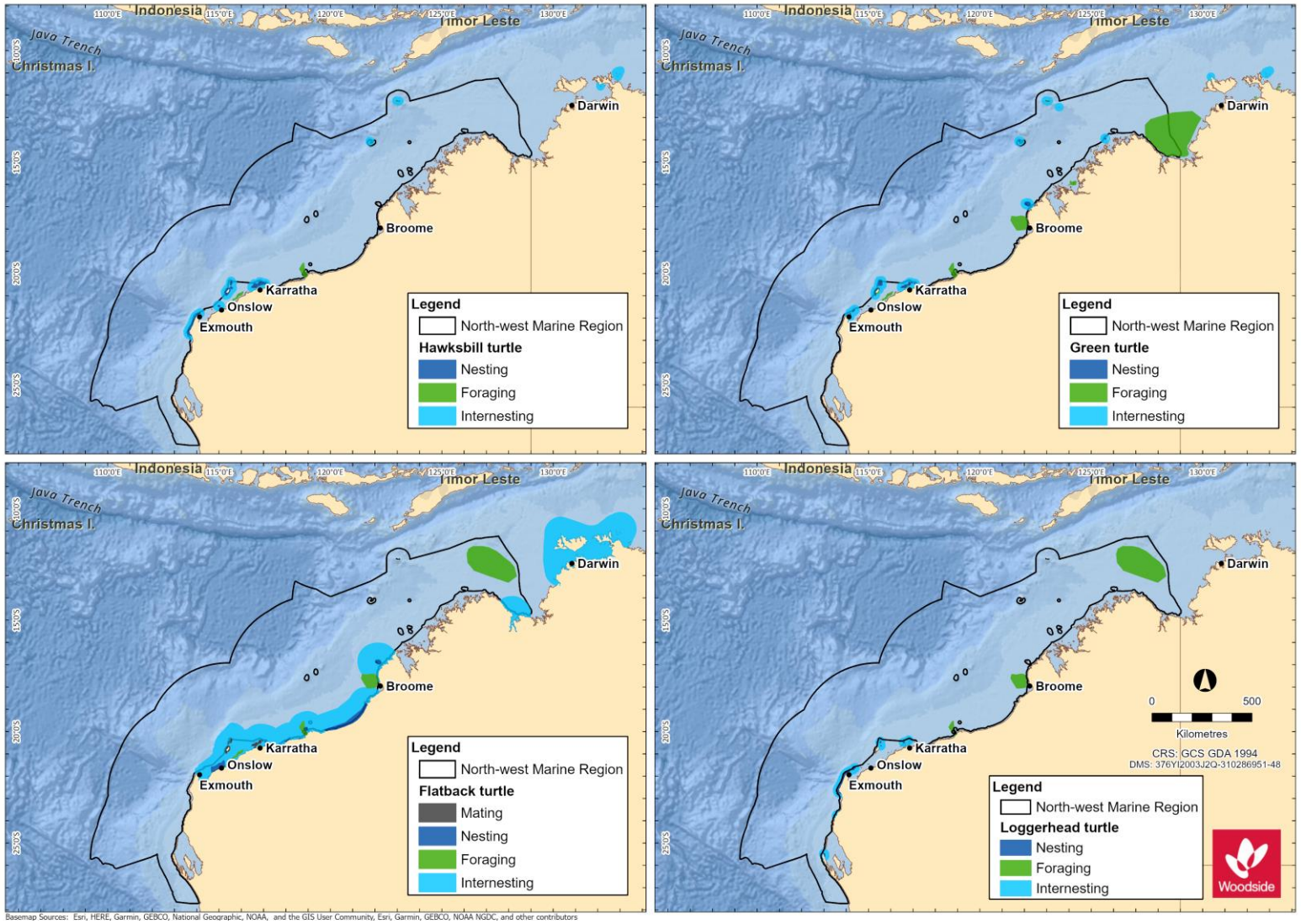

Figure 6-3 Marine turtle species BIAs within the NWMR

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 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); and
- 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 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).

Species / Genetic Stock	Key Information
Flatback Turtle	
Cape Domett Stock (F-CD)	Cape Domett is an important high density nesting area. 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; and
- the flatback turtle, South-west Kimberley stock and Pilbara genetic stocks.

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 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 G-NWS stock within the NWS / Scarborough activity area are located at Barrow 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, 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 500-1000 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, 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, October to March.

Species / Genetic Stock	Key Information
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 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, October to March. 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).

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; and
- the loggerhead turtle, Western Australia 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 loggerhead turtles are outlined in **Table 6-3** 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, November to March.
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, 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).

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*); and
- leaf-scaled sea snake (*Aipysurus foliosquama*).

The short-nosed sea snake and the leaf-scaled sea snake are listed threatened species (Critically Endangered) under the EPBC Act **(Table 6-7**).

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 km^2 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 the two threatened sea snake species within the NWMR

Species	Preferred Habitat and Diet	Habitat Location
Short-nosed sea snake	Preferred habitat: Primarily on the reef flats or in shallow waters of the 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, Muiron Islands, 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).

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.

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, 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 also support significant populations of dugong (DSEWPAC, 2012a, c).

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 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. However, there is little knowledge of the seasonal movements, migrations and breeding seasonality for many of the marine mammal species in the NMR due to lack of extensive surveys (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 as occurring within the NWMR

Species Name	Common Name	*Environment Protection and Biodiversity Conservation Act 1999*			WA *Biodiversity Conservation Act 2016*	EPBC Act Part 13 Statutory Instrument
		Threatened Status	Migratory Status	Listed	Conservation Status	
Cetaceans - Mysticeti						
Balaenoptera musculus	Blue whale	Endangered	Migratory	Cetacean	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	Conservation Management Plan for the Southern Right Whale: A Recovery Plan under the *Environment Protection and Biodiversity Conservation Act 1999* 2011-2021 (DSEWPAC, 2012d)
Balaenoptera borealis	Sei whale	Vulnerable	Migratory	Cetacean	Endangered	Conservation Advice *Balaenoptera borealis* sei whale (Threatened Species Scientific Committee, 2015a)
Megaptera novaeangliae	Humpback whale	Vulnerable	Migratory	Cetacean	Conservation dependent	Conservation Advice *Megaptera novaeangliae* humpback whale (Threatened Species Scientific Committee, 2015b)
Balaenoptera physalus	Fin whale	Vulnerable	Migratory	Cetacean	Endangered	Conservation Advice *Balaenoptera physalus* fin whale (Threatened Species Scientific Committee, 2015c)
Balaenoptera edeni	Bryde's whale	N/A	Migratory	Cetacean	N/A	N/A
Balaenoptera bonaerensis	Antarctic minke whale	N/A	Migratory	Cetacean	N/A	N/A
Cetaceans - Odontoceti						
Physeter macrocephalus	Sperm whale	N/A	Migratory	Cetacean	Vulnerable	N/A
Orcinus orca	Killer whale	N/A	Migratory	Cetacean	N/A	N/A
Orcaella heinsohni	Australian snubfin dolphin	N/A	Migratory	Cetacean	Priority	N/A
Sousa chinensis	Indo-Pacific humpback dolphin	N/A	Migratory	Cetacean	Priority	N/A

Species Name	Common Name	*Environment Protection and Biodiversity Conservation Act 1999*			WA *Biodiversity Conservation Act 2016*	EPBC Act Part 13 Statutory Instrument
		Threatened Status	Migratory Status	Listed	Conservation Status	
Tursiops aduncus	Spotted bottlenose dolphin (Arafura/Timor Sea populations)	N/A	Migratory	Cetacean	N/A	N/A
Sirenians and Pinnipeds						
Dugong dugon	Dugong	N/A	Migratory	Marine	Other protected fauna	N/A
Neophoca cinerea	Australian sea lion	Endangered	N/A	Marine	Vulnerable	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 areas, characterised by high productivity, and migration routes associated with reproductive patterns. The NWMR is thought to be 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.

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.

Table 7-2 Information on the threatened/migratory marine mammal species within the NWMR

Species	Key Information
Baleen whales (Mysticeti)	
Humpback whale	In Australian waters two genetically distinct populations migrate annually along the west (Group IV) and east coasts (Group V) between May and November. In WA, the migration pathway for the Group IV population (also known as Breeding Stock D) extends from Albany to the Kimberley coastline, passing through the NWMR (Threatened Species Scientific Committee, 2015b). Since the 1982 moratorium on commercial whaling population numbers have recovered significantly; 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 (CI 20,152–33,272) in 2008 (Salgado Kent *et al.*, 2012). Current population growth for the Group IV population is estimated to be between 9.7 and 13% per annum (Threatened Species Scientific Committee, 2015b). Using the Salago-Kent *et al.* (2012) estimate of 26,100 individuals and an annual population growth rate of ~10%, current population size could be in excess of 75,000 individuals (Woodside, 2019). 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, around the time of breeding and calving (typically August to 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). There are reports of neonates further south, suggesting that the calving areas may be poorly defined. Aerial photogrammetric surveys in 2013 and 2015 recorded large numbers of humpback whale calves along 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, 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.*, 2018). There are BIAs for migration and breeding and calving for the humpback whale along the WA coast and within the NWMR (refer **Table 7-3** and **Figure 7-1**).
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, nearly all blue whales sighted in the NWMR are likely to be pygmy blue whales. The East Indian Ocean (EIO) pygmy blue whale 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). 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: 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; and a 'northbound migratory stage' (April to August) where animals travel north back to Indonesia again. There are 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

Species	Key Information
	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 of the south-eastern Australia and may not reflect the full population but does imply an increasing population (McCauley *et al.*, 2018). 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). Refer **Table 7-3** and **Figure 7-2** 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.
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 in other international locations that vary in morphology and migratory behaviours (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 (2011) 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, 2011). There are no identified BIAs for this species in the National Conservation Values Atlas.
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). Southern right whales aggregate in calving areas along the south coast of WA outside of the NWMR. However, there have been sightings in waters of the NWMR as far north as Ningaloo (Bannister and Hedley, 2001), and a stranding record exists for the far north Kimberley coast (ALA, 2020). Southern right whale calving grounds are found at mid to lower latitudes and are occupied during the austral winter and early-mid spring. They are regularly present on the southern Australian coast from about mid-May to mid-November, and peak periods for mating are from mid-July through August. Mating occurs within these breeding grounds as evidenced by many observations of intromission and mating behaviours. Southern right whales in south-western Australia appear to be increasing at the maximum biological rate but there is limited evidence of increase in south-eastern Australian waters (DSEWPAC, 2012d). There are no identified BIAs for this species in the NWMR.
Antarctic minke whale	The Antarctic minke whale is distributed worldwide and has been recorded off all Australian states (but not in the NT), feeding in cold waters and migrating to warmer waters to breed. It is thought that the Antarctic minke whale migrates up the WA coast to about 20°S to feed and possibly breed (Bannister *et al.*, 1996); however, detailed information about timing and location of migrations and breeding grounds within the NWMR is not well 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. There are no identified BIAs for this species in the National Conservation Values Atlas.
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

Species	Key Information
	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 National Conservation Values Atlas.
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 are 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. A recent study by Aulich *et al.* (2019) 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 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 way-station for feeding (Aulich *et al.*, 2019). Some whales were found to continue migrating as far north as Dampier (Aulich *et al.*, 2019). There are no identified BIAs for this species in the National Conservation Values Atlas.
Toothed whales (Odontoceti)	
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 (23) 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). There are no identified BIAs for this species in the NWMR.
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	Key Information
	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.
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, 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). 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 7-3** 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 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). 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 **Table 7-3** and **Figure 7-4** for the location and type of BIAs for Indo-Pacific humpback dolphins in the NWMR.
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

Species	Key Information
	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. Refer **Table 7-3** 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 (Brown *et al.*, 2014). 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). Aerial surveys since the mid-1980s indicate that dugong populations are now stable at a regional scale in Shark Bay and in the Exmouth/Ningaloo Reef. Refer **Table 7-3** and **Figure 7-5** for the location and type of BIAs for dugong in the NWMR.
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 considered to be 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 7-6** shows the foraging BIAs for the Australian sea lion to the south of the NWMR.

7.5 Biological Important Areas in the NWMR

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	Breeding	Calving	Migration
Humpback whale[1]	✓	✓	✓	Shark Bay Exmouth Gulf (north migration – early June) (south migration – late Aug to Oct) Southern Kimberley region	No foraging BIA identified within the NWMR	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 [1] [2]	✓	✓	✓	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)
Australian snubfin dolphin [1]	✓	✓	-	No resting BIA identified within the NWMR	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	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	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	No migration BIA identified within the NWMR

Species	Woodside Activity Area			BIAs				
	Browse	NWS/S	NWC	Resting	Foraging	Breeding	Calving	Migration
					Broome Bay Deep Bay Prince Regent River King George River Cape Londonderry Ord River	Ord River	King George River Cape Londonderry Ord River	
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 Cambridge Gulf Camden Sound area King Sound (south) King Sound (north) Yampi Sound	Roebuck Bay Cambridge Gulf Camden Sound area King Sound (south) King Sound (north) Yampi Sound	No calving BIA identified within the NWMR	No migration BIA identified within the NWMR

Species	Woodside Activity Area			BIAs				
	Browse	NWS/S	NWC	Resting	Foraging	Breeding	Calving	Migration
Dugong[1]	✓	✓	✓	No resting BIA identified within the NWMR	Exmouth Gulf Ningaloo Reef Shark Bay Roebuck Bay Dampier Peninsula	No breeding BIA identified within the NWMR	Exmouth Gulf Ningaloo Reef Shark Bay	Not listed as a migratory species

1. *DSEWPAC (2012a)*

2. *Commonwealth of Australia (2015a)*

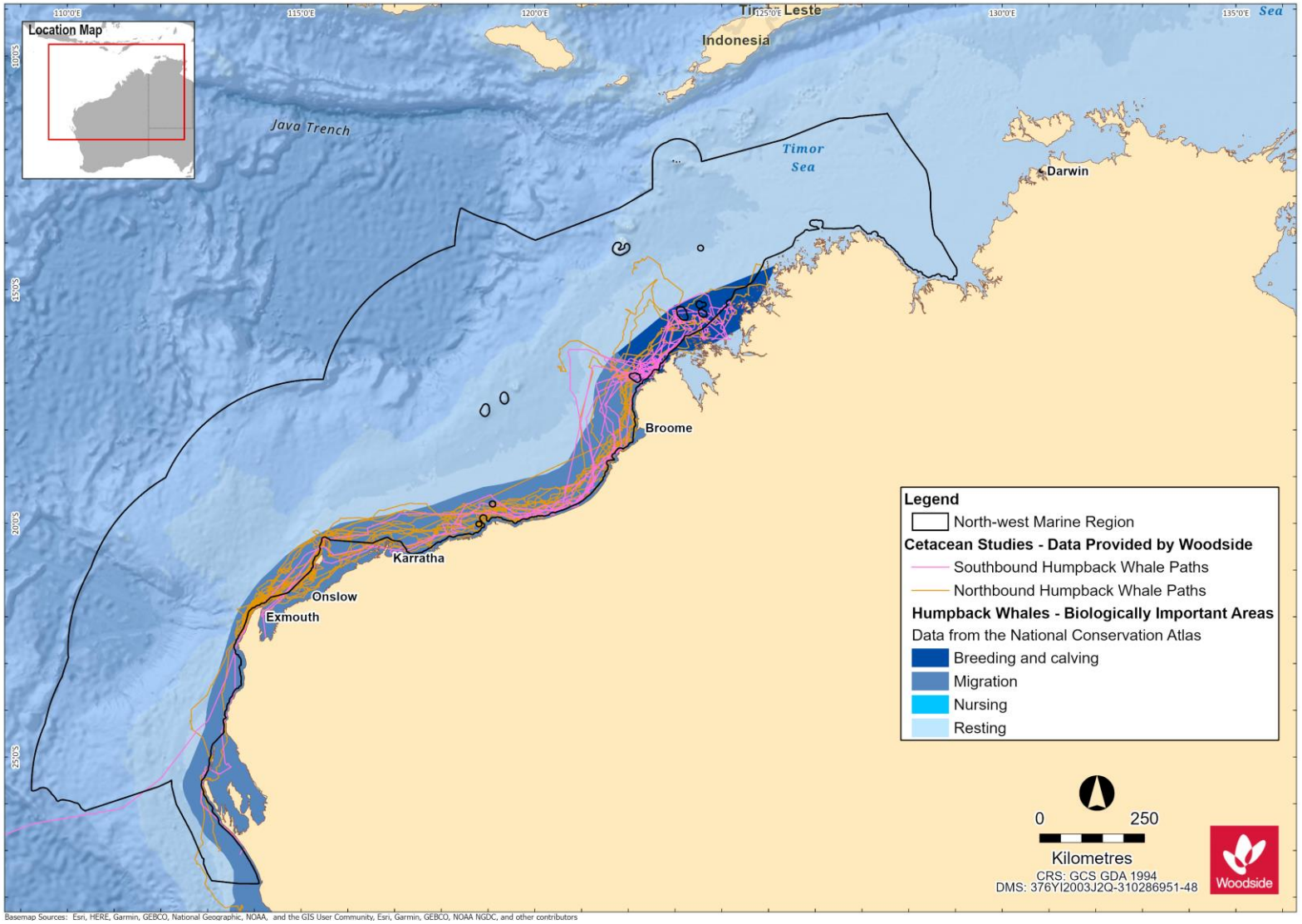

Figure 7-1 Humpback whale BIAs for the NWMR and tagged tracks for north and south bound migrations

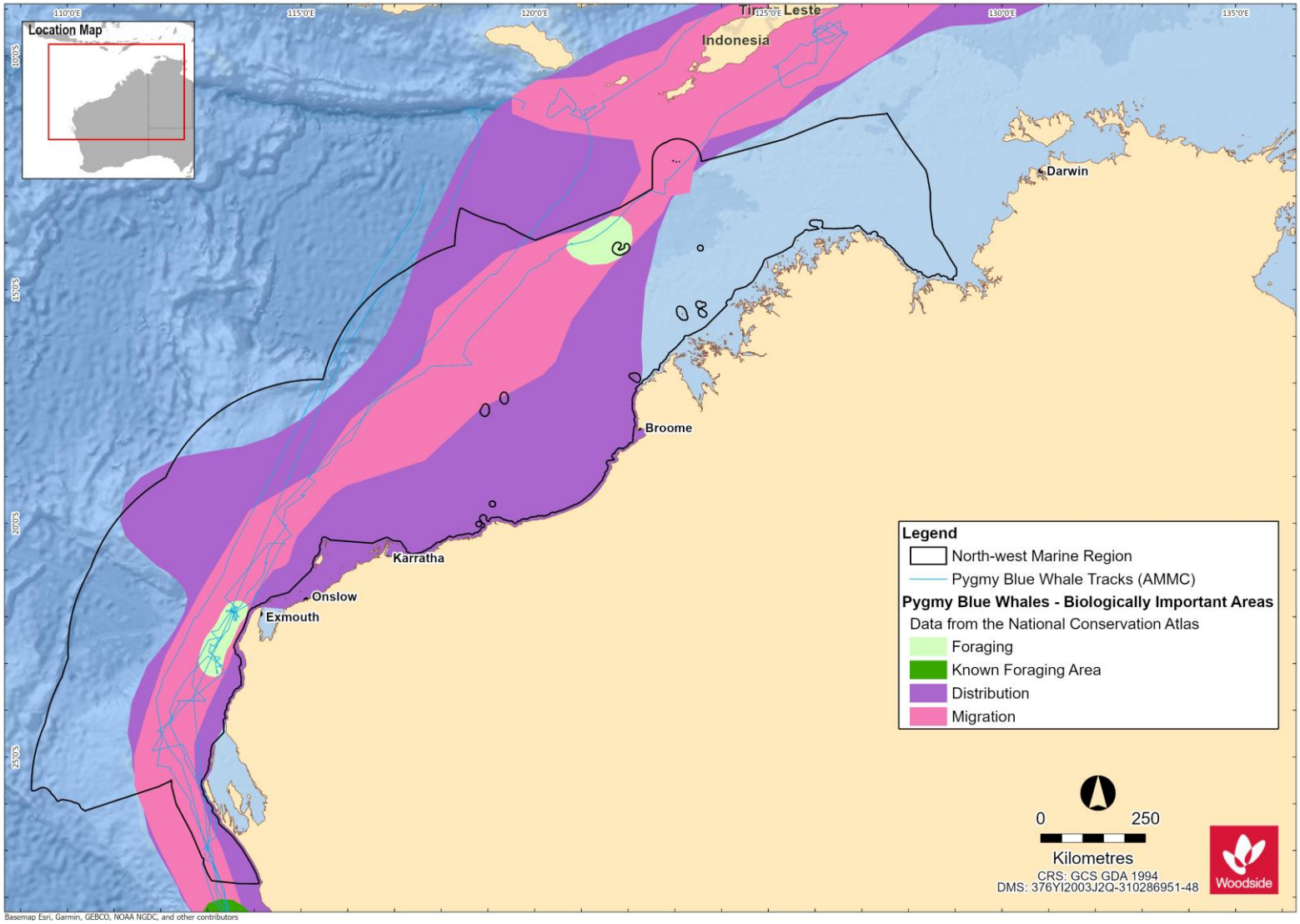

Figure 7-2 Pygmy blue whale BIAs for the NWMR and tagged whale tracks for northbound migration

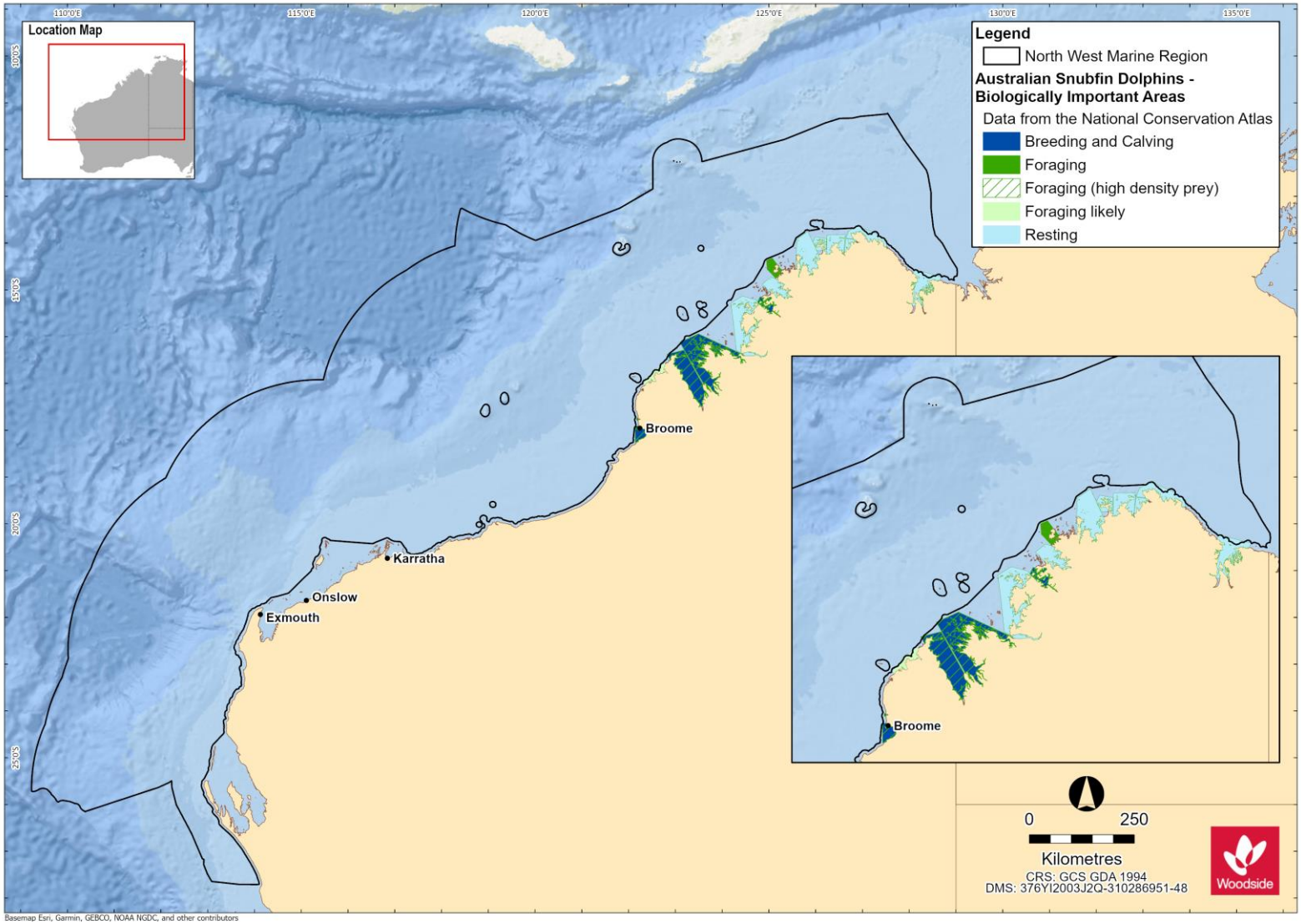

Figure 7-3 Australian snubfin dolphin BIAs for the NWMR

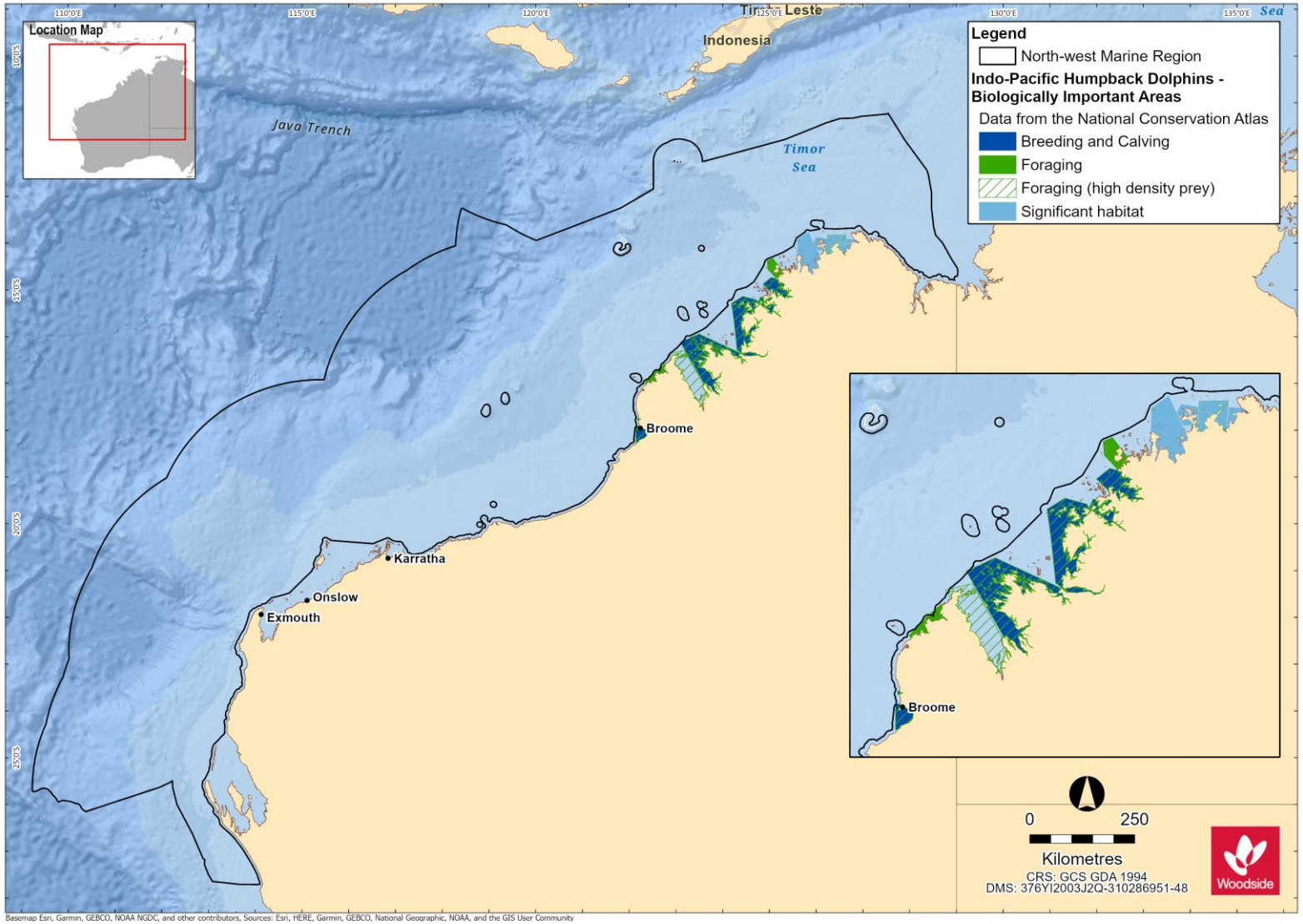

Figure 7-4 Indo-Pacific humpback dolphin BIAs for the NWMR

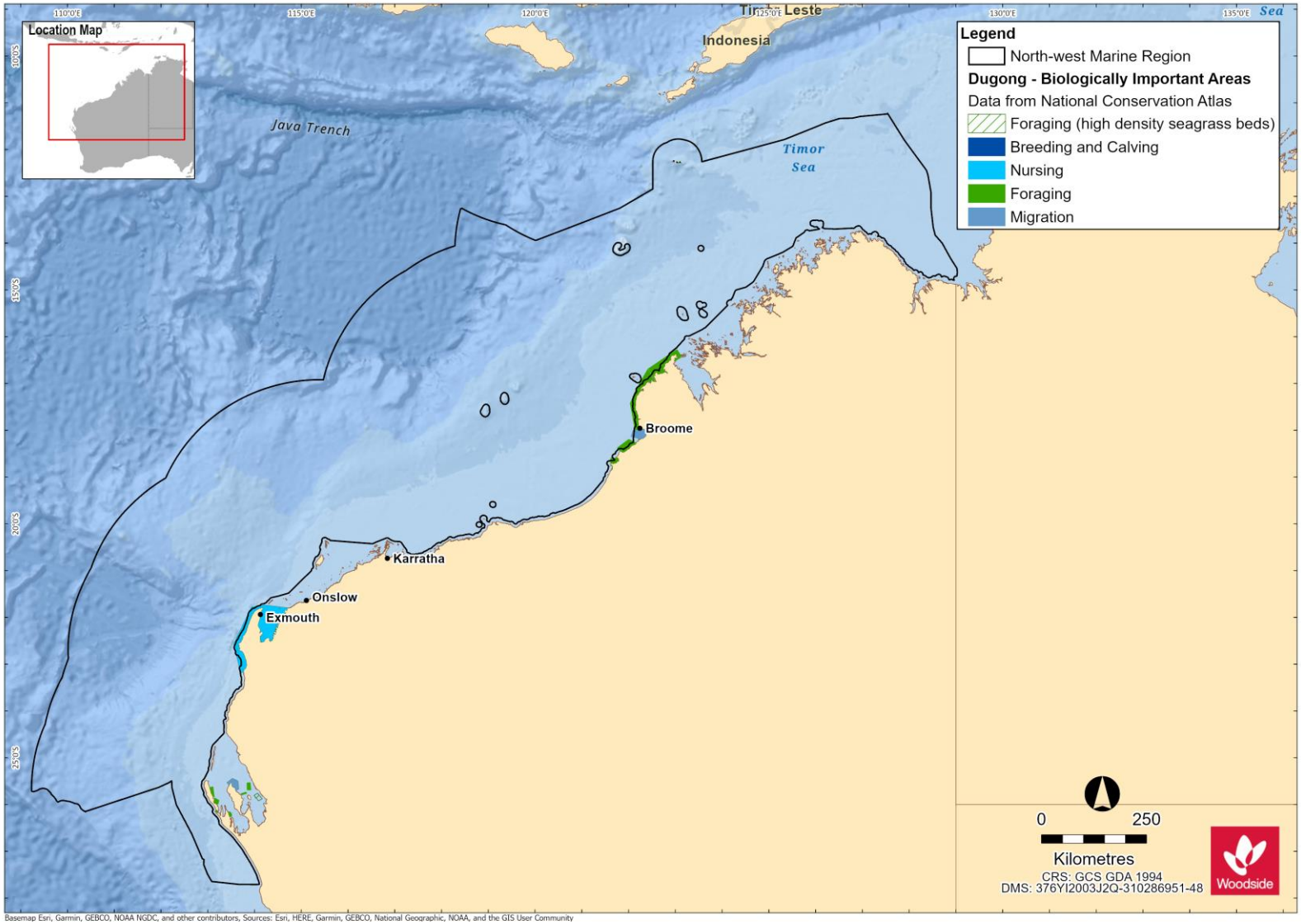

Figure 7-5 Dugong BIAs for the NWMR

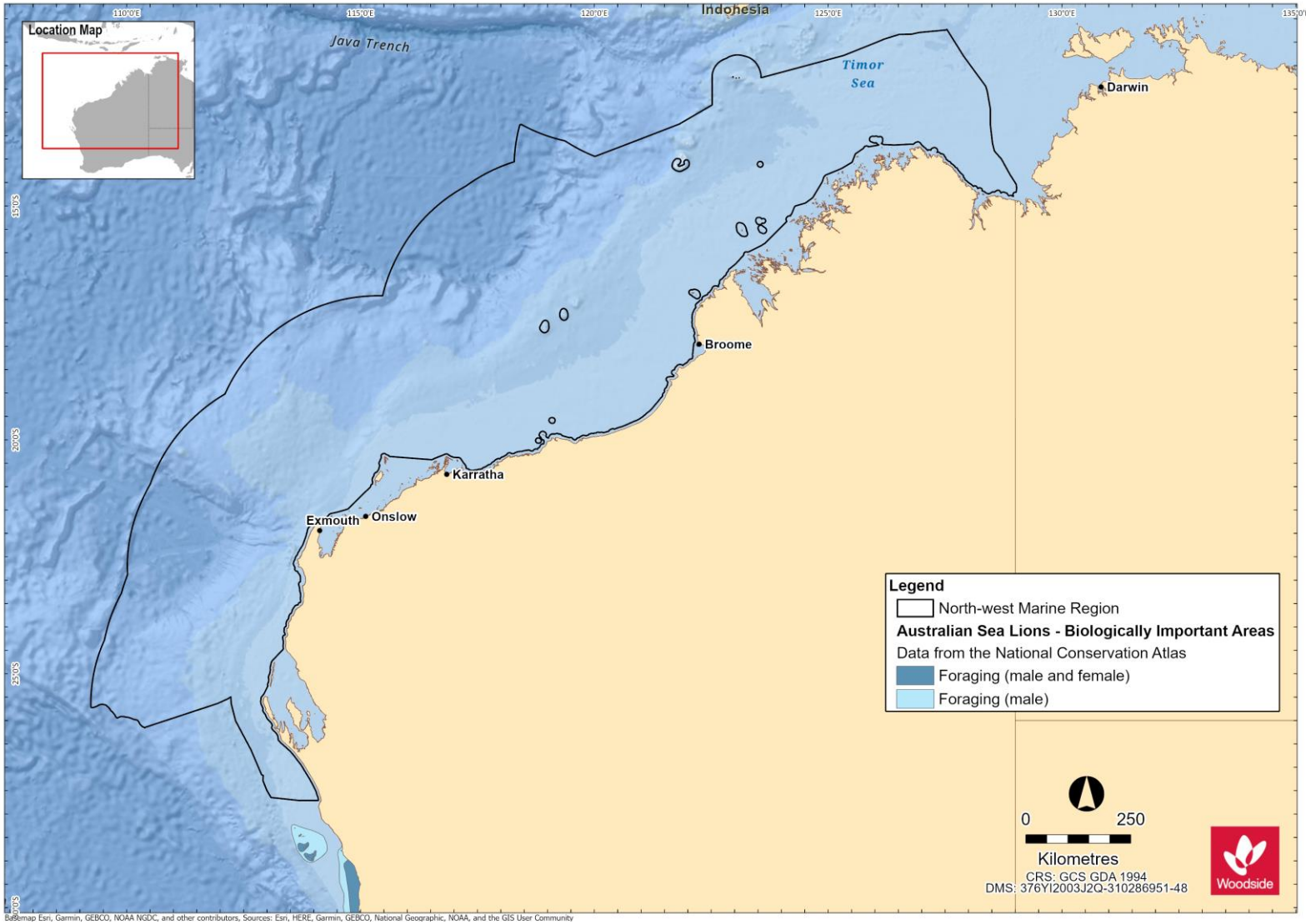

Figure 7-6 Australian sea lion BIAs in the northern extent of the SWMR closest to the NWMR

7.6 Marine Mammal Summary for the NWMR

7.6.1 Browse

The Browse activity area includes biologically important habitat for five 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); and
- dugong (foraging).

BIAs for the marine mammal species are outlined in **Table 7-3**.

7.6.2 North-west Shelf / Scarborough

The NWS / Scarborough activity area includes biologically important habitat for five 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); and
- dugong (foraging and calving areas).

BIAs for the marine mammal species are outlined in **Table 7-3**.

7.6.3 North-west Cape

The North-west Cape activity area includes biologically important habitat for three threatened and/or migratory marine mammal species:

- blue whale and pygmy blue whale (foraging and migration areas);
- humpback whale (resting and migration areas); and
- dugong (foraging and 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, 2012e). The NWMR marine bioregional plan also noted that Roebuck Bay and Eighty Mile Beach are internationally significant and recognised migratory shorebird locations.

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 the internationally significance under the Ramsar Convention. Important Bird Areas (IBAs) for the NWMR, which are also recognised as global Key Biodiversity Areas (KBAs) (BirdLife Australia[4]), 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 threatened and migratory seabird and shorebird species that occur within the NWMR, with their conservation status and relevant recovery plans and/or conservation advice.

4 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. Bird species (threatened/migratory) identified by the EPBC Act PMST and other sources of information as potentially occurring within the NWMR

Species Name	Common Name	*Environment Protection and Biodiversity Conservation Act 1999*			WA *Biodiversity Conservation Act 2016*	EPBC Act Part 13 Statutory Instrument
		Threatened Status	Migratory Status	Listed	Conservation Status	
Seabirds						
Macronectes giganteus	Southern giant petrel	Endangered	Migratory	Marine	Migratory	National recovery plan for threatened albatrosses and giant petrels 2011-2016 (DSEWPAC, 2011c)
Papasula abbotti	Abbott's booby	Endangered	N/A	Marine	N/A	Conservation Advice for the Abbott's booby - *Papasula abbotti* (Threatened Species Scientific Committee, 2020b)
Pterodroma mollis	Soft-plumaged petrel	Vulnerable	N/A	Marine	N/A	Conservation Advice *Pterodroma mollis* soft-plumaged petrel (Threatened Species Scientific Committee, 2015f)
Sternula nereis nereis	Australian fairy tern	Vulnerable	N/A	N/A	Vulnerable	Conservation Advice for *Sternula nereis nereis* (Fairy Tern) (DSEWPAC, 2011d)
Anous tenuirostris melanops	Australian lesser noddy	Vulnerable	N/A	Marine	Endangered	Conservation Advice *Anous tenuirostris melanops* Australian lesser noddy (Threatened Species Scientific Committee, 2015e)
Thalassarche carteri	Indian yellow-nosed albatross	Vulnerable	Migratory	Marine	Endangered	National recovery plan for threatened albatrosses and giant petrels 2011-2016 (DSEWPAC, 2011c)
Anous stolidus	Common noddy	N/A	Migratory	Marine	Migratory	Draft Wildlife Conservation Plan for Seabirds (Commonwealth of Australia, 2019)
Fregata ariel	Lesser frigatebird	N/A	Migratory	Marine	Migratory	
Fregata minor	Great frigatebird	N/A	Migratory	Marine	Migratory	
Sula leucogaster	Brown booby	N/A	Migratory	Marine	Migratory	
Sula sula	Red-footed booby	N/A	Migratory	Marine	Migratory	

Species Name	Common Name	*Environment Protection and Biodiversity Conservation Act 1999*			WA *Biodiversity Conservation Act 2016*	EPBC Act Part 13 Statutory Instrument
		Threatened Status	Migratory Status	Listed	Conservation Status	
Onychiprion anaethetus (listed as *Sterna anaethetus)*	Bridled tern	N/A	Migratory	Marine	Migratory	
Thalasseus bergii	Greater crested tern	N/A	Migratory	Marine	Migratory	
Sternula albifrons	Little tern	N/A	Migratory	Marine	Migratory	
Sterna dougallii	Roseate tern	N/A	Migratory	Marine	Migratory	
Onychoprion fuscata	Sooty tern	N/A	N/A	Marine	N/A	
Hydroprogne caspia	Caspian tern	N/A	Migratory	Marine	Migratory	
Ardenna pacifica	Wedge-tailed shearwater	N/A	Migratory	Marine	Migratory	
Puffinus assimillis	Little shearwater	N/A	N/A	Marine	N/A	
Ardenna carneipes	Flesh-footed shearwater	N/A	Migratory	Marine	Vulnerable	
Calonectris leucomelas	Streaked shearwater	N/A	Migratory	Marine	Migratory	
Phaethon lepturus	White-tailed tropicbird	N/A	Migratory	Marine	Migratory	
Chroicocephalus novaehollandiase	Silver gull	N/A	N/A	Marine	N/A	
Migratory shorebirds						
Numenius madagascariensis	Eastern curlew, Far Eastern curlew	Critically endangered	Migratory	Marine	Critically endangered	Conservation Advice *Numenius madagascariensis* eastern curlew (DOE, 2015a)
Calidris ferruginea	Curlew sandpiper	Critically endangered	Migratory	Marine	Critically endangered	Conservation Advice *Calidris ferruginea* curlew sandpiper (DOE, 2015b)
Calidris tenuirostris	Great knot	Critically endangered	Migratory	Marine	Critically endangered	Conservation Advice *Calidris tenuirostris* Great knot (Threatened Species Scientific Committee, 2016a)
Limosa lapponica menzbieri	Bar-tailed godwit (*menzbieri*)	Critically endangered	Migratory	Marine	Critically endangered	Conservation Advice *Limosa lapponica menzbieri* Bar-tailed godwit (northern Siberia). (Threatened Species Scientific Committee, 2016c)

Species Name	Common Name	*Environment Protection and Biodiversity Conservation Act 1999*			WA *Biodiversity Conservation Act 2016*	EPBC Act Part 13 Statutory Instrument
		Threatened Status	Migratory Status	Listed	Conservation Status	
Calidris canutus	Red knot	Endangered	Migratory	Marine	Endangered	Conservation Advice *Calidris canutus* Red knot (Threatened Species Scientific Committee, 2016b)
Charadrius mongolus	Lesser sand plover	Endangered	Migratory	Marine	Endangered	Conservation Advice *Charadrius mongolus* Lesser sand plover (Threatened Species Scientific Committee, 2016e)
Charadrius leschenaultii	Greater sand plover	Vulnerable	Migratory	Marine	Vulnerable	Conservation Advice *Charadrius leschenaultia* Greater sand plover (Threatened Species Scientific Committee, 2016d)
All migratory shorebird species	Wildlife Conservation Plan for Migratory Shorebirds (Commonwealth of Australia, 2015c).					

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, 2019). At least 34 seabird species listed as threatened, migratory and/or marine under the EPBC Act are known to occur regularly in the NWMR and include a variety of species of terns, noddies, petrels, shearwaters, frigatebirds, and boobies. Many of these species spend most of their lives at sea (predominately pelagic species), 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, 2012e).

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. Sixteen (16) species of seabirds breed there. Eighty percent 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**) and the information on a select number of seabird species documented for the NWMR (based on the screening criteria presented in **Section 3**), as presented in **Table 8-2**.

Table 8-2 Information on threatened/migratory seabird species of the NWMR

Species	Key Information
Seabirds	
Southern giant petrel	This species is included in the National recovery plan for threatened albatrosses and giant petrels. Habitat critical to survival is defined for breeding and foraging. There are six known breeding localities under Australian jurisdiction (for all species giant petrels) and all are located in the Southern Ocean including islands off Tasmania and within the Australian Antarctic Territory (DSEWPAC, 2011c). Habitat critical to survival identified for foraging is defined as waters south of 25 degrees latitude. The giant petrel species distribution is mainly within the Southern Ocean but this species does migrate into subtropical waters during the winter and its distribution includes the southern extent of the NWMR. No BIAs for this species are located in the NWMR.
Abbott's booby	The Abbott's booby is a large, long-lived seabird known to nest only at Christmas Island. The recovery of this species is strongly dependent on the protection of breeding habitat defined habitat critical to the survival of this species on Christmas Island (Threatened Species Scientific Committee, 2020b). This species spends much of its time at sea and known to forage over large distances offshore when nesting and its range includes off the coast of Java, near the Chagos and in the Banda Sea, and may possibly extend into the north-western extent of the NWMR. No BIAs for this species are located in the NWMR.
Soft-plumaged petrel	This petrel species breeds only at two locations in Australian waters within the Southern Ocean (one off Tasmania and Macquarie Island) (Threatened Species Scientific Committee, 2015f). As a mainly sub-Antarctic species they are usually distributed in cooler seas but distribution extents into subtropical waters and its known distribution includes the southern extent of the NWMR. No BIAs for this species are located in the NWMR.
Australian fairy tern	The Australian fairy tern is listed as Vulnerable for the sub-species only recorded for WA. It has a coastal distribution from Sydney, south to Tasmania and around southern WA up to the Dampier Archipelago and out on the offshore island groups of Barrow, Montebello and the Lowendals (DSEWPAC, 2011d). The Australian fairy tern feeds on small baitfish and roosts and nests on sandy beaches below vegetation. These behaviours, generally, occur in inshore waters of island archipelagos and on the Australian mainland shores and adjacent wetlands. Fairy terns breed from August to February. The Australian fairy tern is unlikely to be present

Species	Key Information
	within the offshore environment of the NWMR. The largest breeding colony in Western Australia for this species is in the Houtman Abrolhos Islands, SWMR (Surman, 2019). For the description and location of BIAs in the NWMR, refer to **Table 8-3** and **Figure 8-2**.
Australian lesser noddy	The Houtman Abrolhos, WA is an important breeding habitat for the Australian lesser noddy in the eastern Indian Ocean. This species exhibits nesting habitat specialisation (white mangrove stands) and has a limited foraging range during the breeding season. Furthermore, the lesser noddy forages over shelf waters and appears not to disperse over their non-breeding period as they remain largely in the general vicinity or slightly to the south of the colony in the non-breeding season (February to September; Surman *et al*., 2018). No BIAs for this species are located in the NWMR.
Indian yellow-nosed albatross	This species is included in the National recovery plan for threatened albatrosses and giant petrels. Habitat critical to survival is defined for breeding and foraging. There are six known breeding localities under Australian jurisdiction (for all species of albatrosses) and all are located in the Southern Ocean including islands off Tasmania and within the Australian Antarctic Territory (DSEWPAC, 2011c). Habitat critical to survival identified for foraging is defined as waters south of 25 degrees latitude. All albatross species distribution (including the Indian yellow-nose albatross) is mainly within the Southern Ocean but this species does migrate into subtropical waters during the winter and its distribution includes the southern extent of the NWMR. No BIAs for this species are located in the NWMR.
Common noddy	This species is listed as migratory and marine. The common (or brown) noddy is the largest species of noddy found in Australian waters. The species is widespread in tropical and subtropical areas beyond Australia. This seabird species is gregarious and normally occurs in flocks, up to hundreds of individuals, when feeding or roosting. The Houtman Abrolhos, WA is the primary breeding habitat for the common noddy in the Eastern Indian Ocean. This species spends their non-breeding season (March to August) in the NWS area, around 950 km north from the breeding colony (Surman *et al*. 2018). The species occurs within NWMR waters, particularly around offshore islands such as the Montebello Island group. This species is recorded on unmanned oil and gas platforms within the NWS. No BIAs for this species are located in the NWMR.
Lesser frigatebird **Great frigatebird**	Both species of frigatebird are listed as migratory and marine. Within the NWMR, the lesser frigatebird is known to breed on Adele, Bedout and West Lacepede islands, Ashmore Reef and Cartier Island (Commonwealth of Australia, 2019). The lesser frigatebird feeds mostly on fish and sometimes cephalopods, and all food is taken while the bird is in flight. Lesser frigatebirds generally forage close to breeding colonies. Breeding/foraging BIAs for the lesser frigatebird are located in the NWMR; refer to **Table 8-3**.
Brown booby	The brown booby is the most common booby, occurring throughout all tropical oceans bounded by latitudes 30º N and 30º S. There are large colonies on offshore islands within the NWMR such as the Lacepede Islands (one of the largest colonies in the world), Ashmore Reef, and other offshore Kimberley islands. This seabird species is a specialised plunge diver, mostly eating fish and some cephalopods (Commonwealth of Australia, 2019). Breeding/foraging BIAs for the brown booby are located in the NWMR; refer to **Table 8-3** and **Figure 8-3**.
Red-footed booby	Within the NWMR, its known breeding sites for this species include Ashmore Reef and Cartier Island. It is a pelagic species and generally occurs away from land. It mainly eats flying fish and squid. Prey abundance is reliant on the high productivity in slope areas off remote islands where the birds breed (Commonwealth of Australia, 2019). Breeding/foraging BIAs for the red-footed booby are located in the NWMR; refer to **Table 8-3** and **Figure 8-3**.
Greater crested tern	The greater crested tern has a widespread distribution recorded on islands and coastlines of tropical and subtropical areas, ranging from the Atlantic coast of South Africa, Indian Ocean and through south-east Asia and Australia. Outside the breeding season it can be found at sea throughout its range, with the exception of the central Indian Ocean (Commonwealth of Australia, 2019). The largest breeding colony in WA for this species is the Houtman Abrolhos Islands, SWMR (Surman, 2019). No BIAs for this species are located in the NWMR.
Little tern	There are three sub-populations of this species in Australia and two of these occur in the NWMR: northern Australian breeding sub-population occurring around Broome and extending across in to the NMR, and an east Asian breeding sub-population, with the terns present from Shark Bay to south-eastern Queensland during the austral summer. Little terns

Species	Key Information
	usually forage close to breeding colonies in the shallow water of estuaries (Commonwealth of Australia, 2019). For the description and location of BIAs in the NWMR, refer to **Table 8-3** and **Figure 8-2**.
Roseate tern	This species is generally tropical in distribution and there are many breeding populations in the NWMR, including Ashmore Reef, Napier Broome Bay, Bonaparte Archipelago, Lacepede Islands, Dampier Archipelago and the Lowendal Islands. A large number of non-breeding roseate terns have been observed at several remote locations in the Kimberley and there are high numbers also recorded for Eighty Mile Beach Ramsar site. The Kimberley colonies are likely to be another sub-species that breeds in east Asia. Roseate terns predominately eat small pelagic fish (Commonwealth of Australia, 2019). The largest breeding colony in Western Australia for this species is in the Houtman Abrolhos Islands, SWMR (Surman, 2019). For the description and location of BIAs in the NWMR, refer to **Table 8-3** and **Figure 8-2**.
Wedge-tailed shearwater	The wedge-tailed shearwater is a pelagic, marine seabird known from tropical and subtropical waters. Its distribution is widespread across the Indian and Pacific oceans. It is known to breed on the east and west coasts (and offshore islands) of Australia. This species is known to consume fish, cephalopods, and other biota primarily via contact-dipping. Wedge-tailed shearwaters are now understood to undertake extensive foraging trips (over thousands of kilometres over periods of days when chicking and provisioning young) and much longer and extensive pelagic travels over the north-west Indian Ocean during the non-breeding season, targeting current boundaries and upwellings. The species breeds throughout its range, mainly on vegetated islands, atolls and cays and excavates burrows in the ground where chicks are raised (Commonwealth of Australia, 2019). Large breeding colonies of the wedge-tailed shearwater are located on the Houtman Abrolhos islands (SWMR) (Surman *et al*., 2018) and several locations in the NWMR including: Muiron Islands (North-west Cape), Varanus Island and the Dampier Archipelago in the Pilbara where burrow numbers were estimated to several hundred thousand to half a million such as on the Muiron Islands, though it is not known if all burrows are utilised on an annual basis (Birdlife Australia, 2018; Surman *et al.*, 2018). Cannell *et al* (2019) satellite tracked adult wedge-tailed shearwaters during egg incubation and chick rearing on the Muiron Islands in January 2018. For the incubation trips, there was a strong consistency for the birds to travel towards seamounts, typically located north-west of the Muiron Islands, between Australia and Indonesia. One bird however remained south-west of the islands, in the Cape Range Canyon. A similar pattern to utilise areas associated with sea mounts was also observed for the long foraging trips during chick rearing, though some of the foraging was concentrated in deeper waters. A bimodal foraging strategy during chick-rearing was observed, with adults undertaking long foraging trips after a series of shorter foraging trips within the NWMR. Surman *et al*. (2018) reported most wedge-tailed shearwaters from the breeding colonies on the Houtman Abrolhos undertook extensive non-breeding migrations. This seabird species occupied waters adjacent or to the north of their nesting sites or migrated 4200 km north-west into the equatorial central Indian Ocean near the Ninety East Ridge during the non-breeding season (later April to mid-November). For the description and location of BIAs in the NWMR, refer to **Table 8-3** and **Figure 8-1**.
Flesh-footed shearwater	The species mainly occurs in the subtropics, over continental shelves and slopes and occasionally inshore waters, with individual birds pass through the tropics and over deeper waters during migration to the North Pacific and Indian oceans (Commonwealth of Australia, 2019). They are a common visitor to the waters off southern Australia, from south-western WA to south-eastern Queensland. The fleshy-footed shearwater is a trans-equatorial migrant, breeding from late September to May off south-western Australia, and migrating north by early May, across the southern Indian and possibly Indonesia to the northern Pacific Ocean. No BIAs for the flesh-footed shearwater are located in the NWMR.
Streaked shearwater	The streaked shearwater has a broad distribution in the western Pacific Ocean, breeding on the coast and offshore islands of Japan, Russia, China and the Korean Peninsula. During winter months (non-breeding season), the species undertakes trans-equatorial migration to the coasts of Vietnam, New Guinea, the Philippines, Australia, southern India and Sri Lanka. The streaked shearwater feeds mainly on fish and squid that it catches by surface-seizing and shallow plunges (Commonwealth of Australia, 2019). No BIAs for the streaked shearwater are located in the NWMR.
White-tailed tropicbird	Tropicbirds are predominately pelagic species and the white-tailed tropicbird forages in warm waters and over long distances (pan-tropical). The species is most common off north-west Australia. In the NWMR, this species is considered a sub-species and are limited in number and distribution. Nesting sites are known for Clerke Reef (Rowley Shoals) and Ashmore

Species	Key Information
	Reef. Christmas Island is also a known nesting site and the species can disperse several thousand kilometres during foraging trips. This species feeds mainly on fish and cephalopods, captured by deep plunge diving (Commonwealth of Australia, 2019). There are breeding BIAs at the Rowley Shoals and Ashmore Reef within the NWMR for the white-tailed tropicbird; refer to **Table 8-3**.
Silver gull	The silver gull is typically described as an inshore and coastal foraging seabird and has an Australian-wide distribution including locations within the NWMR. It is noted as it has been recorded on unmanned oil and gas platforms located within the NWS.

8.2.1 Biologically Important Areas in the NWMR

BIAs representing important life cycle stages and behaviours for eight species of seabird in the NWMR are presented in **Table 8-3**.

Table 8-3 Seabird BIAs within the NWMR

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 barrier 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	Dampier Archipelago, Montebello, Lowendal and Barrow Island Groups, south Ningaloo and barrier island of Shark Bay	Eighty Mile Beach

Seabird Species	Woodside Activity Area			BIAs			
	Browse	NWS/S	NWC	Breeding/foraging	Foraging	Breeding	Resting
					nearest BIA to the NWMR		
White-tailed tropicbird	✓	-	-			Rowley Shoals Ashmore Reef	

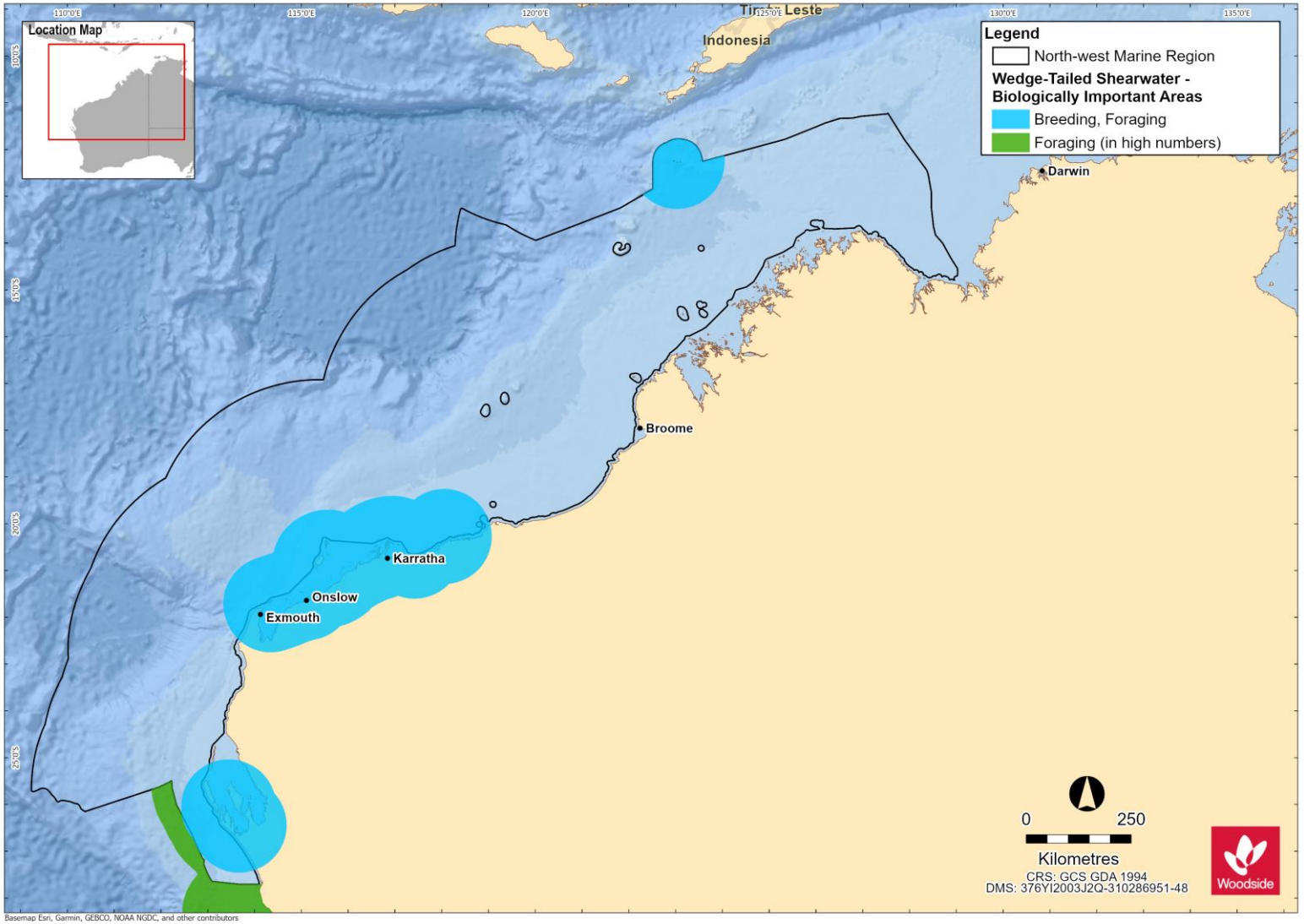

Figure 8-1 Wedge-tailed shearwater BIAs for the NWMR

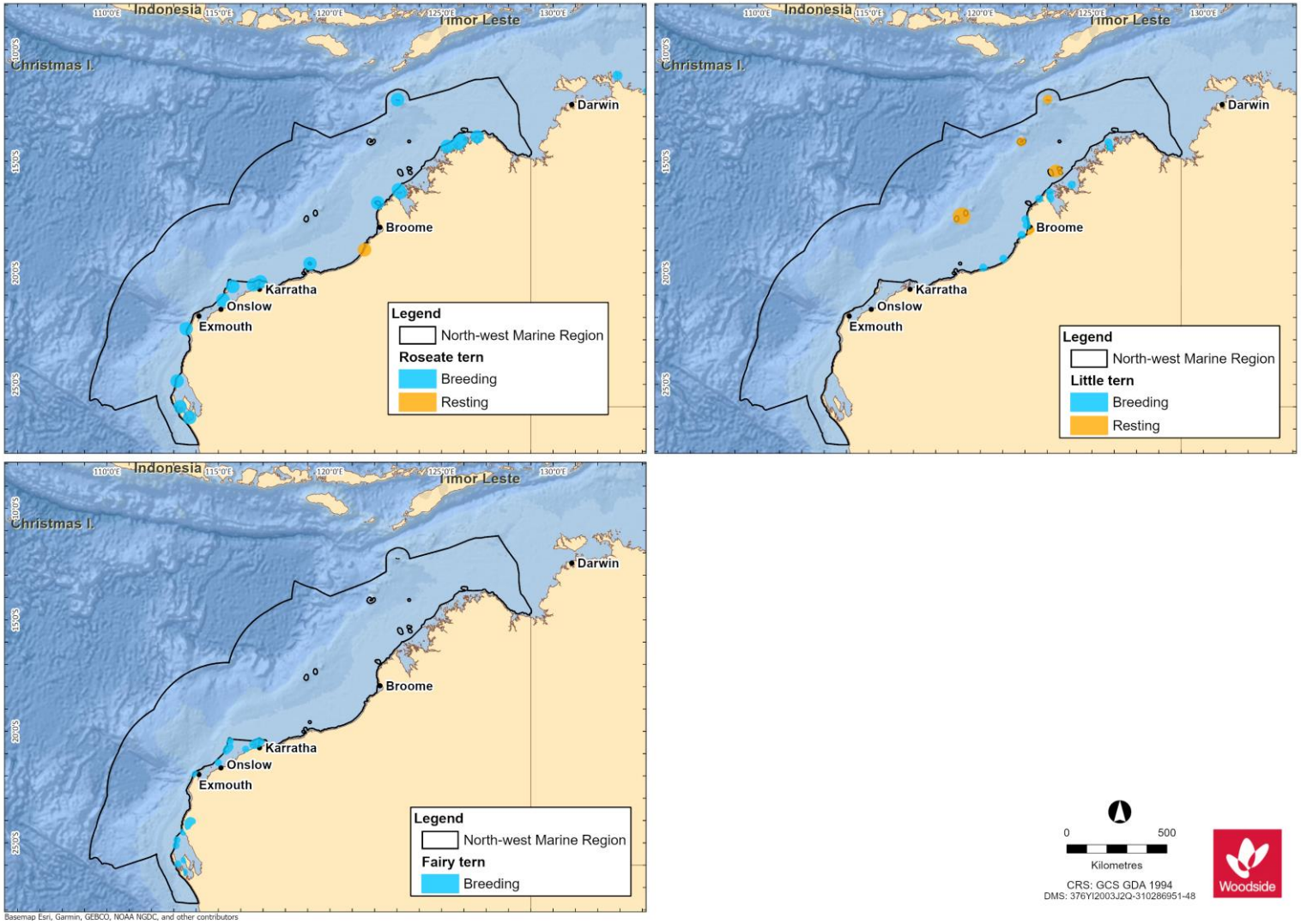

Figure 8-2 Tern species BIAs for the NWMR

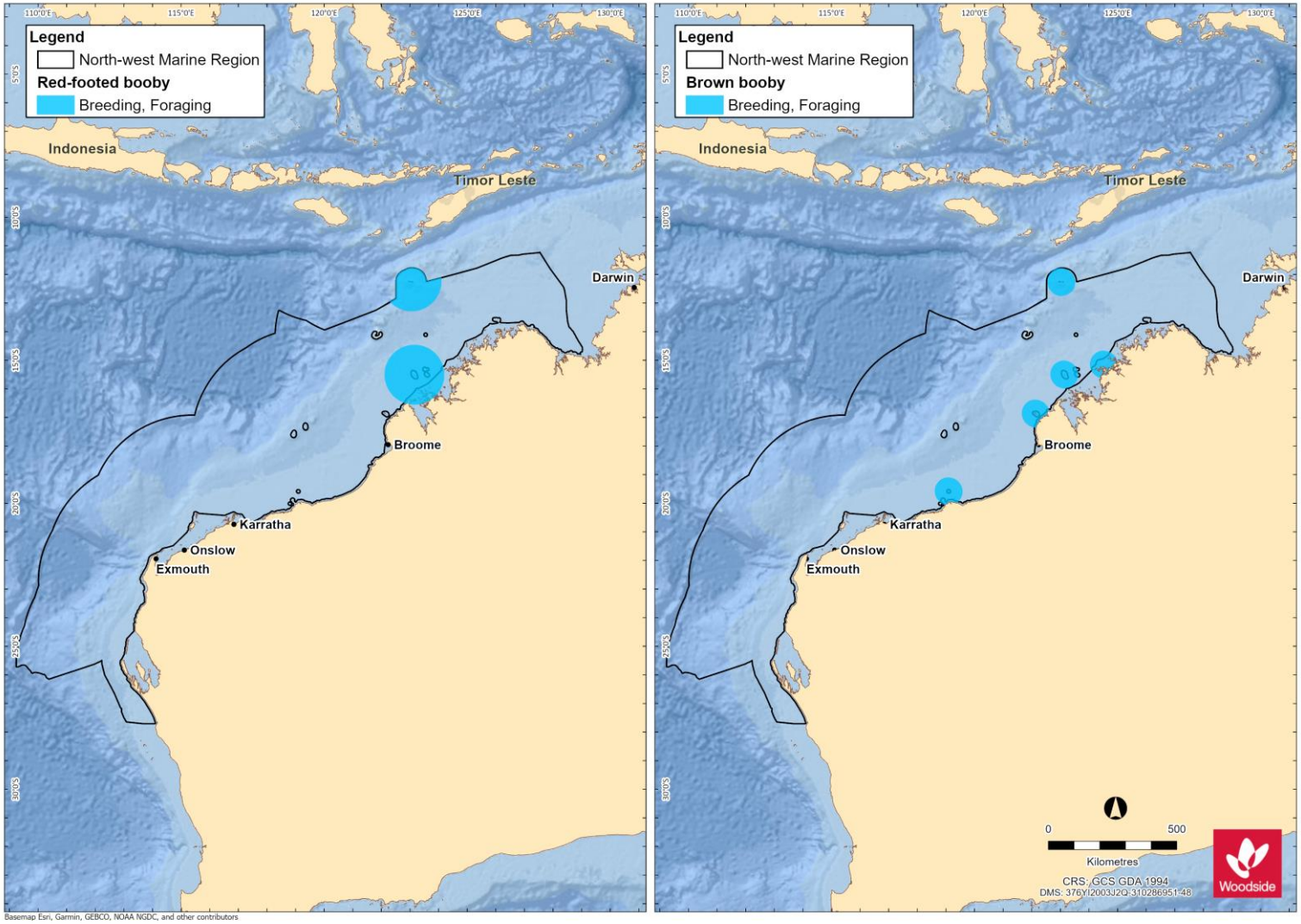

Figure 8-3 Red-footed and brown booby BIAs for the NWMR

8.2.2 Seabird Summary for NWMR

8.2.2.1 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); and,
- white-tailed tropicbird (breeding).

BIAs for the seabird species are outlined in **Table 8-3**.

8.2.2.2 NWS / Scarborough

The NWS / Scarborough activity area includes biologically important habitat for five threatened and/or migratory seabird species:

- wedge-tailed shearwater (breeding/foraging);
- lesser frigatebird (breeding/foraging);
- brown booby (breeding/foraging);
- little tern (breeding/foraging); and
- roseate tern (breeding and resting).

BIAs for the seabird species are outlined in **Table 8-3**.

8.2.2.3 North-west Cape

The North-west Cape activity area includes biologically important habitat for five threatened and/or migratory seabird species:

- Australian fairy tern (breeding);
- wedge-tailed shearwater (breeding/foraging); and
- roseate tern (breeding and resting).

BIAs for the seabird species are outlined in **Table 8-3**.

8.3 Shorebirds

Shorebirds (migratory and resident species) are generally associated with wetland or coastal environments, and the NWMR hosts a large number of 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. Many shorebird species undergo annual migrations, typically breeding at high latitudes of the Northern Hemisphere and migrating south for the non-breeding season and Australia is part of the East Asian-Australasian Flyway (EAAF). 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). The EAAF is of most relevance to the NWMR. There are 37 species of shorebird which annually migrate to Australia via the EAAF and 36 of these species spend the austral summer (non-breeding season) foraging and roosting in coastal and wetland habitats (Commonwealth of Australia, 2015c; Weller and Lee, 2017).

Ashmore Reef is documented as a BIA for migratory shorebirds in the NWMR (DSEWPAC, 2012a).

Table 8-4. Information on threatened/migratory shorebird species of the NWMR

Species	Key Information
Shorebirds	
Eastern curlew, Far eastern curlew	This species is the largest, migratory shorebird in the world, with a long neck, long legs and a very long downcurved bill and is a long-haul flyer. The eastern curlew is a coastal species with a continuous distribution north from Barrow Island to the Kimberley region. The species is endemic to the EAAF and is a non-breeding visitor to Australia from August to March, primarily foraging on crabs and molluscs in intertidal mudflats. During the non-breeding season in Australia, this species is most associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass (DOE, 2015a).
Curlew sandpiper	The curlew sandpiper breeds in northern Siberia but has a non-breeding range that extends from western Africa to Australia, with small numbers reaching New Zealand (Bamford *et al*., 2008). In Australia, curlew sandpipers occur around the coasts and are also quite widespread inland, though in smaller numbers. Records occur in all states and the NT during the non-breeding period, and also during the breeding season when many non-breeding one-year old birds remain in Australia rather than migrating north along the EAAF. The species preferred habitat for foraging is mudflats and nearby shallow waters in sheltered coastal areas such as estuaries, bay, inlets and lagoons (DOE, 2015b).
Great knot	The great knot breeds in the Northern Hemisphere and undertakes biannual migrations along the EAAF to non-breeding habitat in Australia. The great knot winters in Australia and has been recorded around the entirety of the Australian coast the greatest numbers are found in northern Western Australia (Pilbara (Dampier Archipelago) and Kimberley and the Northern Territory. In Australia, this species prefers sheltered, coastal habitat with large intertidal mudflats or sandflats (inkling inlets, bays, harbours, estuaries and lagoons). High numbers (exceeding several thousand birds are regularly recorded from Roebuck Bay. The great knot feeds on a variety of invertebrates by pecking at or just below the surface of moist mud or sand (Threatened Species Scientific Committee, 2016a).
Bar-tailed godwit (*menzbieri*)	The bar-tailed godwit is a large, migratory shorebird and there are two sub-species in the EAAF (*Limosa lapponica baueri* and *L. l. menzbieri*). The sub-species *L. l. menzbieri* breeds in northern Siberia and spends its non-breeding period mostly in the north of WA but also in South-east Asia. The bar-tailed godwit (*menzbieri*) usually forages near the water in shallow water, mainly in tidal estuaries and harbours with a preference for exposed sandy or soft mud substrates on intertidal flats, banks and beaches (Threatened Species Scientific Committee, 2016c).
Red knot (*piersmai*)	This species is a small to medium migratory shorebird. There are two sub-species that cannot be distinguished from each other in nonbreeding plumage, however, *Calidris canutus piersmai* tend to overwinter almost exclusively in north-west Australia. The red knot migrates long distances from breeding grounds in high northern latitudes, where it breeds during the boreal summer, to the Southern Hemisphere during the austral summer with migration along the EAAF. Very large numbers are recorded for the north-west Australia and is common in all suitable habitats around the coast, including inland clay pans near Roebuck Bay (where the species roosts). The red knot usually forages in soft substrate along the waters edge on intertidal mudflats, sandflats and sandy beaches of sheltered coasts (Threatened Species Scientific Committee, 2016b).
Lesser sand plover	The lesser sand plover is a small to medium shorebird and one of 36 migratory shorebirds that breed in the Northern Hemisphere during the boreal summer and are known to annually migrate to the non-breeding grounds of Australia along the EAAF for the austral summer. There are five different sub-species and it is most likely the non-breeding ranges of the sub-species *Charadrius m. mongolus* overlaps with the NWMR. This species is widespread in coastal regions, preferring sandy beaches, mudflats of coastal bays and estuaries (Threatened Species Scientific Committee, 2016e).
Greater sand plover	The greater sand plover is a small to medium shorebird and in its non-breeding plumage is difficult to distinguish from the lesser sand plover. This species breeds in the Northern

Species	Key Information
	Hemisphere and undertakes annual migrations to and from Southern Hemisphere feeding grounds in the austral summer along the EAAF. The species distribution in Australia during the non-breeding season is widespread, in WA the greater sand plover is widespread between Northwest Cape and Roebuck Bay (Threatened Species Scientific Committee, 2016d).

9. 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 following criteria:

- 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, twelve 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 9-1, Table 9-2** and **Table 9-3,** and **Figure 9-1, Figure 9-2** and **Figure 9-3**.

Table 9-1 Key Ecological Features (KEF) 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 9-3**)	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).
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

KEF Name	Woodside Activity Area			Values[1]	Description
	Browse	NWS/S	NW Cape		
					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).
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 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	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).
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 (170) 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.

KEF Name	Woodside Activity Area			Values[1]	Description
	Browse	NWS/S	NW Cape		
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 and is adjacent to the three nautical mile State waters limit surrounding Clerke and Imperieuse reefs, and include the Mermaid Reef Marine Park as described in **Section 10**. 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).
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 is an area of moderately enhanced productivity, attracting aggregations of fish and higher-order consumers such as large predatory	The canyons are associated with upwelling as they channel deep water from the Cuvier Abyssal Plain up onto the slope. 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.

KEF Name	Woodside Activity Area			Values[1]	Description
	Browse	NWS/S	NW Cape		
				fish, sharks, toothed whales and dolphins Likely to be important due to their historical association with sperm whale aggregations	
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 plateau are interconnected and support the high productivity and species richness of Ningaloo Reef, globally significant as 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 NCVA, is defined as the waters contained in the existing Ningaloo AMP provided in **Section 10**.
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.

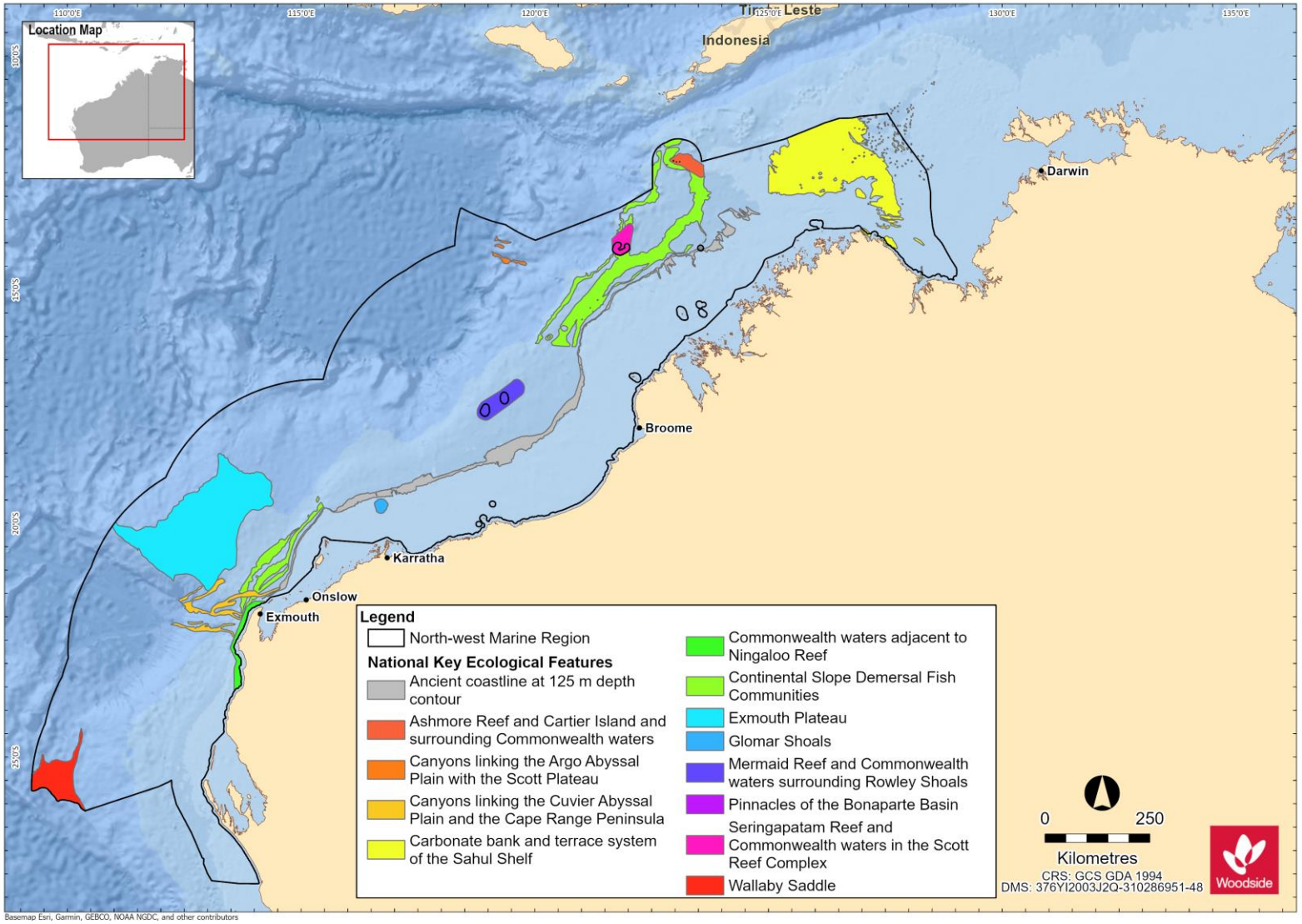

Figure 9-1 Key Ecological Features (KEFs) within the NWMR.

Table 9-2 Key Ecological Features (KEF) 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.

KEF Name	Values[1]	Description
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.
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 Department of Agriculture, Water and the Environment (DAWE) SPRAT database

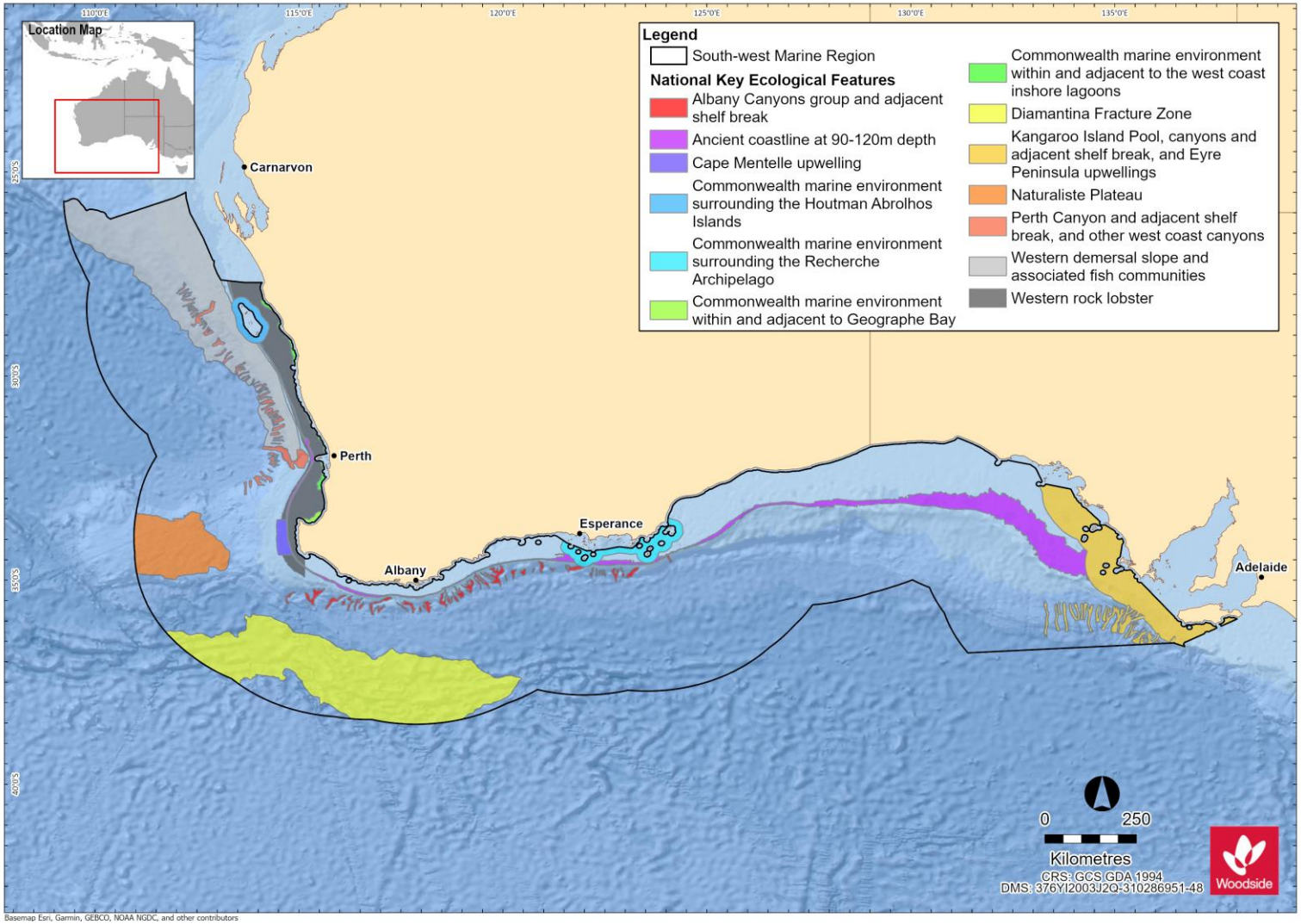

Figure 9-2. Key Ecological Features (KEFs) within the SWMR

Table 9-3 Key Ecological Features (KEF) 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 9-1**)	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.

KEF Name	Values[1]	Description
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.
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 Department of Agriculture, Water and the Environment (DAWE) SPRAT database.*

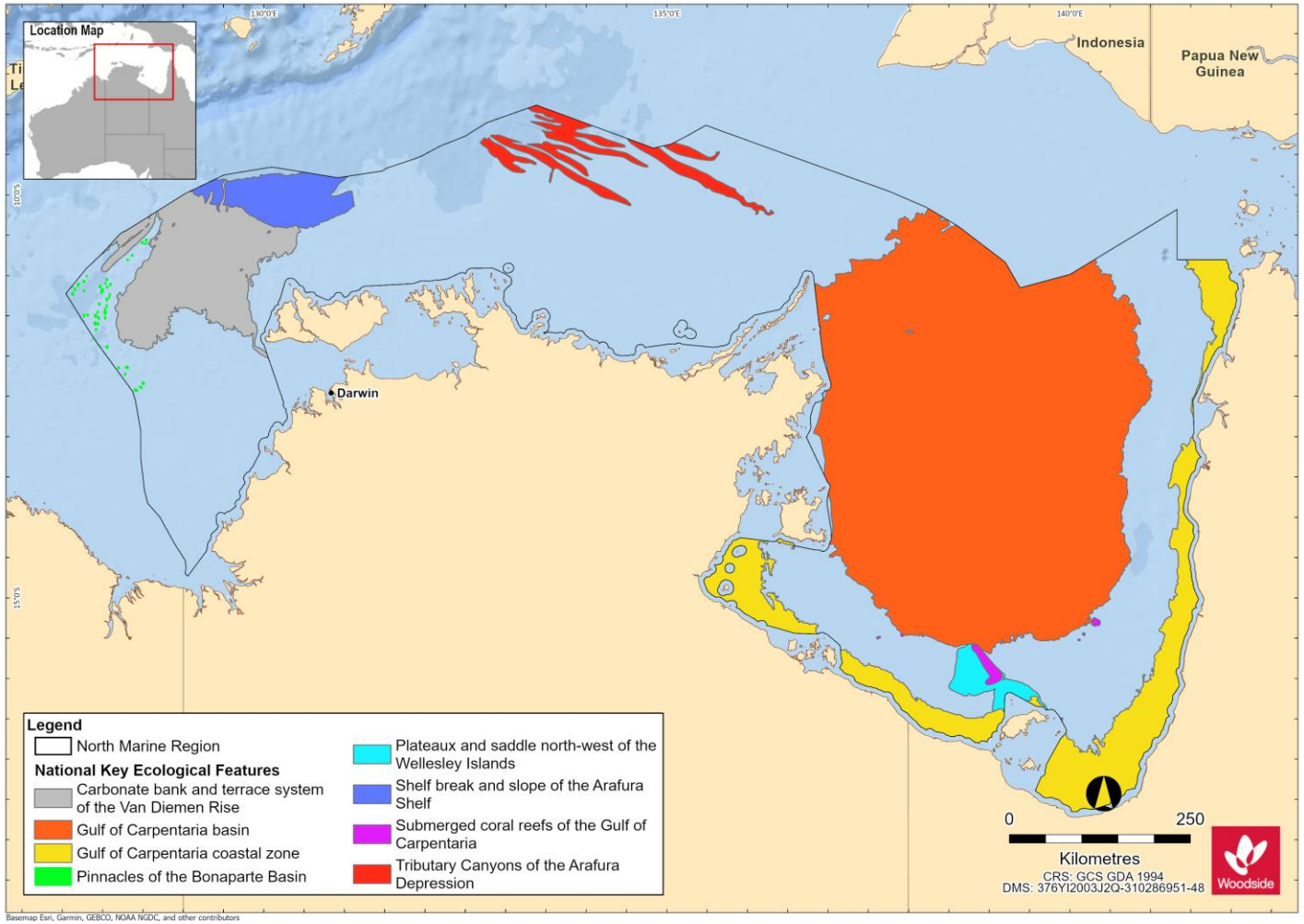

Figure 9-3. Key Ecological Features (KEFs) within the NMR

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10. PROTECTED AREAS

10.1 Regional Context

Protected areas included 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**) shows that there are twenty-nine protected areas found in the NWMR, eighteen in the SWMR and nine in the NMR.

Table 10-1, Table 10-2 and **Table 10-3** outline the protected areas of each of the marine regions NWMR, SWMR and NMR, respectively.

10.2 World Heritage Properties

Properties nominated for World Heritage listing are inscribed on the list only after they have been carefully assessed as representing the best examples of the world's cultural and natural heritage. Only World Heritage listings classed as natural are discussed in this section. World Heritage sites classed as cultural are discussed in **Section 11**.

The list of Australia's World Heritage Properties and the PMST Reports (**Appendix A**) show two World Heritage Properties within the NWMR (**Table 10-1**), no World Heritage Properties within the SWMR (**Table 10-2),** and though not reported in the NMR PMST Report, Kakadu National Park and World Heritage Area is included in **Table 10-3**.

10.3 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 11**.

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 10-1**), three in the SWMR (**Table 10-2**) and for the NMR, Kakadu National Park (not included in the PMST report) is included in **Table 10-3**.

A search of the Commonwealth Heritage List identified four natural commonwealth heritage places within the NWMR (**Table 10-1**).

10.4 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 10-1**), four in the SWMR (**Table 10-2**) and two for the New Territory, included for the NMR (**Table 10-3**).

10.5 Australian Marine Parks

Australian Marine Parks (AMPs), proclaimed under the EPBC Act in 2007 and 2013, are located in Commonwealth waters that start at the outer edge of State and Territory waters, generally three

nautical miles (~5.5 km) from the shore, and extend to the outer boundary of Australia's EEZ, 200 nm (~370 km) from the shore.

PMST Reports (**Appendix A**) show sixteen AMPs within the NWMR (**Table 10-1**), ten within the SWMR (**Table 10-2**) and eight within the NMR (**Table 10-3**).

10.6 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, SWMR or NMR as indicated by the PMST Reports (**Appendix A**).

10.7 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 EEZ (i.e. out to 200 nm and further in some places). Within the Sanctuary it is an offence to kill, injure or interfere with a cetacean. Severe penalties apply to anyone convicted of such offences.

10.8 State Marine Parks and Reserves

State Marine Parks and Reserves, proclaimed under the *Conservation and Land Management Act 1984* (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 14 occurring in the NWMR (**Table 10-1**) and six occurring in the SWMR (**Table 10-2**).

10.9 Summary of Protected Areas within the NWMR

Table 10-1 Protected Areas within the NWMR

Protected Area	Woodside Activity Area			IUCN Protected Area Category* or Relevant Park Zone	Description	Conservation Values
	Browse	NWS/S	NW Cape			
World Heritage Properties						
Shark Bay World Heritage Property	-	-	✓		The Shark Bay World Heritage Property is adjacent to the Shark Bay AMP and was included on the World Heritage List in 1991.	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.
The Ningaloo Coast World Heritage Property	-	-	✓		The Ningaloo Coast World Heritage Property lies within the Ningaloo AMP and was included on the World Heritage List in 2011.	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.
National Heritage Places - Natural						
Shark Bay	-	-	✓		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.	The 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.
The Ningaloo Coast	-	-	✓		The Ningaloo Coast National Heritage Place consists of the same area included in the Ningaloo	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.

Protected Area	Woodside Activity Area			IUCN Protected Area Category* or Relevant Park Zone	Description	Conservation Values
	Browse	NWS/S	NW Cape			
					Coast World Heritage Property (refer above) and was established on the National Heritage List in 2010.	The Ningaloo Coast meets the national heritage listing criteria a, b, c, d, and f.
The West Kimberley	✓	✓	-		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.	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. The national heritage place also contains a remarkable history of Aboriginal 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 Heritage Places - Natural						
Mermaid Reef – Rowley Shoals	-	✓	-	N/A	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.	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.

Protected Area	Woodside Activity Area			IUCN Protected Area Category* or Relevant Park Zone	Description	Conservation Values
	Browse	NWS/S	NW Cape			
Ashmore Reef National Nature Reserve	✓	-	-		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.	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.
Scott Reef and Surrounds – Commonwealth Area	✓	-	-		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.	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.

Protected Area	Woodside Activity Area			IUCN Protected Area Category* or Relevant Park Zone	Description	Conservation Values
	Browse	NWS/S	NW Cape			
Ningaloo Marine Area – Commonwealth Waters	-	-	✓		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.	The Ningaloo Marine Area Commonwealth Heritage Place provides a migratory pathway for humpback whales and foraging habitat for whale sharks. 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 sharks, fish and oceanography.
Wetlands of International Importance (Ramsar)						
Ashmore Reef National Nature Reserve	✓	-	-	Ramsar	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.	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 WA 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.
Eighty Mile Beach	-	✓	-	Ramsar	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).	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.
Roebuck Bay	-	✓	-	Ramsar	The Roebuck Bay Ramsar site covers an area of 550	The Roebuck Bay Ramsar site is recognised as one of the most important areas for migratory shorebirds in Australia.

Protected Area	Woodside Activity Area			IUCN Protected Area Category* or Relevant Park Zone	Description	Conservation Values
	Browse	NWS/S	NW Cape			
					km^2, located south of Broome and adjacent to the Roebuck AMP (refer below).	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.
Ord River Floodplain	✓			Ramsar	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 Ramsar Site is a nursery, feeding and/or breeding ground for migratory birds, waterbirds, fish, crabs, prawns, and crocodiles.	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.
Wetlands of National Importance (DAWE, 2019)						
Ashmore Reef	✓	-	-		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.	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.
Mermaid Reef	-	✓	-		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.	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.

Protected Area	Woodside Activity Area			IUCN Protected Area Category* or Relevant Park Zone	Description	Conservation Values
	Browse	NWS/S	NW Cape			
Exmouth Gulf East	-	-	✓		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.	The Exmouth Gulf East is an outstanding example of tidal wetland systems of 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.
Hamelin Pool	-	-	✓		Hamelin Pool covers an area of 900 km^2 in the far south-east part of Shark Bay.	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.
Shark Bay East	-	-	✓		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.	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.
Australian Marine Parks (DNP, 2018a)						
Abrolhos Marine Park	-	-	✓	II, IV, VI	Abrolhos Marine Park is located adjacent to the WA Houtman Abrolhos Islands, covering a large offshore	Abrolhos Marine Park is significant because it contains habitats, species and ecological communities associated with four bioregions:

Protected Area	Woodside Activity Area			IUCN Protected Area Category* or Relevant Park Zone	Description	Conservation Values
	Browse	NWS/S	NW Cape			
					area of 88,060 km^2 extending from the WA State waters boundary to the edge of Australia's EEZ. The Abrolhos Marine Park is located within both the NWMR and SWMR.	• Central Western Province • Central Western Shelf Province • Central Western Transition • South-west Shelf Transition It includes seven KEFs: 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 at 90-120 m depth; and Wallaby Saddle. The AMP supports a range of species including species listed as threatened, migratory, marine or cetacean under the EPBC Act. BIAs within the AMP 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 AMP is adjacent to the northernmost Australian sea lion breeding colony in Australia on the Houtman Abrolhos Islands.
Carnarvon Canyon Marine Park	-	-	✓	IV	Carnarvon Canyon Marine Park covers an area of 6177 km^2, located ~300 km north-west of Carnarvon.	Carnarvon Canyon Marine Park is significant because it contains habitats, species and ecological communities associated with the Central Western Transition bioregion. The AMP supports a range of species, including species listed as threatened, migratory, marine or cetacean under the EPBC Act. There is limited information about species' use of this AMP.
Shark Bay Marine Park	-	-	✓	VI	Shark Bay Marine Park covers an area of 7443 km^2 located ~60 km offshore of Carnarvon, adjacent to the Shark Bay World Heritage Property and National Heritage Place.	Shark Bay Marine Park is significant because it contains habitats, species and ecological communities associated with two bioregions: • Central Western Shelf Province • Central Western Transition. The AMP supports a range of species including species listed as threatened, migratory, marine or cetacean under

Protected Area	Woodside Activity Area			IUCN Protected Area Category* or Relevant Park Zone	Description	Conservation Values
	Browse	NWS/S	NW Cape			
						the EPBC Act. BIAs within the AMP include breeding habitat for seabirds, internesting habitat for marine turtles, and a migratory pathway for humpback whales.
Gascoyne Marine Park	-	-	✓	II, IV, VI	Gascoyne Marine Park covers an area of 81,766 km^2, located ~20 km off the west coast of the Cape Range Peninsula, adjacent to the Ningaloo Marine Park.	Gascoyne Marine Park is significant because it contains habitats, species and ecological communities associated with three bioregions: • Central Western Shelf Transition • Central Western Transition • Northwest Province. It includes four KEFs: Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula; Commonwealth waters adjacent to Ningaloo Reef; Continental slope demersal fish communities; and Exmouth Plateau. The AMP supports a range of species including species listed as threatened, migratory, marine or cetacean under the EPBC Act. BIAs within the AMP 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.
Ningaloo Marine Park	-	-	✓	II, IV	Ningaloo Marine Park covers an area of 2435 km^2, stretching ~300 km along the west coast of the Cape Range Peninsula, and is adjacent to the WA Ningaloo Marine Park and Gascoyne Marine Park.	Ningaloo Marine Park is significant because it contains habitats, species and ecological communities associated with four bioregions: • Central Western Shelf Transition • Central Western Transition • Northwest Province • Northwest Shelf Province. It includes three KEFs: Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula; Commonwealth waters adjacent to Ningaloo Reef; and Continental slope demersal fish communities. The AMP supports a range of species including species listed as threatened, migratory, marine or cetacean under the EPBC Act. BIAs within the AMP include breeding and

Protected Area	Woodside Activity Area			IUCN Protected Area Category* or Relevant Park Zone	Description	Conservation Values
	Browse	NWS/S	NW Cape			
						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.
Montebello Marine Park	-	✓	-	VI	Montebello Marine Park covers an area of 3413 km^2, located offshore of Barrow Island and 80 km west of Dampier extending from the WA State waters boundary, and is adjacent to the WA Barrow Island and Montebello Islands Marine Parks.	Montebello Marine Park is significant because it contains habitats, species and ecological communities associated with the Northwest Shelf Province bioregion. It includes one KEF: Ancient coastline at 125 m depth contour. The AMP supports a range of species including species listed as threatened, migratory, marine 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.
Dampier Marine Park	-	✓	-	II, IV, VI	Dampier Marine Park covers an area of 1252 km^2, located ~10 km north-east of Cape Lambert and 40 km from Dampier extending from the WA State waters boundary.	Dampier Marine Park is significant because it contains habitats, species and ecological communities associated with the Northwest Shelf Province bioregion. The AMP provides protection for offshore shelf habitats adjacent to the Dampier Archipelago, and the area between Dampier and Port Hedland, and is a hotspot for sponge biodiversity. The AMP supports a range of species including those listed as threatened, migratory, marine or cetacean under the EPBC Act. BIAs within the AMP include breeding and foraging habitat for seabirds, internesting habitat for marine turtles and a migratory pathway for humpback whales.
Eighty Mile Beach Marine Park	-	✓	-	VI	Eighty Mile Beach Marine Park covers an area of 10,785 km^2, located ~74 km north-east of Port Hedland, adjacent to the	Eighty Mile Beach Marine Park is significant because it contains habitats, species and ecological communities associated with the Northwest Shelf Province and consists of shallow shelf habitats, including terrace, banks and shoals.

Protected Area	Woodside Activity Area			IUCN Protected Area Category* or Relevant Park Zone	Description	Conservation Values
	Browse	NWS/S	NW Cape			
					WA Eighty Mile Beach Marine Park.	The AMP supports a range of species including species listed as threatened, migratory, marine or cetacean under the EPBC Act. BIAs within the AMP include breeding, foraging and resting habitat for seabirds, internesting and nesting habitat for marine turtles, foraging, nursing and pupping habitat for sawfishes and a migratory pathway for humpback whales.
Argo – Rowley Terrace Marine Park	✓	✓	-	II, VI, VI (Trawl)	Argo-Rowley Terrace Marine Park covers an area of 146,003 km^2, located ~270 km north-west of Broome, and extends to the limit of Australia's EEZ. The AMP is adjacent to the Mermaid Reef Marine Park and the WA Rowley Shoals Marine Park.	Argo–Rowley Marine Park is significant because it contains habitats, species and ecological communities associated with two bioregions: • Northwest Transition • Timor Province. It includes two KEFs: Canyons linking the Argo Abyssal Plain with the Scott Plateau; and Mermaid Reef and Commonwealth waters surrounding Rowley Shoals. The AMP supports a range of species including species listed as threatened, migratory, marine or cetacean under the EPBC Act. BIAs within the AMP include resting and breeding habitat for seabirds and a migratory pathway for the pygmy blue whale.
Mermaid Reef Marine Park	-	✓	-	II	Mermaid Reef Marine Park covers an area of 540 km^2, located ~280 km north-west of Broome, adjacent to the Argo–Rowley Terrace Marine Park and ~13 km from the WA Rowley Shoals Marine Park. Mermaid Reef is one of three reefs forming the Rowley Shoals. The other two are Clerke Reef and Imperieuse Reef, to the	Mermaid Reef Marine Park is significant because it contains habitats, species and ecological communities associated with the Northwest Transition. It includes one KEF: Mermaid Reef and Commonwealth waters surrounding Rowley Shoals. The Rowley Shoals have been described as the best geological examples of shelf atolls in Australian waters. The AMP supports a range of species, including species listed as threatened, migratory, marine or cetacean under the EPBC Act. BIAs within the AMP include breeding habitat for seabirds and a migratory pathway for the pygmy blue whale.

Protected Area	Woodside Activity Area			IUCN Protected Area Category* or Relevant Park Zone	Description	Conservation Values
	Browse	NWS/S	NW Cape			
					south-west of the AMP, which are included in the WA Rowley Shoals Marine Park.	
Roebuck Marine Park	-	✓	-	VI	Roebuck Marine Park covers an area of 304 km^2, located ~12 km offshore of Broome, and is adjacent to the WA Yawuru Nagulagun/Roebuck Bay Marine Park.	Roebuck Marine Park is significant because it contains habitats, species and ecological communities associated with the Northwest Shelf Province and consists entirely of shallow continental shelf habitat. The AMP supports a range of species including species listed as threatened, migratory, marine or cetacean under the EPBC Act. BIAs within the AMP 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.
Kimberley Marine Park	✓	✓	-	II, IV, VI	Kimberley Marine Park covers an area of 74,469 km^2, located ~100 km north of Broome, extending from the WA State waters boundary north from the Lacepede Islands to the Holothuria Banks offshore from Cape Bougainville.	Kimberley Marine Park is significant because it includes habitats, species and ecological communities associated with three bioregions: • Northwest Shelf Province • Northwest Shelf Transition • Timor Province. It includes two KEFs: Ancient coastline at 125 m depth contour; and Continental slope demersal fish communities. The AMP supports a range of species, including protected species listed as threatened, migratory, marine or cetacean under the EPBC Act. BIAs within the AMP 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.
Ashmore Reef Marine Park	✓	-	-	Ia, IV	Ashmore Reef Marine Park covers an area of 583 km^2, located ~630 km north of	Ashmore Reef Marine Park is significant because it includes habitats, species and ecological communities associated with the Timor Province. It includes two KEFs:

Protected Area	Woodside Activity Area			IUCN Protected Area Category* or Relevant Park Zone	Description	Conservation Values
	Browse	NWS/S	NW Cape			
					Broome and 110 km south of the Indonesian island of Roti. The AMP is located in Australia's External Territory of Ashmore and Cartier Islands and is within an area subject to a Memorandum of Understanding (MoU) between Indonesia and Australia, known as the MoU Box.	Ashmore Reef and Cartier Island and surrounding Commonwealth waters; and Continental slope demersal fish communities. The AMP supports a range of species, including species listed as threatened, migratory, marine or cetacean under the EPBC Act. BIAs within the AMP 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.
Cartier Island Marine Park	✓	-	-	Ia	Cartier Island Marine Park covers an area of 172 km^2, located ~45 km south-east of Ashmore Reef Marine Park and 610 km north of Broome. It is also located in Australia's External Territory of Ashmore and Cartier Islands and within an area subject to an MoU between Indonesia and Australia, known as the MoU Box.	Cartier Island Marine Park is significant because it includes habitats, species and ecological communities associated with the Timor Province. It includes two key ecological features: Ashmore Reef and Cartier Island and surrounding Commonwealth waters and continental slope demersal fish communities. The AMP supports a range of species, including species listed as threatened, migratory, marine or cetacean under the EPBC Act. BIAs within the AMP include breeding and foraging habitat for seabirds, internesting, nesting and foraging habitat for marine turtles and foraging habitat for whale sharks. The AMP is also internationally significant for its abundance and diversity of sea snakes, some of which are listed species under the EPBC Act.
Joseph Bonaparte Gulf Marine Park	✓	-	-	VI	Joseph Bonaparte Gulf Marine Park covers an area of 8597 km^2 and is located ~15 km west of Wadeye, NT, and ~90 km north of Wyndham, WA, in the Joseph Bonaparte Gulf.	Joseph Bonaparte Gulf Marine Park is significant because it contains habitats, species and ecological communities associated with the Northwest Shelf Transition bioregion. It includes one KEF: Carbonate bank and terrace system of the Sahul Shelf. The AMP supports a range of species, including species listed as threatened, migratory, marine or cetacean under

Protected Area	Woodside Activity Area			IUCN Protected Area Category* or Relevant Park Zone	Description	Conservation Values
	Browse	NWS/S	NW Cape			
					It is adjacent to the WA North Kimberley Marine Park. The Joseph Bonaparte Gulf Marine Park is located within both the NWMR and NMR.	the EPBC Act. BIAs within the AMP include foraging habitat for marine turtles and the Australian snubfin dolphin.
Oceanic Shoals Marine Park	✓	-	-	II, IV, VI	Oceanic Shoals Marine Park covers an area of 71,743 km^2 and is located west of the Tiwi Islands, ~155 km north-west of Darwin, NT and 305 km north of Wyndham, WA. The Oceanic Shoals Marine Park is located within both the NWMR and NMR.	Oceanic Shoals Marine Park is significant because it contains habitats, species and ecological communities associated with the Northwest Shelf Transition bioregion. It contains four KEFs: Carbonate bank and terrace systems of the Van Diemen Rise; Carbonate bank and terrace systems of the Sahul Shelf; Pinnacles of the Bonaparte Basin; and Shelf break and slope of the Arafura Shelf. The AMP supports a range of species, including species listed as threatened, migratory, marine or cetacean under the EPBC Act. BIAs within the AMP include foraging and internesting habitat for marine turtles.
State Marine Parks and Reserves						
North Kimberley Marine Park	✓	-	-	Sanctuary, Special Purpose and General Use Zones	The North Kimberley Marine Park covers approx. 18,450 km^2 with its south-western boundary located ~270 km north-east of Derby.	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).
Lalang-garram / Horizontal Falls Marine Park and North Lalang-garram Marine Park (jointly managed)	✓	-	-	Sanctuary, Special Purpose and General Use Zones	The Lalang-garram / Horizontal Falls Marine Park covers ~3530 km^2 from Talbot Bay in the west and Glenelg River in the east. The North Lalang-garram Marine Park covers ~1100	The Lalang-garram / Horizontal Falls Marine Park's most celebrated attraction 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. The North Lalang-garram Marine Park has a number of islands fringed with coral reef and has been identified as an

Protected Area	Woodside Activity Area			IUCN Protected Area Category* or Relevant Park Zone	Description	Conservation Values
	Browse	NWS/S	NW Cape			
					km^2 between Camden Sound and North Kimberley Marine Parks.	ecological hotspot and supports more than 1% of the world's population of brown boobies, with up to 2000 breeding pairs. About 500 pairs of crested terns also nest on the island (DPAW, 2016b).
Lalang-garram / Camden Sound Marine Park	✓	-	-	Sanctuary, Special Purpose and General Use Zones	Lalang-garram / Camden Sound Marine Park covers 7050 km^2 located about 150 km north of Derby.	The Lalang-garram / 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, dugongs, saltwater crocodiles, and several species of sawfish (DPAW, 2013).
Rowley Shoals Marine Park	-	✓	-	Sanctuary, Recreation and General Use Zones	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.	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. 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).
Yawuru Nagulagun / Roebuck Bay Marine Park	-	✓	-	Special Purpose Zone	Yawuru Nagulagun / Roebuck Bay Marine Park is a series of intertidal flats lying on the coast to the south-east of Broome.	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 turtle (DPAW, 2016c).
Eighty Mile Beach Marine Park	-	✓	-	Sanctuary, Recreation, Special	Eighty Mile Beach Marine Park covers ~2000 km^2 stretching across 220km of	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

Protected Area	Woodside Activity Area			IUCN Protected Area Category* or Relevant Park Zone	Description	Conservation Values
	Browse	NWS/S	NW Cape			
				Purpose and General Use Zones	coastline between Port Hedland and Broome.	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, 2014).
Montebello Islands Marine Park, Barrow Island Marine Park and Barrow Island Marine Management Area (jointly managed)	-	✓	-	Sanctuary, Recreation, General Use and Special Purpose Zones	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.	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).
Ningaloo Marine Park and Muiron Islands Marine Management Area (jointly managed)	-	-	✓	Sanctuary, Recreation, General Use and Special Purpose Zones	The Ningaloo Marine Park and Muiron Islands Marine Management Area are located off the North-west Cape of WA, ~1200 km north of Perth, and cover areas of ~2633 km^2 and 286 km^2, respectively.	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).

Protected Area	Woodside Activity Area			IUCN Protected Area Category* or Relevant Park Zone	Description	Conservation 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	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.	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).

**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 (DNP, 2018a)

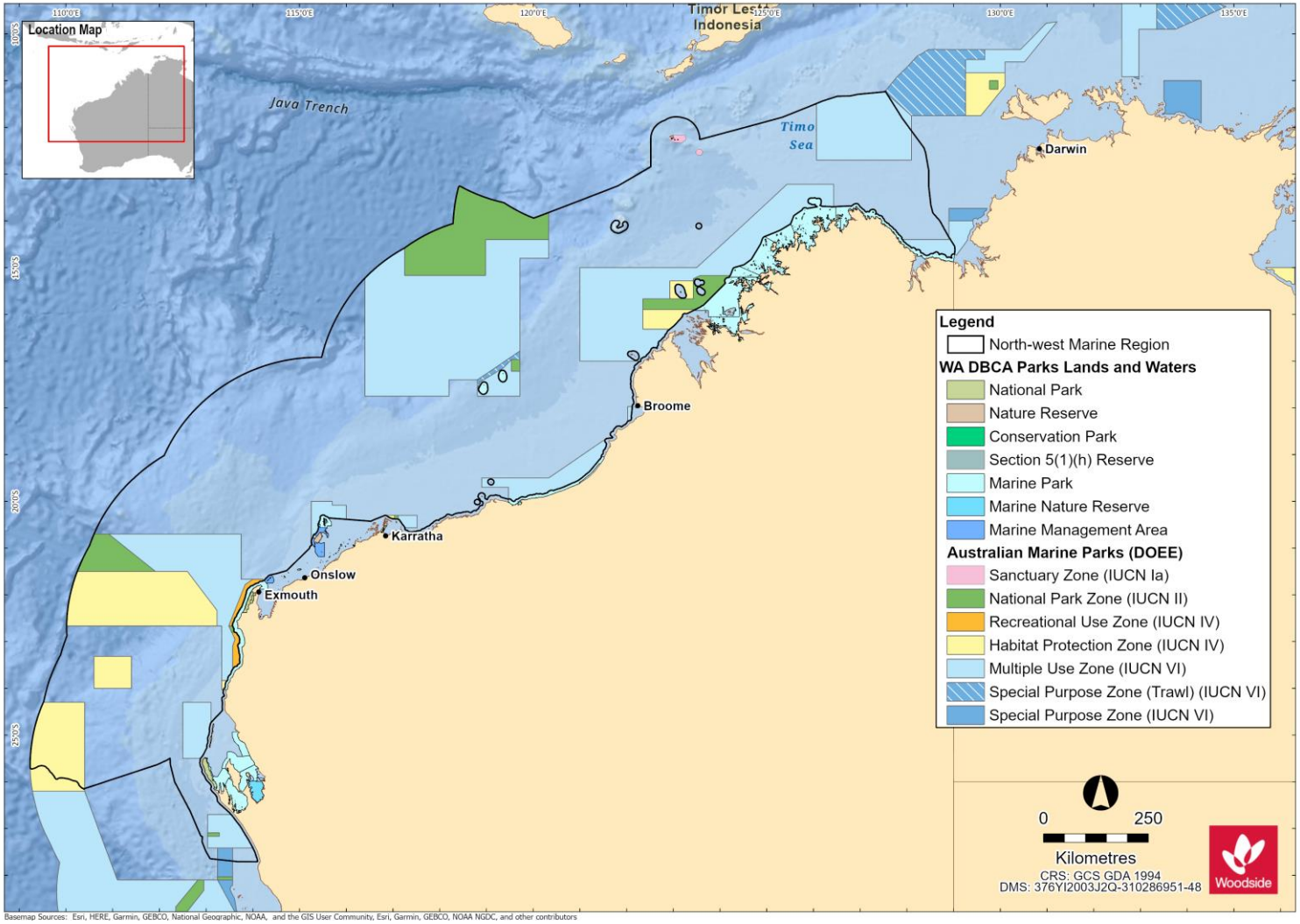

Figure 10-1 Commonwealth and State Marine Protected Areas for the NWMR

10.10 Summary of Protected Areas within the SWMR

Table 10-2 Protected Areas within the SWMR

Protected Area	IUCN Protected Area Category* or Relevant Park Zone	Description	Conservation Values
World Heritage Properties			
N/A			
National Heritage Places - Natural			
N/A			
Commonwealth Heritage Places - Natural			
N/A			
Wetlands of International Importance (Ramsar)			
Beecher Point Wetlands	Ramsar	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.	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 TEC. At least four species of amphibians and twenty-one (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.
Forrestdale and Thomsons Lakes	Ramsar	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.	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.
Peel-Yalgorup System	Ramsar	Peel-Yalgorup System, located adjacent to the City of Mandurah in	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

Protected Area	IUCN Protected Area Category* or Relevant Park Zone	Description	Conservation Values
		WA, 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.	wide variety of waterbird species. It also supports a wide variety of invertebrates, and estuarine and marine fish. The site meets criteria 1, 3, 5 and 6 of the Ramsar Convention.
Vasse-wonnerup system	Ramsar	Vasse-Wonnerup System Ramsar wetland is situated in the Perth Basin, south-western WA. The site was listed under the Ramsar Convention in 1990.	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. 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. Thirteen 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.
Wetlands of National Importance (DAWE, 2019)			
Rottnest Island Lakes		The Rottnest Island Lakes site is the cluster of 18 lakes and swamps on the north-east part of Rottnest Island.	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.
Australian Marine Parks (DNP, 2018b)			
Abrolhos Marine Park	II, IV, VI	The Abrolhos Marine Park is located within both the NWMR and SWMR. Refer **Table 10-1** for description and conservation values.	
Bremer Marine Park	II, VI	Bremer Marine Park covers an area of 4472 km^2 and is located approximately half-way between Albany and Esperance, offshore from the Fitzgerald River National Park, extending from the WA State waters boundary.	Bremer Marine Park is significant because it contains habitats, species and ecological communities associated with two bioregions: • Southern Province • South-west Shelf Province. It includes two KEFs: Albany Canyon group and adjacent shelf break; and Ancient coastline at 90-120 m depth.

Protected Area	IUCN Protected Area Category* or Relevant Park Zone	Description	Conservation Values
			The AMP supports a range of species including species listed as threatened, migratory, marine or cetacean under the EPBC Act. BIAs within the AMP 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. The AMP includes canyons—important aggregation areas for killer whales.
Eastern Recherche Marine Park	II, VI	Eastern Recherche Marine Park covers an area of 20,575 km^2 and is located ~135 km east of Esperance, adjacent to the Recherche Archipelago, close to the WA Cape Arid National Park.	Eastern Recherche Marine Park is significant because it contains habitats, species and ecological communities associated with three bioregions: • South-west Shelf Province • Southern Province • Great Australian Bight Shelf Transition. It includes three KEFs: Mesoscale eddies; Ancient coastline at 90-120 m depth; and Commonwealth marine environment surrounding the Recherche Archipelago. The AMP supports a range of species including species listed as threatened, migratory, marine or cetacean under the EPBC Act. BIAs within the AMP include foraging habitat for seabirds, Australian sea lions and white sharks, and a calving buffer area for southern right whales.
Geographe Marine Park	II, IV, VI	Geographe Marine Park covers an area of 977 km^2 and is located in Geographe Bay, ~8 km west of Bunbury and 8 km north of Busselton, adjacent to the WA Ngari Capes Marine Park.	Geographe Marine Park is significant because it contains habitats, species and ecological communities associated with the South-west Shelf Province bioregion. It includes two KEFs: Commonwealth marine environment within and adjacent to Geographe Bay; and Western rock lobster. The AMP supports a range of species including species listed as threatened, migratory, marine or cetacean under the EPBC Act. BIAs within the AMP include foraging habitat for seabirds, a migratory pathway for humpback and pygmy blue whales, and a calving buffer area for southern right whales.
Great Australian Bight Marine Park	II, VI	Great Australian Bight Marine Park covers an area of 45,822 km^2 and is located ~12 km south-east of Eucla and 174 km west of Ceduna, adjacent to the SA Far West Coast and Nuyts Archipelago Marine Parks.	Great Australian Bight Marine Park is significant because it contains habitats, species and ecological communities associated with two bioregions: • Great Australian Bight Shelf Transition • Southern Province. It includes three KEFs: Ancient coastline at 90-120 m depth; Benthic invertebrate communities of the eastern Great Australian Bight; and Small pelagic fish of the South-west Marine Region. The AMP supports a range of species including species listed as threatened, migratory, marine or cetacean under the EPBC Act. BIAs within the AMP include foraging habitat for seabirds, Australian sea lions, white sharks and

Protected Area	IUCN Protected Area Category* or Relevant Park Zone	Description	Conservation Values
			pygmy blue and sperm whales, and a calving area, migratory pathway and large aggregation area for southern right whales.
Jurien Marine Park	II, VI	Jurien Marine Park covers an area of 1851 km^2 and is located ~148 km north of Perth and 155 km south of Geraldton, adjacent to the WA Jurien Bay Marine Park.	Jurien Marine Park is significant because it includes habitats, species and ecological communities associated with two bioregions: • South-west Shelf Transition • Central Western Province. It includes three KEFs: Ancient coastline at 90-120 m depth; Demersal slope and associated fish communities of the Central Western Province; and Western rock lobster The AMP supports a range of species including species listed as threatened, migratory, marine or cetacean under the EPBC Act. BIAs within the AMP include foraging habitat for seabirds, Australian sea lions and white sharks, and a migratory pathway for humpback and pygmy blue whales.
Perth Canyon Marine Park	II, IV, VI	Perth Canyon Marine Park covers an area of 7409 km^2 and is located ~52 km west of Perth and ~19 km west of Rottnest Island.	Perth Canyon Marine Park is significant because it includes habitats, species and ecological communities associated with four bioregions: • Central Western Province • South-west Shelf Province • Southwest Transition • South-west Shelf Transition. It includes four KEFs: 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; and Mesoscale eddies. The AMP supports a range of species including species listed as threatened, migratory, marine or cetacean under the EPBC Act. BIAs within the AMP 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 Corner Marine Park	II, IV, VI	South-west Corner Marine Park covers an area of 271,833 km^2 and is located adjacent to the WA Ngari Capes Marine Park. It covers an extensive offshore area that is closest to WA State waters ~48 km west of Esperance, 73 km west of Albany and 68 km west of Bunbury.	South-west Corner Marine Park is significant because it contains habitats, species and ecological communities associated with three bioregions: • Southern Province • South-west Transition • South-west Shelf Province. It includes six KEFs: Albany Canyon group and adjacent shelf break; Cape Mentelle upwelling; Diamantina Fracture Zone; Naturaliste Plateau; Western rock lobster; and Ancient coastline at 90 m-120 m depth.

Protected Area	IUCN Protected Area Category* or Relevant Park Zone	Description	Conservation Values
			The AMP supports a range of species including species listed as threatened, migratory, marine or cetacean under the EPBC Act. BIAs within the AMP 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.
Twilight Marine Park	II, VI	Twilight Marine Park covers an area of 4641 km^2 and is located ~245 km south-west of Eucla and 373 km north-east of Esperance, adjacent to the WA State waters boundary.	Twilight Marine Park is significant because it contains habitats, species and ecological communities associated with the Great Australian Bight Shelf Transition bioregion. The AMP supports a range of species including species listed as threatened, migratory, marine or cetacean under the EPBC Act. BIAs within the AMP include foraging habitat for seabirds, Australian sea lions and white sharks, and a calving buffer area for southern right whales.
Two Rocks Marine Park	II, VI	Two Rocks Marine Park covers an area of 882 km^2 and is located ~25 km north-west of Perth, to the north-west of the WA Marmion Marine Park.	Two Rocks Marine Park is significant because it includes habitats, species and ecological communities associated with the South-west Shelf Transition bioregion. It includes three KEFs: Commonwealth marine environment within and adjacent to the west-coast inshore lagoons; Western rock lobster; and Ancient coastline at 90-120 m depth. The AMP supports a range of species including species listed as threatened, migratory, marine or cetacean under the EPBC Act. BIAs within the AMP 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.
State Marine Parks and Reserves			
Jurien Bay Marine Park	Sanctuary, Special Purpose and General Use Zones.	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.	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).
Marmion Marine Park	Sanctuary, Recreation and Special Use Zones.	The Marmion Marine Park lies within State waters between Trigg Island and Burns Beach and encompasses a coastal area of ~95 km^2. Marmion	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, to a general use zone and the Waterman Recreation Area. The marine park contains important habitat for the endemic Australian

Protected Area	IUCN Protected Area Category* or Relevant Park Zone	Description	Conservation Values
		Marine Park was the State's first marine park, declared in 1987.	sea lion, an array of seabird species migratory whales are regular visitors (CALM, 1992; DPAW, 2016d).
Swan Estuary Marine Park	Special Purpose and Nature Reserve Zones.	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.	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. The Park and adjacent reserves also provide habitat for a diverse assemblage of aquatic and terrestrial flora and fauna (CALM, 1999).
Shoalwater Islands Marine Park	Sanctuary, Special Purpose and General Use Zones.	The Shoalwater Islands Maine Park is located adjacent to Rockingham on the south-west coast of WA, ~50 km south of Perth and covers an area of ~66 km^2.	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 the 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).
Ngari Capes Marine Park	Sanctuary, Special Purpose and Recreation Zones.	The Ngari Capes Marine Park is located off the south-west coast of WA, ~250 km south of Perth, covering ~1238 km^2.	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 the marine park as well as a diverse range of seabirds and shorebirds (DEC, 2013).
Walpole and Nornalup Inlets Marine Park	Recreation Zone.	The Walpole and Nornalup Inlets Marine Park is located adjacent to the towns of Walpole and Nornalup on the south coast of WA, ~120 km west of Albany, and covers ~14 km^2.	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 the marine park (DEC, 2009).

**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 South-west Marine Parks Network Management Plan 2018 (DNP, 2018b)

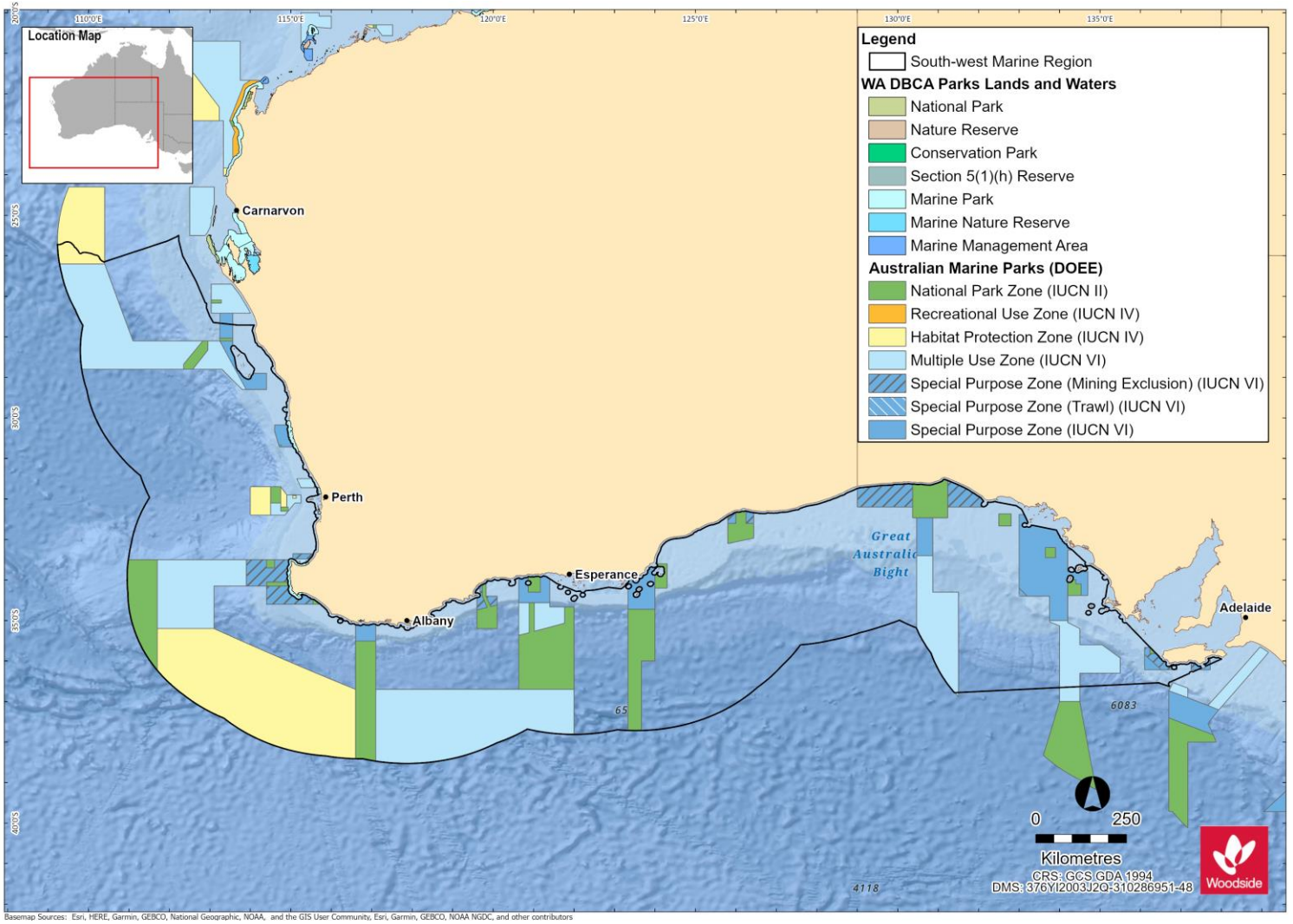

Figure 10-2. Commonwealth and State Marine Protected Areas for the SWMR

10.11 Summary of Protected Areas within the NMR

Table 10-3 Protected Areas within the NMR

Protected Area	IUCN Protected Area Category* or Relevant Park Zone	Description	Conservation Values
World Heritage Properties			
Kakadu National Park		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 the World Heritage list in three stages over 11 years. It is located in tropical north Australia covering a total area of 19,804 square kilometres.	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.
National Heritage Places - Natural			
Kakadu National Park		Refer to World Heritage property description above.	Refer to World Heritage property conservation values above
Commonwealth Heritage Places - Natural			
N/A			
Wetlands of International Importance (Ramsar)			
Kakadu National Park		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.	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.

Protected Area	IUCN Protected Area Category* or Relevant Park Zone	Description	Conservation Values
Cobourg Peninsula		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.	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.
Wetlands of National Importance (DAWE, 2019)			
Southern Gulf Aggregation		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.	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.
Australian Marine Parks (DNP, 2018c)			
Arafura Marine Park	VI	Arafura Marine Park covers an area of 22,924 km^2 is located ~256 km north-east of Darwin and 8 km offshore of Croker Island, NT. It extends from NT waters to the limit of Australia's EEZ.	The AMP is significant because it contains habitats, species and ecological communities associated with two bioregions: • Northern Shelf Province • Timor Transition. It includes one KEF: Tributary canyons of the Arafura Depression. The AMP supports a range of species, including species listed as threatened, migratory, marine or cetacean under the EPBC Act. BIAs within the AMP include internesting habitat for marine turtles and important foraging and breeding habitat for seabirds.
Arnhem Marine Park	VI	Arnhem Marine Park covers an area of 7125 km^2 and is located ~100 km south-east of Croker Island and 60 km south-east of the Arafura Marine Park. It extends from NT waters surrounding the Goulburn Islands, to the waters north of Maningrida.	Arnhem Marine Park is significant because it contains habitats, species and ecological communities associated with the Northern Shelf Province bioregion. The AMP supports a range of species, including species listed as threatened, migratory, marine or cetacean under the EPBC Act. BIAs within the AMP include foraging habitat and a migratory pathway for marine turtles and seabirds.
Gulf of Carpentaria Marine Park	II, VI	Gulf of Carpentaria Marine Park covers an area of 23,771 km^2 and is located ~90 km north-west of Karumba, Queensland and is adjacent to the Wellesley Islands in	Gulf of Carpentaria Marine Park is significant because it contains habitats, species and ecological communities associated with the Northern Shelf Province bioregion.

Protected Area	IUCN Protected Area Category* or Relevant Park Zone	Description	Conservation Values
		the south of the Gulf of Carpentaria basin.	It includes four KEFs: Gulf of Carpentaria basin; Gulf of Carpentaria coastal zone; Plateaux and saddle north-west of the Wellesley Islands; and Submerged coral reefs of the Gulf of Carpentaria. The AMP supports a range of species, including species listed as threatened, migratory, marine or cetacean under the EPBC Act. BIAs within the AMP include breeding and foraging areas for seabirds and internesting and foraging areas for turtles.
Joseph Bonaparte Gulf Marine Park	VI	The Joseph Bonaparte Gulf Marine Park is located within both the NWMR and NMR. Refer **Table 10-1** for description and conservation values.	
Limmen Marine Park	IV	Limmen Marine Park covers an area of 1399 km^2 and is located ~315 km south-west of Nhulunbuy, NT, in the south-west of the Gulf of Carpentaria. It extends from NT waters, between the Sir Edward Pellew Group of Islands and Maria Island in the Limmen Bight, adjacent to the NT Limmen Bight Marine Park.	Limmen Marine Park is significant because it contains habitats, species and ecological communities associated with the Northern Shelf bioregion. It includes one KEF: Gulf of Carpentaria coastal zone. The AMP supports a range of species, including species listed as threatened, migratory, marine or cetacean under the EPBC Act. BIAs within the AMP include internesting and foraging habitat for marine turtles.
Oceanic Shoals Marine Park	II, IV, VI	The Oceanic Shoals Marine Park is located within both the NWMR and NMR. Refer **Table 10-1** for description and conservation values.	
Wessel Marine Park	IV, VI	Wessel Marine Park covers an area of 5908 km^2 and is located ~22 km east of Nhulunbuy, NT. It extends from NT waters adjacent to the tip of the Wessel Islands to NT waters adjacent to Cape Arnhem.	Wessel Marine Park is significant because it contains habitats, species and ecological communities associated with the Northern Shelf bioregion. It includes one KEF: Gulf of Carpentaria basin. The AMP supports a range of species, including species listed as threatened, migratory, marine or cetacean under the EPBC Act. BIAs within the AMP include breeding habitat for seabirds and internesting and foraging habitat for marine turtles.
West Cape York Marine Park	II, IV, VI	West Cape York Marine Park covers an area of 16,012 km^2 and is located adjacent to the northern end	West Cape York Marine Park is significant because it contains species and ecological communities associated with two bioregions: • Northeast Shelf Transition

Protected Area	IUCN Protected Area Category* or Relevant Park Zone	Description	Conservation Values
		of Cape York Peninsula ~25 km south-west of Thursday Island and 40 km north-west of Weipa, Queensland.	• Northern Shelf Province. It includes two KEFs: Gulf of Carpentaria basin; and Gulf of Carpentaria coastal zone. The AMP supports a range of species, including species listed as threatened, migratory, marine or cetacean under the EPBC Act. BIAs within the AMP include breeding and foraging habitat for seabirds, internesting and foraging habitat for marine turtles and dugong, and foraging, breeding and calving habitat for dolphins.
Territory Marine Parks and Reserves			
Cobourg Marine Park	II, IV, VI	Cobourg Marine Park covers an area of 2,290 km^2 and is located in the waters surrounding the Cobourg Peninsula ~220 km north-east of Darwin. The Marine Park is part of the larger Garig Gunak Barlu National Park. Garig Gunak Barlu National Park includes both the Marine Park and the Cobourg Sanctuary.	Cobourg Marine Park is located in the Cobourg and Van Diemen Gulf marine bioregions with the northern portion of the Park covered by the Cobourg marine bioregion and the southern portion covered by the Van Diemen Gulf marine bioregion. The 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 Park. The areas of the Park that have been studied and where extensive collections have been made indicates that the Park supports rich and diverse marine life including live coral reefs, seagrass, diverse reef and pelagic fish populations, marine turtles and dugong.

**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 Marine Parks Network Management Plan 2018 (DNP, 2018c)

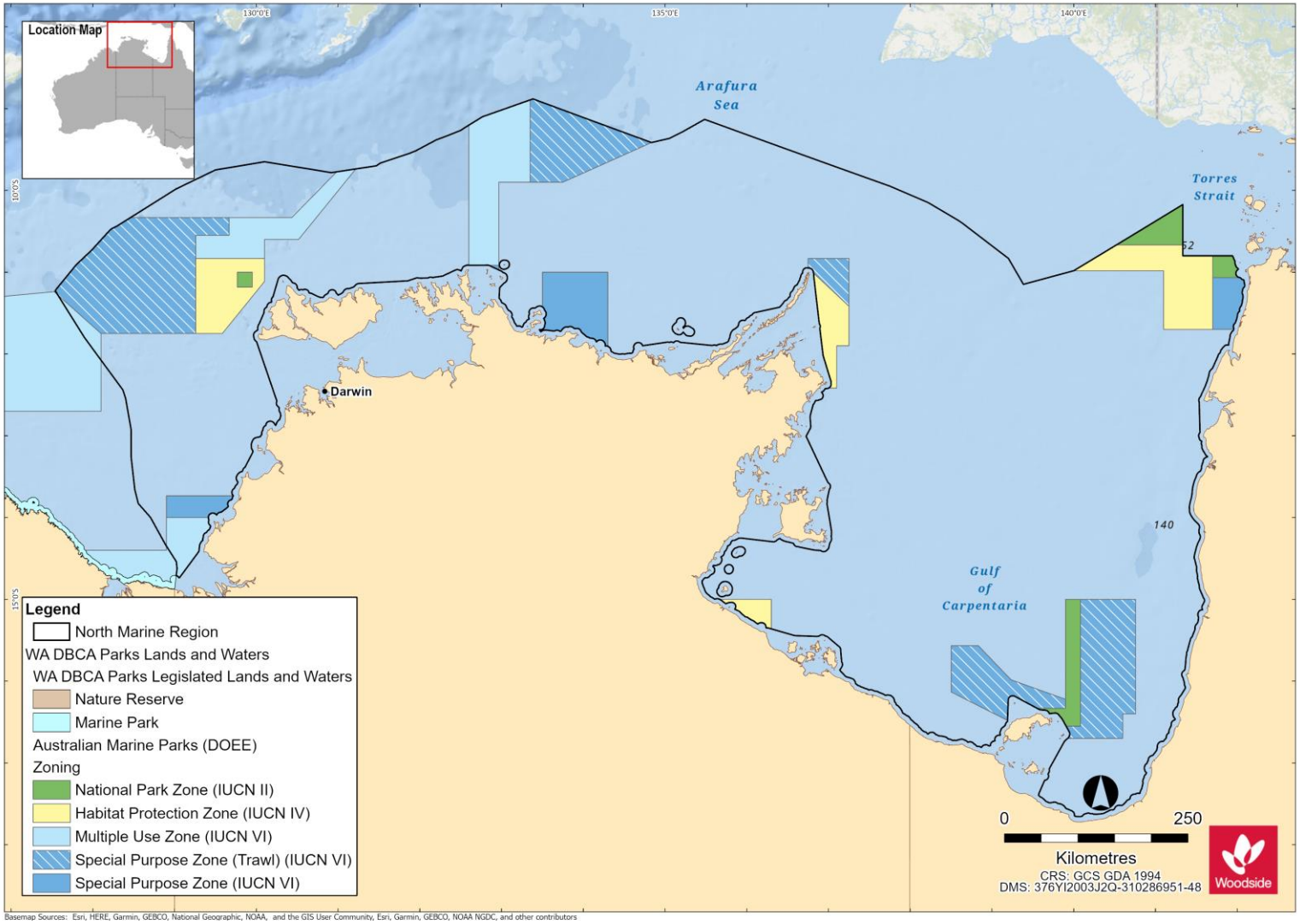

Figure 10-3. Commonwealth and State Marine Protected Areas within the NMR

11. SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT

This section summarises the information relating to the socio-economic and cultural environment of the regions offshore Western Australia, with a focus on the NWMR and to a lesser extent the SWMR and NWR.

The cultural environment includes Indigenous and European heritage values, including underwater values such as historic shipwrecks. Socio-economic values include commercial and traditional fishing, tourism and recreation, shipping, oil and gas activities and defence activities.

11.1 Cultural Heritage

11.1.1 Indigenous 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 Aboriginal 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.

Woodside also recognises the potential for heritage to survive in submerged landscapes. Sea-level rises since the last ice age mean that areas now under the sea were once exposed, that many of today's islands would have been connected to the mainland, and that Aboriginal people are highly likely to have inhabited these places. Woodside works with traditional custodians, academics and heritage professionals to identify tangible and intangible heritage values in the submerged landscape to avoid disturbing heritage where possible and to minimise impacts where heritage cannot be avoided.

It is an offence to excavate, destroy, damage, conceal or alter Indigenous heritage onshore or in state waters under section 17 of the *Aboriginal Heritage Act 1972 (WA) (AHA)* without ministerial 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.

The Department of Planning, Lands and Heritage maintains a register of registered sites and heritage places including middens, burial, ceremonial [sites], artefacts, rock shelters, mythological [sites] and engraving sites. 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 *Environment Protection and Biodiversity Conservation Act 1999 (Cth)*. Murujuga National Park is managed under the *Conservation and Land Management Act 1984 (WA)*.

11.1.2 European Sites of Significance

European sites of significance and heritage value are found along adjacent foreshores of the SWMR, NWMR and NWR. Heritage values are protected in Western Australia under the *Heritage Act 2018*.

11.1.3 Underwater Cultural Heritage

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 *Environment Protection and Biodiversity Conservation Act 1999* (Cth). Historic places may also be protected under the *Heritage Act 2018* (WA); under section 129 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).

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. 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).

The Australian National Shipwreck Database and the WA Maritime Museum Shipwreck Database list these protected wrecks.

11.1.4 National and Commonwealth Listed Heritage Places

Australia's National Heritage Sites are those of outstanding natural, historic and/or Indigenous significance to Australia. National Heritage places classed as natural are discussed in **Section 10.3**. Historic and/or Indigenous National Heritage Listed Places of the NWMR include:

- Dampier Archipelago (including Burrup Peninsula)
- Dirk Hartog Landing Site/Cape Inscription
- HMAS Sydney II and the HSK Kormoran Shipwreck Sites
- Batavia Shipwreck Site and Survivor Camps Area 1629 – Houtman Abrolhos

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 10.3**. Listed Heritage Places in the NWMR include:

- Mermaid Reef – Rowley Shoals (refer **Section 10.3**)
- Ashmore Reef National Nature Reserve (refer **Section 10.3**)
- Scott Reef and Surrounds – Commonwealth Area (refer **Section 10.3**)
- Ningaloo Marine Area (refer **Section 10.3**)

World Heritage Properties are those sites that hold universal value which transcends any value they 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 10.2**). There are no cultural heritage listings located within the NWMR.

Summary tables of heritage places for NWMR, SWMR and NMR are presented in **Table 11-1,Table 11-2** and **Table 11-3**.

11.2 Summary of Heritage Places within the NWMR

Table 11-1 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						
N/A						

11.3 Summary of Heritage Places within the NMR

Table 11-2 Heritage Places (Indigenous and Historic) within the NMR

Heritage Places	Class	Description	Conservation Values
National Heritage Properties			
None			
Commonwealth Heritage Properties			
None			

11.4 Summary of Heritage Places within the SWMR

Table 11-3 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. Aboriginal 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 Aboriginal 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 the Aboriginal 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.

Heritage Places	Class	Description	Conservation Values
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.
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	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

Heritage Places	Class	Description	Conservation Values
		corner of Garden Island elements of the J Battery complex are now covered in part by sand.	strategic role in the coastal defences of Cockburn Sound and Fremantle following the entry of Japan into the Second World War (1939-45).

11.5 Fisheries - Commercial

11.5.1 Commonwealth and State Fisheries

The diverse range of habitats and species offshore WA has allowed for various fisheries to develop and operate throughout the region.

The Australian Fisheries Management Authority (AFMA) manages fisheries on behalf of the Commonwealth Government and is bound by objectives under the Commonwealth *Fisheries Management Act 1991*.

WA State commercial fisheries are managed by the WA Department of Primary Industries and Regional Development (WA DPIRD) under the WA *Fish Resources Management Act 1994* (FRMA), Fisheries Resources Management Regulations 1995, relevant gazetted notices and licence conditions, and applicable Fishery Management Plans.

Commonwealth and State managed fisheries that operate within the NWMR and in areas beyond this region are summarised in the **Table 11-4**.

Table 11-4 Commonwealth and State managed fisheries

Fishery	Woodside Activity Area			Description			
	Browse	NWS/S	NW Cape				
Commonwealth Managed Fisheries							
Southern Bluefin Tuna Fishery	✓	✓	✓	**Management area**	The Southern Bluefin Tuna Fishery (SBTF) 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 and purse seine fishing.	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 *et al*., 2020). SBTF is a fishery that is shared amongst many countries. Australia currently has a 35% share of the total global allowable catch, and while wild capture fishing in Australia to sell directly to market can occur anywhere throughout the SBTF's range, currently the vast majority of that quota is value-added through ranching (on-growing the wild captured fish for extra 5-6 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) (for example as available in Port Lincoln). 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. The stock remains classified as overfished.		
				Active licences/vessels	Seven purse seine vessels, 20 longline vessels (Patterson *et al*., 2020).		
Western Skipjack Tuna Fishery	✓	✓	✓	**Management area**	The combined western and eastern skipjack tuna (*Katsuwonus pelamis*) fisheries (STF) encompass the entire Australian EEZ. The Western Skipjack Tuna Fishery (WSTF) extends westward from the SA/Victorian border across the Great Australian Bight and around the west coast of WA to the Cape York Peninsula.		

Fishery	Woodside Activity Area			Description		
	Browse	NWS/S	NW Cape			
				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 (STF) has not been actively fished since the 2008-2009 fishing season (Patterson *et al*., 2020). 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.	
Western Tuna and Billfish Fishery	✓	✓	✓	**Management area**	The Western Tuna and Billfish Fishery (WTBF) extends to the Australian EEZ boundary in the Indian Ocean.	
				Species targeted	**Fishing methods**	**Fishing depth**
				Bigeye tuna (*Thunnus obesus*) Yellowfin tuna (*Thunnus albacares*) Swordfish (*Xiphias gladius*) Albacore (*Thunnus alalonga*) Striped marlin (*Kajikia audax*)	Fishers mainly use pelagic longline fishing gear to catch the targeted species. Minor line (including handline, troll, rod and reel) can also be used.	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 WTBF 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.	
				Active licences/vessels:	Two pelagic longline vessels and two minor longline vessels (Patterson *et al*., 2020).	
Western Deepwater Trawl Fishery			✓	**Management area**	The Western Deepwater Trawl Fishery (WDTF) is located in deep water off WA, from the line approximating the 200 m isobath to the edge of the Australian Fishing Zone (AFZ).	

<table>
<tr><th rowspan="2">Fishery</th><th colspan="3">Woodside Activity Area</th><th rowspan="2">Description</th></tr>
<tr><th>Browse</th><th>NWS/S</th><th>NW Cape</th></tr>
<tr><td></td><td></td><td></td><td></td><td>
<table>
<tr><th>Species targeted</th><th>Fishing methods</th><th>Fishing depth</th></tr>
<tr><td>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, stakeholder consultation has indicated that this may be to depths of 800 m.</td></tr>
<tr><td>Fishing effort:</td><td colspan="2">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 deepwater bugs (Patterson et al., 2020). Total fishing effort has been variable but relatively low since then. Effort in 2018-2019 (492 trawl hours) was less than half that of 2017-2018 (1108 trawl hours) (Patterson et al., 2020).</td></tr>
<tr><td>Active licences/vessels:</td><td colspan="2">One active vessel in 2018-2019 (Patterson et al., 2020).</td></tr>
</table>
</td></tr>
<tr><td>North-west Slope Trawl Fishery</td><td>✓</td><td>✓</td><td></td><td>
<table>
<tr><td>Management area</td><td colspan="2">The North-west Slope Trawl Fishery (NWSTF) 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)
Mixed snappers have historically been an important component of the catch.</td><td>Demersal trawl.</td><td>Typically at depths of 350 to 600 m (Patterson et al., 2017), however stakeholder consultation has indicated that this may be to depths of 800 m.</td></tr>
</table>
</td></tr>
</table>

Fishery	Woodside Activity Area			Description			
	Browse	NWS/S	NW Cape				
				Fishing effort:	The NWSTF commenced in 1985 and the number of active vessels peaked at 21 in the 1986-1987 season and declined through the 1990s before increasing to 10 vessels in 2000-2001 and 2002-2002 seasons. Four vessels operated in the 2017-2018 and 2018-2019 seasons (Patterson *et. al*. 2020). Fishing for scampi occurs over soft, muddy sediments or sandy habitats, using demersal trawl gear on the continental slope (Patterson *et al*., 2017).		
				Active licences/vessels:	Four vessels (Patterson *et. al*., 2020).		
State Managed Fisheries							
Pilbara Fish Trawl (Interim) Managed Fishery		✓		**Management area**	The Pilbara Trawl (Interim) Managed Fishery is of high intensity and is 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*., 2020a). No fish trawl units have been allocated for use in Area 6 of Zone 2 since the management plan commenced operation in 1998.		
				Species targeted		**Fishing methods**	**Fishing depth**
				The Pilbara Fish Trawl (Interim) Managed Fishery (PFTIMF) targets more than 50 scalefish species. The five main demersal scalefish species landed by the fisheries in the Pilbara region are blue-spotted emperor, crimson snapper, rosy threadfin bream, red emperor and goldband snapper in 2018 (Newman *et al*., 2020a).	Demersal trawl.	The Pilbara Fish Trawl Fishery lands the largest component of the catch and operates in waters between 50 and 200 m water depth (Allen *et al*., 2014, Newman et al. 2015). Stakeholders have advised that trawling can occur in depths of up to approximately 800 m.
				Fishing effort:	Based on State of the Fisheries annual reports provided by DPIRD, catch trends are seen to be increasing over the past reporting years:		

Fishery	Woodside Activity Area			Description			
	Browse	NWS/S	NW Cape				
					Pilbara Trawl (Interim) Managed Fishery caught 1996 t in 2018-19, 1780 t in 2017-18, 1529 t in 2016-17, 1172 t in 2015-16, 1105 t in 2014-15.		
				Active licences/vessels:	Two Pilbara Trawl (Interim) Managed Fishery vessels in 2017 (Newman *et al*., 2020a). Active vessels data are confidential as there were fewer than three vessels in the Pilbara Fish Trawl Interim Managed Fishery (Newman *et al*., 2020a).		
Pilbara Trap Managed Fishery		✓	✓	**Management area**	The Pilbara Trap 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.		
				Species targeted		**Fishing methods**	**Fishing depths**
				Pilbara Trap Managed Fishery catch is made up of around 45-50 different fish species. The four main species landed by the fisheries in the Pilbara region are blue-spotted emperor, red emperor, goldband snapper and Rankin cod.		Demersal fish traps.	Greatest effort in waters less than 50 m depth targeting high value species such as red emperor and goldband snapper.
				Fishing effort	Based on State of the Fisheries annual reports provided by DPIRD, catch trends are seen to be increasing over the past reporting years: Pilbara Trap Managed Fishery caught 563 t in 2018-19, 573 t in 2017-18, 495 t in 2016-17, 510 t in 2015-16, 268 t in 2014-15. In 2018, the total catch for the Pilbara Trap Managed Fishery was 563 t, making up 21% of the total catch by the Pilbara Demersal Scale Fishery (Newman *et al*., 2019).		

Fishery	Woodside Activity Area			Description			
	Browse	NWS/S	NW Cape				
				Active licences/vessels	In the 2019 season, there were six licences in the Pilbara Trap Managed Fishery, (Newman *et al*., 2020a). Active vessels data are confidential as there were fewer than three vessels in the Pilbara Trap Managed Fishery (Newman *et al*., 2019).		
Pilbara Line Managed Fishery		✓	✓	**Management area**	The Pilbara Line Managed Fishery boat licences are permitted to operate anywhere within "Pilbara waters", 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 Pilbara Line Managed 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 The Pilbara Line Managed Fishery operates on an exemption basis that enables licence holders to fish for any nominated five-month block during the year.		Demersal long line.	Pilbara Line Fishing Depth: Operates up to a depth of 600 m.
				Fishing effort	Based on State of the Fisheries annual reports provided by DPIRD, catch trends are seen to be increasing over the past reporting years: Pilbara Line Managed Fishery caught 93 t in 2018-19, 143 t in 2017-18, 126 t in 2016-17, 97 t in 2015-16, 40 t in 2014-15. The total catch in 2018 for the Pilbara Line Managed Fishery was 93 t, making up 3% of the total catch by the Pilbara Demersal Scalefish Fishery (Newman *et al*., 2019).		

Fishery	Woodside Activity Area			Description			
	Browse	NWS/S	NW Cape				
				Active licences/vessels	In the 2018 season there are nine individual licences in the Pilbara Line Fishery, held by seven operators. Active vessels data is confidential as there were fewer than three vessels in the Pilbara Line Fishery (Newman *et al*., 2018).		
Mackerel Managed Fishery	✓	✓	✓	**Management area**	The commercial fishery extends from Geraldton to the Northern Territory border. There are three managed fishing areas: Kimberley (Area 1), Pilbara (Area 2), and Gascoyne and West Coast (Area 3).		
				Species targeted		**Fishing methods**	**Fishing depth**
				Spanish mackerel (*Scomberomorus commerson*) Grey mackerel (*S. semifasciatus*) Other species from the genus *Scomberomorus*		Near-surface trawling gear. Jig fishing.	Previous engagement with WAFIC suggests that the depth of fisheries may extend to 70 m.
				Fishing effort:	Most of the catch is taken from waters off the Kimberley coasts (Lewis and Brand-Gardner, 2018), 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). Based on State of the Fisheries annual reports provided by DPIRD, catch trends are as follows: 213 t in 2018-19 (the lowest on record (Lewis *et al*., 2020), 283 t in 2017-18, 276 t in 2016-17, 302 t in 2015-16, 322 t in 2014-15.		
				Active licences/vessels:	Fifteen boats fished in 2018, with approximately 35-40 people directly employed in the Mackerel Managed Fishery, primarily from May-November (Lewis *et al*., 2020).		
Marine Aquarium Managed Fishery	✓	✓	✓	**Management area**	The Marine Aquarium Managed Fishery is able to operate in all 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.*, 2020b).		
				Species targeted		**Fishing methods**	**Fishing depth**

Fishery	Woodside Activity Area			Description		
	Browse	NWS/S	NW Cape			
				Finfish, hard coral, soft coral, tridacnid clams, syngnathids (seahorses and pipefish), other invertebrates (including molluscs, crustaceans, echinoderms etc.), algae, seagrasses and 'live rock'.	The fishery is diver-based, which typically restricts effort to safe diving depths (less than 30 m).	Less than 30 m, as advised by WAFIC.
				Fishing effort:	Total catch for the Marine Aquarium Managed Fishery in 2018 was 156,188 fishes, 32.025 t of coral, live rock and living sand and 176.02 L of marine plants and live feed.	
				Active licences/vessels:	Eleven licences were active in 2019 (Newman *et al.*, 2020b).	
Beche-de-mer Fishery	✓	✓	✓	**Management area**	Fishing occurs in the northern half of WA from Exmouth Gulf to the NT border and is managed under Ministerial Exemptions.	
				Species targeted	**Fishing methods**	**Fishing depth**
				The sea cucumber fishery targets two main species: sandfish (*Holothuria scabra*) and redfish (*Actinopyga echinites*).	Diving	The targeted species typically inhabit nearshore in shallow depths.
				Fishing effort	Based on State of the Fisheries annual reports provided by DPRID, catch trends are as follows: 62t in 2018 (Gaughan and Santoro, 2020), 135t in 2017, 93t in 2016, 38t in 2015	
				Active licences/vessels	Six active licences in 2019 (Hart *et al*., 2019). Active vessels data is confidential as there were fewer than three vessels.	
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**

Fishery	Woodside Activity Area			Description		
	Browse	NWS/S	NW Cape			
				The fishery targets: Western king prawns (*Penaeus esculentus*) Brown tiger prawns (*Penaeus esculentus*) Blue endeavour prawns (*Metapenaeus endeavouri*	Low opening, otter prawn trawl systems.	Prawn trawling takes place in water depths of approximately 30 metres and less (licence holder feedback). 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 2018 were less than 60 t below the target catch range (Kangas *et al.*, 2020a).	
				Active licences/vessels:	One vessel (Kangas *et al.*, 2020a).	
Pearl Oyster Managed Fishery	✓	✓	✓	**Management area**	Located in shallow coastal waters with the pearl oyster managed fishery designated by four zones extending from Exmouth to Kununurra and the seaward boundary demarcated by the 200 nm EEZ.	
				Species targeted	**Fishing methods**	**Fishing depth**
				Pearl oysters (*Pinctada maxima*).	Drift diving.	Fishing effort is mostly focussed in shallow coastal waters (10-15 m depth), with a maximum depth of 35 m (Lulofs *et al.* 2002).
				Fishing effort:	In 2018, catch was taken from Zones 2 and 3 with no fishing in Zone 1. The number of pearl oysters caught for 2018-19 was 614,002. Total effort was 15,637 dive hours, this was an increase from 2017 effort of 12,845 hours. No fishing occurred in Zone 1 in 2017 and 2018 (Gaughan and Santoro, 2020).	
				Active licences/vessels:	15,637 diver hours (Hart *et al.*, 2020a).	
		✓	✓	**Management area**	The Pilbara Crab Managed Fishery comprises WA waters off the north-western coast of WA north of 23° 34′ south latitude and west of 120° 00′ east longitude. Areas of the fishery north and east of Exmouth and	

Fishery	Woodside Activity Area			Description			
	Browse	NWS/S	NW Cape				
Pilbara Crab Managed Fishery					nearshore are currently closed as per Schedule 2 of the Draft Management Plan for the Pilbara Crab Managed Fishery.		
				Species targeted		**Fishing methods**	**Fishing depth**
				Crabs of the Family Portunidae, excluding crabs of the genus *Scylla*.		Traps.	Up to 50 m deep.
				Fishing effort:	The capacity of the fishery is 600 traps.		
				Active licences/vessels:	No information available at this time.		
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 however, species generally found in shallow waters (up to 30 m).
				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 2018 commercial catch was 191 t, with 72% taken by the South West Coast Salmon Managed Fishery, 25% by the South Coast Salmon Managed Fishery and 3% by other fisheries (Duffy and Blay, 2020a).		
				Active licences/vessels:	Six licences.		
	✓	✓	✓	**Management area**	The Specimen Shell Managed Fishery (SSMF) encompasses the entire WA coastline, but effort is concentrated in areas adjacent to the population centres such as Broome, Exmouth, Shark Bay,		

<table>
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<tr><td>Specimen Shell Managed Fishery</td><td></td><td></td><td></td><td colspan="4">
<table>
<tr><td></td><td colspan="3">Geraldton, Perth, Mandurah, the Capes area and Albany (Hart et al., 2020b). There are a number of closed areas where the SSMF is not permitted to operate. These include various marine parks and aquatic reserves, such as Ningaloo Marine Park.</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.</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., 2017). In the past there has been one licence holder in the Specimen Shell Managed Fishery who has trialled ROV means of shell collection, WAFIC have provided advice that this fishery is no longer active.</td></tr>
<tr><td>Fishing effort:</td><td colspan="3">Information not available.</td></tr>
<tr><td>Active licences/vessels:</td><td colspan="3">In 2018 there were 31 licences with only two divers allowed in the water per licences at one time (Hart et al., 2018). The number of people employed regularly in the fishery is likely to be about 21 (Hart et al., 2018).</td></tr>
</table>
</td></tr>
<tr><td>West Australian Abalone Fishery</td><td>✓</td><td>✓</td><td>✓</td><td colspan="4">
<table>
<tr><td>Management area</td><td colspan="3">The Western Australian Abalone 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.</td></tr>
<tr><td colspan="2">Species targeted</td><td>Fishing methods</td><td>Fishing depth</td></tr>
<tr><td colspan="2">Greenlip abalone (Haliotis laevigata)
Brownlip abalone (Haliotis conicopora)
Roe’s abalone (Haliotis roei)</td><td>Divers.</td><td>Distribution to 5 m depth for Roe’s abalone and 40 m depth for greenlip / brownlip abalone (DOF, 2011).</td></tr>
</table>
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<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>NW Cape</th></tr>
<tr><td></td><td></td><td></td><td></td><td>Fishing effort:</td><td colspan="3">In 2018, the total commercial catch was 48 t, 1 t less than the catch in each of the last two seasons. No commercial fishing for abalone north of Moore River (Zone 8 of the managed fishery) has occurred since 2011–2012 (Strain et al., 2018).</td></tr>
<tr><td></td><td></td><td></td><td></td><td>Active licences/vessels:</td><td colspan="3">26 vessels active in Roe’s abalone fishery (WAFIC[5]).</td></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. Catches were dominated by crystal crabs of which 99% of their Total Allowable Catch (TAC) was landed (How and Orme, 2020a).
Crystal (snow) crab (Chaceon albus)
Giant (king) crab (Pseudocarcinus gigas)
Champagne (spiny) crabs (Hypothalassia acerba)</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 m – 800 m). Most of the commercial Crystal crab catch is taken in depths of 500 m – 800 m (WAFIC[6]).</td></tr>
<tr><td>Fishing effort:</td><td colspan="3">The total landings in 2018 was 168. t. Two vessels operated in the fishery in 2017, using baited pots operated in a longline formation in the shelf edge waters, mostly in depths between 500 and 800 m (How and Orme, 2020a). Fishing effort was concentrated between Fremantle and Carnarvon.</td></tr>
<tr><td>Active licences/vessels:</td><td colspan="3">There were four active vessels in 2018 (How and Orme, 2020a).</td></tr>
</table>

[5] https://www.wafic.org.au/fishery/roes-abalone-fishery/

[6] https://www.wafic.org.au/fishery/west-coast-deep-sea-crustacean-fishery/

Fishery	Woodside Activity Area			Description			
	Browse	NWS/S	NW Cape				
Abrolhos Islands and Mid-West Trawl Fishery			✓	**Management area**	The Abrolhos Islands and Mid-West Trawl Fishery (AIMWTMF) operates around the Abrolhos Islands within the SWMR.		
				Species targeted		**Fishing methods**	**Fishing depth**
				Saucer scallops (*Ylistrum balloti,* formerly *Amusium balloti*)		Trawl.	Information not available, however, the species occurs at depth of around 30-60 m and therefore fishing effort would likely be at these depths (Himmelman *et al*., 2009).
				Fishing effort:	The scallop landings in the AIMWTMF were 31.0 t meat weight (154.8 t whole weight). Between 2011 and 2015, the annual pre-season surveys showed very low recruitment (1-year old), as a result of the 2011 extreme marine heatwave and subsequent poor pawning stock (Kangas *et al.*, 2020b). The fishery was closed between 2011 and 2016.		
				Active licences/vessels:	Information about licences or vessels is not available but the Department of Primary Industry and Regional Development reported 774 t of catch from this fishery in the 2019 annual report (DPIRD, 2019).		
Broome Prawn Managed Fishery	✓			**Management area**	The Broome Prawn Managed Fishery (BPMF) operates off Broome and forms part of the North Coast Prawn Fishery.		
				Species targeted		**Fishing methods**	**Fishing depth**
				Western king prawn (*Penaeus latisulcatus*) Coral prawn		Trawl.	Trawling is generally in waters between 30 and 60 m deep, however can occur down to 100 m (DOEH, 2004).
				Fishing effort:	BPMF recorded extremely low fishing effort in 2018. Only two vessels undertook trial fishing to investigate whether the catch rates were sufficient for commercial fishing. This resulted in negligible landings of Western king prawn (Kangas *et al*., 2020a).		

Fishery	Woodside Activity Area			Description			
	Browse	NWS/S	NW Cape				
				Active licences/vessels:	Two vessels conducting fishing trial operated in 2018 (Kangas *et al*., 2020a).		
Exmouth Gulf Prawn Managed Fishery			✓	**Management area**	The estimated employment in the fishery in 2017 was 18 people including skippers and other crew (Kangas *et al*., 2018). 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*)		Trawl.	Information not available.
				Fishing effort:	The total landings of prawns in 2018 were 880 t (Kangas *et al*., 2020a). In the 2016 season, a fishing effort of about 23,000 hours resulted in a catch of 822 t.		
				Active licences/vessels:	The precise number of vessels is unreported. Eighteen people were said to be employed in this fishery in 2018 (Kangas *et al.*, 2019); however, in 2013 it was reported that 18 skippers as well as other crew and support staff were employed (WAFIC[7]).		
Gascoyne Demersal Scalefish Managed Fishery			✓	**Management area**	The Gascoyne Demersal Scalefish Fishery (GDSF) is located between the southern Ningaloo Coast to south of Shark Bay (23°07.30'S to 26°.30'S) with a closure area at Point Maud to Tantabiddi (21°56.30'S) (WAFIC[8]).		
				Species targeted		**Fishing methods**	**Fishing depth**

[7] https://www.wafic.org.au/fishery/exmouth-gulf-prawn-fishery/

[8] https://www.wafic.org.au/fishery/gascoyne-demersal-scalefish-fishery/

Fishery	Woodside Activity Area			Description		
	Browse	NWS/S	NW Cape			
				Pink snapper (*Chrysophrys auratus*) Goldband snapper (*Pristipomoides multidens*) Red emperor (*Lutjanus sebae*) Cods (*Gadus morhua*) Emperors (*Lethrinus miniatus)*	Mechanised handlines.	Information not available.
				Fishing effort:	The GDSF reported a total commercial catch of 210 t in 2017-18.	
				Active licences/vessels:	In 2018, 13 vessels fished during the season, in the 2017 season there were 16 vessels (Gaughan and Santoro, 2018).	
Kimberley Developing Mud Crab Fishery	✓			**Management area**	The Kimberley Developing Mud Crab 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).	
				Species targeted	**Fishing methods**	**Fishing depth**
				Brown mud crab (*Scylla olivacea*) Green mud crab (*Scylla serrata*)	Trap.	Information not available.
				Fishing effort:	The catch landed represents all commercially caught mud crabs landed in WA for 2018. A nominal catch rate of 0.66 kg/traplift was recorded for 2018, which is a 28% decrease from 2017 but remains above the harvest strategy threshold (Johnston *et al*., 2020).	
				Active licences/vessels:	There are currently three licences issued to commercial operators (600 trap limit), and three exemptions issued to Indigenous groups (total of 210 traps currently allocated of a maximum 600 traps) (Johnston *et al*., 2020).	
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.	
				Species targeted	**Fishing methods**	**Fishing depth**

Fishery	Woodside Activity Area			Description		
	Browse	NWS/S	NW Cape			
				Banana prawn (*Penaeus merguiensis*) Western king prawn (*Penaeus latisulcatus*) Brown tiger prawn (*Penaeus esculentus*) Blue endeavour prawn (*Metapenaeus endeavouri*)	Trawl.	Information not available.
				Fishing effort:	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). The total landings for the 2018 season were 81 t. Fishing effort was less than half at 138 days, compared to 281 boat days in 2017 (Kangas *et al*., 2020a).	
				Active licences/vessels:	The precise number of vessels is unreported, though low effort produced a catch of 17 t in 2016 (Kangas *et al.*, 2018).	
Northern Demersal Scalefish Managed Fishery	✓			**Management area**	The 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*)	Line fishing, handline, dropline and fish trap fishing.	Information not available.

Fishery	Woodside Activity Area			Description			
	Browse	NWS/S	NW Cape				
				Fishing effort:	In 2018, the fishery reported a total catch of 1297 t. Most of the catch is landed from Zone B, with a catch of 1106 t in 2018. The level of catch in Zone B is the highest reported since zoning was implemented in 2006 (Newman *et al.*, 2019).		
				Active licences/vessels:	Six vessels fished in the 2018 season and at least 20 people were directly employed (Gaughan and Santoro, 2018).		
Octopus Interim Management Fishery				**Management area**	The developing Octopus Fishery operates from Kalbarri Cliffs in the north to Esperance in the south.		
				Species targeted		**Fishing methods**	**Fishing depth**
				Octopus sp. cf. tetricus		Passive shelter pots and active traps.	In inshore waters to a depth of 70 m (DPIRD, 2018).
				Fishing effort:	In 2019, the total commercial octopus catch was 314 t, which was 22% higher than the 2017 catch of 257 t. In 2016, about 200 vessels reported a total catch of 252 t (Hart *et al.*, 2020c).		
				Active licences/vessels:	About 21 vessels fish within the octopus specific fisheries, and about 200 vessels from the West Coast Rock Lobster Fishery catch octopus as bycatch (Gaughan and Santoro, 2018).		
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* and goldenline *S. analis*) Sea mullet *(Mugil cephalus*) Tailor (*Pomatomus saltatrix*) Western yellowfin bream (*Acanthopagrus australis*)		Beach seine and mesh net.	Information not available.

Fishery	Woodside Activity Area			Description			
	Browse	NWS/S	NW Cape				
				Fishing effort:	In 2018, the total catch was 176 t (Gaughan and Santoro, 2020). The fishery currently employs about 14 fishers based on the seven fishery licences in operation (WAFIC[9]).		
				Active licences/vessels:	Six vessels operated employing around 12 fishers (Gaughan and Santoro, 2018).		
Shark Bay Crab Managed Fishery				**Management area**	The Shark Bay Crab Managed Fishery operates within the NWMR.		
				Species targeted		**Fishing methods**	**Fishing depth**
				Blue swimmer crab (*Portunus armatus*)		Trap and trawl.	Information not available.
				Fishing effort:	Commercial fishing for blue swimmer crabs in Shark Bay was voluntarily halted by industry in 2012 to facilitate stock rebuilding. The stock is still in a recovery phase; however, the fishery has resumed and reported a total commercial catch of 518 t in the 2017/18 season. The average commercial trap catch rate was 1.5 kg/traplift during 2017/18 (Chandrapavan *et al.*, 2017).		
				Active licences/vessels:	The precise number of vessels in the Shark Bay Blue Swimmer Crab Fishery is unreported. There are five crab trap permits. These permits are consolidated onto three active vessels (WAFIC[10]).		
Shark Bay Prawn and Scallop Managed Fishery				**Management area**	The Shark Bay Prawn Managed Fishery is the highest producing WA fishery for prawns.		
				Species targeted		**Fishing methods**	**Fishing depth**
				Western king prawn (*Penaeus latisulcatus*) Brown tiger prawn (*Penaeus esculentus*)		Low-opening otter trawls.	Information not available.

[9] https://www.wafic.org.au/fishery/inner-shark-bay-scalefish-fishery/

[10] https://www.wafic.org.au/fishery/shark-bay-prawn-and-scallop-managed-fisheries/

Fishery	Woodside Activity Area			Description		
	Browse	NWS/S	NW Cape			
				Endeavour prawns (*Metapenaeus endeavouri*) Coral prawns (*Metapenaeopsis sp*.) Saucer scallop (*Amusium balloti*)		
				Fishing effort:	The Shark Bay Scallop Managed Fishery is currently in a recovery phase due to the results from the pre-season survey of stock abundance (Fletcher and Santoro, 2015; Kangas *et al.*, 2018).	
				Active licences/vessels:	The precise number of vessels in the Shark Bay Prawn Managed Fishery is unreported; however, about 100 people are employed in this fishery (Gaughan and Santoro, 2018). About 20 skippers and crew are employed in scallop fishing in the Shark Bay and South Coast fisheries across 18 vessels in 2015 (Sporer *et al.*, 2015).	
South Coast Crustacean Managed Fishery	-	-	-	**Management area**	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.	
				Species targeted	**Fishing methods**	**Fishing depth**
				Southern rock lobster (*Jasus edwardsii*) Western rock lobster (*Panulirus cygnus*) Giant crab (*Pseudocarcinus gigas*) Crystal crab (*Chaceon albus*) Champagne crab (*Hypothalassia acerba*)	Pots.	Information not available.
				Fishing effort:	The South Coast Crustacean Managed Fishery reported a total catch of 101.2 t in 2018 season and the value of the fishery for 2017/2018 was about $5.9 million (Howe and Orme, 2020b).	
				Active licences/vessels:	The number of vessels is unknown; however, a total of 1977 pots are licensed to be used.	
	-	-	-	**Management area**	The fishery is active in coastal waters between Cape Leeuwin and the South Australia border. Landings are primarily at Albany, Bremer Bay and Esperance (Norriss and Blazeski, 2020).	

<table>
<tr><th rowspan="2">Fishery</th><th colspan="3">Woodside Activity Area</th><th rowspan="2">Description</th></tr>
<tr><th>Browse</th><th>NWS/S</th><th>NW Cape</th></tr>
<tr><td>South Coast Purse Seine Managed Fishery</td><td></td><td></td><td></td><td>
<table>
<tr><th>Species targeted</th><th>Fishing methods</th><th>Fishing depth</th></tr>
<tr><td>Small pelagic finfish such as pilchards and yellowtail scad using purse seine nets from vessels.
Sandy sprat (Hyperlophus vittatus)
Blue sprat (Spratelloides robustus)</td><td>Purse seine.</td><td>Information not available.</td></tr>
<tr><td>Fishing effort:</td><td colspan="2">In the 2017/18 season the total catch effort was 2,168 t (Norriss and Blazeski, 2020).</td></tr>
<tr><td>Active licences/vessels:</td><td colspan="2">Nine active vessels in 2017/18 (Norriss and Blazeski, 2020).</td></tr>
</table>
</td></tr>
<tr><td>South-west Trawl Managed Fishery</td><td>-</td><td>-</td><td>-</td><td>
<table>
<tr><td>Management area</td><td colspan="2">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).</td></tr>
<tr><th>Species targeted</th><th>Fishing methods</th><th>Fishing depth</th></tr>
<tr><td>Scallops (Ylistrum balloti, formerly Amusium balloti) and associated by-products
Western king prawn (Penaeus latisulcatus)
In years of low scallop catches licencees may use other trawl gear to target fin-fish species.</td><td>Trawl.</td><td>Information not available.</td></tr>
<tr><td>Fishing effort:</td><td colspan="2">Effort in the fishery is highly variable and typically fluctuates in response to recruitment variability in saucer scallops and prawns. The fishery was not active in 2015 or 2016 (Fairclough and Walters, 2018).</td></tr>
<tr><td>Active licences/vessels:</td><td colspan="2">Only one boat fished in 2018 for a total of 5 boat days for minimal catch (Fairclough and Walters, 2018).</td></tr>
</table>
</td></tr>
</table>

Fishery	Woodside Activity Area			Description			
	Browse	NWS/S	NW Cape				
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.
				Fishing effort:	The total catch for 2018 was 243 t (Duffy and Blay, 2020b).		
				Active licences/vessels:	Number of vessels is unknown; however, 12 commercial fishers were employed in 2018 (Duffy and Blay, 2020b).		
West Coast Beach Bait Managed Fishery	-	-	-	**Management area**	Primarily active in the Bunbury areas in the SWMR.		
				Species targeted		**Fishing methods**	**Fishing depth**
				Whitebait		Beach-based haul nets.	Information not available.
				Fishing effort:	In recent years the fishery is primarily active in the Bunbury area. Total catch of whitebait in 2015 was 40.2 t (Duffy and Blay, 2020c).		

Fishery	Woodside Activity Area			Description			
	Browse	NWS/S	NW Cape				
				Active licences/vessels:	Number of vessels is unknown; however, only one license was issued (DPIRD, 2019).		
West Coast Demersal Gillnet and Demersal Longline (Interim) Managed Fishery	-	-	-	**Management area**	The West Coast Demersal Gillnet and Demersal Longline (Interim) Managed Fishery (WCDGDLF) is part of the Temperate Demersal Gillnet and Demersal Longline Fishery (TDGDLF), which operates between 26° and 33° S, and the Joint Authority Southern Demersal Gillnet and Demersal Longline Managed Fishery (JASDGDLF), 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*)		Gillnet and longline.	Information not available.
				Fishing effort:	Catch estimated annual value of the fishery was $0.2 million for 2017 to 2018 (Braccini and Blay, 2020).		
				Active licences/vessels:	Vessel numbers are unknown; however, 17 interim managed fishery permits were held in 2019 (DPIRD, 2019) and between 18 and 21 skippers and crew were employed between 2016 and 2017.		
West Coast Demersal Scalefish Fishery	-	-	-	**Management area**	These fisheries include the West Coast Demersal Scalefish (Interim) Managed Fishery (51 boats), the West Coast Demersal Gillnet and Demersal Longline (Interim) Managed Fishery and the temperate Demersal Gillnet and Demersal Longline Fisheries. The West Coast Demersal Scalefish 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.		
				Species targeted		**Fishing methods**	**Fishing depth**
				Baldchin groper (*Choerodon rubescens*) Dhufish (*Glaucosoma hebraicum*) Pink snapper *(Pagrus auratus*)		Lines.	Inshore species – 20 to 250 m water depth.

Fishery	Woodside Activity Area			Description		
	Browse	NWS/S	NW Cape			
						Offshore species – more than 250 m water depth.
				Fishing effort:	In 2016, the West Coast Demersal Scalefish (interim) Managed Fishery reported a total catch of 256 t.	
				Active licences/vessels:	The precise number of vessels in the West Coast Demersal Scalefish Fisheries is unreported; however, it is restricted to 60 interim managed fishery permit holders.	
West Coast Purse Seine Managed Fishery	-	-	-	**Management area**	Located in waters from Cape Bouvard extending to Lancelin.	
				Species targeted	**Fishing methods**	**Fishing depth**
				Small pelagic finfish such as: Scaly mackerel (*Sardinella lemuru*) Pilchards (*Sardinops sagax*) Australian anchovy (*Engraulis australis*) Yellowtail scad (*Trachurus novaezelandiae*) Maray (*Etrumeus teres*)	Purse seine.	Information not available.
				Fishing effort:	Information not available	
				Active licences/vessels:	Seven vessels in 2017 (Gaughan and Santoro, 2018).	
West Coast Rock Lobster Managed Fishery			✓	**Management area**	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.	

<table>
<tr><th rowspan="2">Fishery</th><th colspan="3">Woodside Activity Area</th><th colspan="3" rowspan="2">Description</th></tr>
<tr><th>Browse</th><th>NWS/S</th><th>NW Cape</th></tr>
<tr><td rowspan="4"></td><td rowspan="4"></td><td rowspan="4"></td><td rowspan="4"></td><td>Species targeted</td><td>Fishing methods</td><td>Fishing depth</td></tr>
<tr><td>Western rock lobster (Panulirus cygnus)</td><td>Baited pots.</td><td>Less than 20 m.</td></tr>
<tr><td>Fishing effort:</td><td colspan="2">In 2018, 234 vessels reported a total catch of 6400 t in 2017 (de Lestang et al., 2018). In 2016, 226 vessels reported a total catch of 6,086 t (Gaughan and Santoro, 2018).</td></tr>
<tr><td>Active licences/vessels:</td><td colspan="2">234 vessels operated in 2017 and 233 vessels operated in 2018 (Gaughan and Santoro, 2018).</td></tr>
</table>

11.5.2 Aquaculture

Aquaculture operations in the northwest are typically restricted to inland and shallow coastal waters.

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.

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.

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.

North Coast Bioregion

Aquaculture activities in the North Coast bioregion is dominated by the production of pearls. 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 (Gaughan and Santoro, 2018). 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).

Other aquaculture developments in the North Coast include emerging producers of coral and live rock species for aquariums as well as barramundi (*Lates calcarifer)* farms and microalgae culturing for Omega-3, biofuels and protein biomass (Gaughan and Santoro, 2020).

11.6 Fisheries – Traditional

Traditional or customary fisheries are typically restricted to shallow coastal waters and/or areas with structures such as reef.

Dugong, fish and marine turtles that move between coastal and Commonwealth waters are important components of the Aboriginal people's culture and diet. Aboriginal 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 11-1)**, 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.

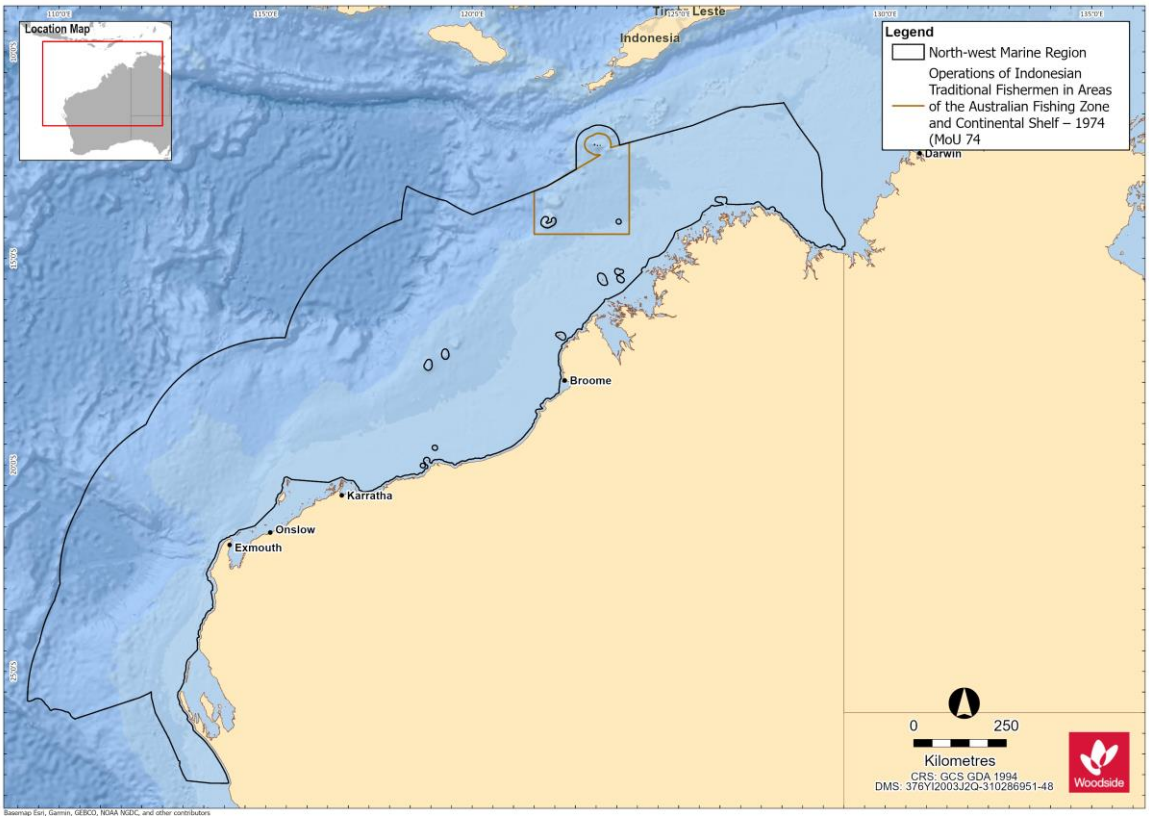

Figure 11-1 MOU 74 Box. Operations of Indonesian Traditional Fishermen in Areas of the Australian Fishing Zone and Continental Shelf – 1974

11.7 Tourism and Recreation

There are growing tourism and recreational sectors in WA. 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, other recreational fishing, diving, snorkelling, marine fauna watching, and yachting.

11.7.1 Gascoyne Region

Outside the petroleum industry, tourism is the largest revenue earner of all the major industries of the Gascoyne region. It contributes significantly to the local economy in terms of both income and

employment. In 2018 there was an average of 337,400 visitors with a visitor spend of $359 million (Gascoyne Development Commission[11]).

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). The main marine nature-based tourist activities are concentrated around and within the Ningaloo WHA.

11.7.2 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, generating $413 million in gross revenue annually (Pilbara Development Commission[12]).

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 (Williamson *et al.*, 2006). Once at sea, charter vessels may also frequent the waters surrounding the Montebello Islands.

11.7.3 Kimberley Region

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.

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.

11.8 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 10,064 vessel movements in Port of Dampier 2019/20 annual reporting period (PPA, 2020). 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).

[11] https://www.gdc.wa.gov.au/industry-profiles/tourism/

[12] https://www.pdc.wa.gov.au/our-focus/strategicinitiatives/tourism

11.9 Oil and Gas Infrastructure

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. 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.

11.10 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.
- 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.

12. REFERENCES

[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

[ALA] Atlas of Living Australia 2020. *Eubalaena australis* (Desmoulins, 1822). Available at: https://bie.ala.org.au/species/urn:lsid:biodiversity.org.au:afd.taxon:99e19958-7c6e-4f22-ad50-44027af1e418

[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

[BOM] Bureau of Meteorology 2021a. Climatology of tropical cyclones in Western Australia. http://www.bom.gov.au/cyclone/climatology/wa.shtml [Accessed 05 May 2021].

[BOM] Bureau of Meteorology 2021b. Climate statistics for Troughton Island, monthly mean maximum air temperatures. http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p_nccObsCode=36andp_display_type=dataFileandp_startYear=andp_c=andp_stn_num=001007 [Accessed 05 June 2021].

[BOM] Bureau of Meteorology 2021c. Climate Statistics for Troughton Island, monthly mean rainfall. http://www.bom.gov.au/climate/averages/tables/cw_001007.shtml [Accessed 05 June 2021).

[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.

[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 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.

[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 2020. National Conservation Values Atlas. Available at: https://www.environment.gov.au/marine/marine-bioregional-plans/conservation-values-atlas

[DBCA] Department of Biodiversity Conservation and Attractions 2020. Economic contribution of Ningaloo: one of Australia's best kept secrets. Deloitte Access Economics. June 2020. 58 pp.

[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 2009. 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 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.

[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.

[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:

12. REFERENCES

[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

[ALA] Atlas of Living Australia 2020. *Eubalaena australis* (Desmoulins, 1822). Available at: https://bie.ala.org.au/species/urn:lsid:biodiversity.org.au:afd.taxon:99e19958-7c6e-4f22-ad50-44027af1e418

[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

[BOM] Bureau of Meteorology 2021a. Climatology of tropical cyclones in Western Australia. http://www.bom.gov.au/cyclone/climatology/wa.shtml [Accessed 05 May 2021].

[BOM] Bureau of Meteorology 2021b. Climate statistics for Troughton Island, monthly mean maximum air temperatures. http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p_nccObsCode=36andp_display_type=dataFileandp_startYear=andp_c=andp_stn_num=001007 [Accessed 05 June 2021].

[BOM] Bureau of Meteorology 2021c. Climate Statistics for Troughton Island, monthly mean rainfall. http://www.bom.gov.au/climate/averages/tables/cw_001007.shtml [Accessed 05 June 2021).

[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.

[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 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.

[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 2020. National Conservation Values Atlas. Available at: https://www.environment.gov.au/marine/marine-bioregional-plans/conservation-values-atlas

[DBCA] Department of Biodiversity Conservation and Attractions 2020. Economic contribution of Ningaloo: one of Australia's best kept secrets. Deloitte Access Economics. June 2020. 58 pp.

[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 2009. 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 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.

[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.

[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

[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 2011. State of the Fisheries and Aquatic Resources Report 2010/11. Fletcher, W.J. and Santoro, K. (eds), Department of Fisheries, Perth, Western Australia.

[DPAW] Department of Parks and Wildlife 2013. Lalang-garram / Camden Sound Marine Park management plan 73 2013–2023, Department of Parks and Wildlife, Perth.

[DPAW] Department of Parks and Wildlife 2014. 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 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. Lalang-garram / Horizontal Falls and North Lalang-garram Marine Parks joint management plan 2016, Management Plan 88. Department of Parks and Wildlife, Perth

[DPAW] Department of Parks and Wildlife 2016c. Yawuru Nagulagun / Roebuck Bay Marine Park joint management plan 2016. Department of Parks and Wildlife, Perth.

[DPAW] Department of Parks and Wildlife 2016d. Marmion Marine Park. Visitor Guide.

[DPIRD] Department of Primary Industries and Regional Development 2018. Western Australian Marine Stewardship Council Report Series No. 14. Resource Assessment Report Western Australian Octopus Resource.

[DPIRD] Department of Primary Industries and Regional Development 2019. Annual Report. 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, Population and Communities 2012d. Conservation Management Plan for the Southern Right Whale. A Recovery Plan under the Environment Protection and Biodiversity Conservation Act 1999 2011-2021. Canberra, ACT: Department of Sustainability, Environment, Water, Population and Communities. Available from: http://www.environment.gov.au/resource/conservation-management-plan-southern-right-whale-recovery-plan-under-environment

[DSEWPAC] Department of Sustainability, Environment, Water, Populations and Communities 2012e. 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

[ERM] Environmental Resources Management 2009. Browse LNG Development: Social Study on Indonesian Fishers (Phase 2) 2008. Report produced for Woodside Energy Limited.

[PPA] Pilbara Ports Authority 2020. 2019-20 Annual Report. Available at: https://www.pilbaraports.com.au/about-ppa/publications/annual-report

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

Aulich, M.G., McCauley, R.D., Saunders, B.J., and Parsons, M.J.G. 2019. Fin whale (*Balaenoptera physalus*) migration in Australian waters using passive acoustic monitoring. Scientific Reports 9: 8840. https://doi.org/10.1038/s41598-019-45321-w

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.

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.

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

BirdLife Australia 2018. Seabird and Shorebird Baseline Studies, Ningaloo Region – Report on January 2018 bird surveys.

Blue Planet Marine 2020. Australian Blue Whale Species Assessment Report (No. v4). Unpublished report to Woodside Energy Ltd.

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.

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. 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.

Bruce, B.D., Stevens, J.D., Malcolm, H. 2006. Movements and swimming behaviour of white sharks (*Carcharodon carcharias*) in Australian waters. Marine Biology 150: 161–172.

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.

Campana, S. and W. Joyce. 2004. Temperature and depth associations of porbeagle shark (*Lamna nasus*) in the northwest Atlantic. Fisheries Oceanography 13 (1): 52-64.

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.

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.

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.

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.

Chandrapavan, A. ,Sporer, E., Oliver R. and Cavalli, P. 2017. Shark Bay Blue Swimmer Crab Resource Status Report 2016. In: *Status Reports of the Fisheries and Aquatic Resources of Western Australia 2015/16*: The State of the Fisheries eds. W.J. Fletcher, M.D. Mumme and F.J. Webster, Department of Fisheries, Western Australia. pp. 95-98.

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].

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.

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 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 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 2019. Draft Wildlife Conservation Plan for Seabirds. Canberra, ACT: Commonwealth of Australia. Available from: https://www.environment.gov.au/biodiversity/threatened/comment/draft-wildlife-conservation-plan-for-seabirds

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.

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

Dawson, C.E. 1985. Indo-Pacific pipefishes (Red Sea to the Americas). Gulf Coast Research Laboratory, Ocean Springs, Mississippi, USA.

de Lestang, S., Rossbach, M. and Blay, N. 2018. West Coast Rock Lobster Resource Status Report 2017. 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. 32-36.

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.

Duffy, R. and Blay, N. 2020a. West Coast Nearshore and Estuarine 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. 55-64.

Duffy, R. and Blay, N. 2020b. South Coast Estuarine and Nearshore Scalefish and Invertebrate 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. 201-209.

Duffy, R. and Blay, N. 2020c. West Coast Nearshore And Estuarine 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. 55-64.

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.

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

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) 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. and Santoro, K. (eds) 2009. State of the fisheries report 2008/09. Western Australian Department of Fisheries, Perth.

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.

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.

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.

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. 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.

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.

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.M. 2015. Species Distribution Modelling of Western Pilbara Inshore Dolphins. Masters Research thesis. Murdoch University, Perth, Western 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

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., Ferridge, R., Syers, C. and Kalinowski, P. 2017. Statewide Specimen Shell Resources 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. 204-206.

Hart, A., Bruce, C., Kalinowski, P. and Steele, A. 2018. Statewide Specimen Shell Resources 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. 204-206.

Hart, A., Murphy, D. and Steele, A. 2019. Sea Cucumber Resource Status Report 2019. In: *Status Reports of the Fisheries and Aquatic Resources of Western Australia 2018/19*: The State of the Fisheries eds. D.J. Gaughan and K. Santoro. Department of Primary Industries and Regional Development, Western Australia. pp. 173-175.

Hart, A., Murphy, D. and Steele, A. 2020a. Pearl Oyster Managed Fishery 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. 165-169.

Hart, A., Bruce, C. and Steele, A. 2020b. Statewide Specimen Shell 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. 253-255.

Hart, A., Murphy, D. and Wiberg, L. 2020c. West Coast Octopus 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. 50-54.

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.

Himmelman, J.H., Guderley, H.E. and Duncan, P.F. 2009. Responses of the saucer scallop *Amusium balloti* to potential predators. Journal of Experimental Marine Biology and Ecology 378(1–2): 58-61.

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. 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.

Holloway, P. 2001. A regional model of the semidiurnal internal tide on the Australian North West Shelf. Journal of Geophysical Research 106: 19625-19638.

How, J. and Orme, L. 2020a. West Coast Deep Sea Crustacean 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.

How, J. and Orme, L. 2020b. South Coast Crustacean 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. 189-194.

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. 2018. 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

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.

Johnston, D., Harris, D. and Blazeski, S. 2020. 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.

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., Sporer, E., Wilkin, S., Shanks, M., Cavalli, P., Pickles, L. and Oliver, R. 2018. North Coast Prawn 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. 119-122.

Kangas, M., Wilkin, S., Shanks, M. and Brand-Gardner, S. 2019. North Coast Prawn Resource Status Report 2019. 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. 145-153.

Kangas, M., Wilkin, S., Shanks, M. and Brown, S. 2020a. North Coast Prawn 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. 143-150.

Kangas, M., Wilkin, S., Breheny, N., Cavalli, P., Grounds, G. and Brown S. 2020b. 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.

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.

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.

Lewis, P. and Brand-Gardner, S. 2018. Statewide Large Pelagic Finfish 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. 195-199.

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.

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.

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.

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.

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

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., O'Shea, T.J. and Reynolds, J.R. 2011. The ecology and conservation of sirenia; dugongs and manatees. Cambridge University Press, London.

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. 2009. Sea Noise Logger Deployment Scott Reef: 2006–2008 – Whales, Fish and Seismic Survey. Report produced for Woodside Energy Ltd.

McCauley, R. 2011. 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 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. 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., 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.

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.

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

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.

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.

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 Blay, N. 2019. North Coast Demersal Fisheries Status Report 2019. In: *Status Reports of the Fisheries and Aquatic Resources of Western Australia 2018/19*: The State of the Fisheries eds. D.J. Gaughan and K. Santoro. Department of Primary Industries and Regional Development, Western Australia. pp. 159-168.

Newman, S., Wakefield, C., Skepper, C., Boddington D. and Steele, A. 2020a. North Coast Demersal Fisheries 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. 156-165.

Newman, S., Bruce, C. and Wiberg, L. 2020b. Statewide Marine Aquarium Fish and Hermit Crab Resources 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. 247-252.

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.

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. 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., 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.

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

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.

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

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.

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**.

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.

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.

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.

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.

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.

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

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.

Strahan, R. 1983. The Australian Museum Complete Book of Australian Mammals. London, United Kingdom: Angus and Robertson.

Strain, L., Brown, J. and Walters, S. 2018. West Coast Roe's Abalone 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. 36–40.

Surman, C.A. 2019. Houtman Abrolhos – A Natural History. Halfmoon Biosciences. 192 pp.

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.

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.

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.

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. and Morgan, D.L. 2004. The northern river shark *Glyphis sp. C.* (Carcharhinidae) discovered in Western Australia. Zootaxa 685: 1–8.

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., 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 2010. Commonwealth Listing Advice on *Thunnus maccoyii* (Southern Bluefin Tuna). Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/69402-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 2014. Listing Advice *Isurus oxyrinchus* shortfin mako shark. Department of Sustainability, Environment, Water, Population and Communities. Department of the Environment and Energy. Accessed at http://www.environment.gov.au/biodiversity/threatened/species/pubs/79073-listing-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 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

Threatened Species Scientific Committee 2016b. Conservation Advice *Calidris canutus* Red knot. Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/855-conservation-advice-05052016.pdf

Threatened Species Scientific Committee 2016c. Conservation Advice *Limosa lapponica menzbieri* Bar-tailed godwit (northern Siberian). Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/86432-conservation-advice-05052016.pdf

Threatened Species Scientific Committee 2016d. Conservation Advice *Charadrius leschenaultii* Greater sand plover. Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/877-conservation-advice-05052016.pdf

Threatened Species Scientific Committee 2016e. Conservation Advice *Charadrius mongolus* Lesser sand plover. Canberra: Department of the Environment. Available from:

APPENDIX C-2: ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION 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: 20-Apr-2023

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:	1
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	22
Listed Migratory Species:	36

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:	59
Whales and Other Cetaceans:	25
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
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:	33
Key Ecological Features (Marine):	2
Biologically Important Areas:	5
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
EEZ and Territorial Sea

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
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	Species or species habitat may occur within area
FISH		
Thunnus maccoyii Southern Bluefin Tuna [69402]	Conservation Dependent	Breeding known to occur within area
MAMMAL		

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
REPTILE		
Aipysurus apraefrontalis Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat known to occur within area
Aipysurus foliosquama Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat likely to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat likely 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 likely 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 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 likely 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
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat likely to occur within area
Migratory Marine Species		

Scientific Name	Threatened Category	Presence Text
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 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
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 likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat likely 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 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
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
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

Scientific Name	Threatened Category	Presence Text
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 may 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
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
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
[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 likely to occur within area
[Phaethon lepturus fulvus](#) Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Species or species habitat may occur within area
Fish		
[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 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
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 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
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
Reptile		
Acalyptophis peronii Horned Seasnake [1114]		Species or species habitat may occur within area
Aipysurus apraefrontalis Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat known to occur within area
Aipysurus duboisii Dubois' Seasnake [1116]		Species or species habitat may occur within area
Aipysurus eydouxii Spine-tailed Seasnake [1117]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Aipysurus foliosquama Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat likely to occur within area
Aipysurus laevis Olive Seasnake [1120]		Species or species habitat may occur within area
Aipysurus tenuis Brown-lined Seasnake [1121]		Species or species habitat may occur within area
Astrotia stokesii Stokes' Seasnake [1122]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat likely to occur within area
Chitulia ornata as Hydrophis ornatus Spotted Seasnake, Ornate Reef Seasnake [87377]		Species or species habitat may occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
Disteira kingii Spectacled Seasnake [1123]		Species or species habitat may occur within area
Disteira major Olive-headed Seasnake [1124]		Species or species habitat may occur within area
Ephalophis greyi North-western Mangrove Seasnake [1127]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat likely to occur within area
Hydrophis elegans Elegant Seasnake [1104]		Species or species habitat may occur within area
Hydrophis macdowelli as Hydrophis mcdowelli Small-headed Seasnake [75601]		Species or species habitat may occur within area
Leioselasma czeblukovi as Hydrophis czeblukovi Fine-spined Seasnake, Geometrical Seasnake [87374]		Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Congregation or aggregation known to occur within area
Pelamis platurus Yellow-bellied Seasnake [1091]		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 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

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 as Kogia simus Dwarf Sperm Whale [85043]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]		Breeding known to occur within area
Orcaella heinsohni as Orcaella brevirostris 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
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 as Sousa chinensis 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 may 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

Habitat Critical to the Survival of Marine Turtles		
Scientific Name	Behaviour	Presence
Aug - Sep		

Scientific Name	Behaviour	Presence
Natator depressus Flatback Turtle [59257]	Nesting	Known to occur

Extra Information

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
Project Highclere Cable Lay and Operation	2022/09203		Completed
Controlled action			
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
Equus Gas Fields Development Project, Carnarvon Basin	2012/6301	Controlled Action	Completed
Not controlled action			
'Goodwyn A' Low Pressure Train Project	2003/914	Not Controlled Action	Completed
Development of Mutineer and Exeter petroleum fields for oil production, Permit	2003/1033	Not Controlled Action	Completed
Maia-Gaea Exploration wells	2000/17	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
Project Highclere Geophysical Survey	2021/9023	Not Controlled Action	Completed
Searipple gas and condensate field development	2000/89	Not Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
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
Western Flank Gas Development	2005/2464	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
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 sesmic survey	2006/2781	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
Decommissioning of the Legendre facilities	2010/5681	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
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	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		Manner)	
Greater Western Flank Phase 1 gas Development	2011/5980	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
Offshore Drilling Campaign	2011/5830	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
Tidepole Maz 3D Seismic Survey Campaign	2007/3706	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

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
Glomar Shoals	North-west

Biologically Important Areas

Scientific Name	Behaviour	Presence
Marine Turtles		

Scientific Name	Behaviour	Presence
[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
[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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Protected Matters Search Tool

Report Generated - 2:55PM - 08 June 2023

Matters of National Environment Significance	Count
World Heritage Properties	1
National Heritage Places	1
Wetlands of International Importance (Ramsar Wetlands)	0
Great Barrier Reef Marine Park	0
Commonwealth Marine Area	1
Listed Threatened Ecological Communities	0
Listed Threatened Species	47
Listed Migratory Species	64

Other Matters Protected by the EPBC Act	Count
Commonwealth Lands	5
Commonwealth Heritage Places	2
Listed Marine Species	110
Whales and Other Cetaceans	28
Critical Habitats	0
Commonwealth Reserves Terrestrial	0
Australian Marine Parks	4
Habitat Critical to the Survival of Marine Turtles	4

Extra Information	Count
State and Territory Reserves	28
Regional Forest Agreements	0
Nationally Important Wetlands	2

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 and is accurate at the time of generation.
Please see the caveat for interpretation of information provided here. Consider carefully the age of information for decision making.

EPBC Act Referrals	23
Key Ecological Features	1
Biologically Important Areas	32
Bioregional Assessments	0
Geological and Bioregional Assessments	0

Report Metadata	Caveat

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World Heritage Places

Place ID	Place Name	State	Legal Status	Natural Values	Cultural Values	Website
106208	The Ningaloo Coast	WA	Declared property	vii,x		Australian Heritage

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National Heritage Places

Place ID	Place Name	State	Heritage Class	Legal Status	Website
105881	The Ningaloo Coast	WA	Natural	Listed place	Australian Heritage

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Wetlands of International Importance (Ramsar Wetlands)

Ramsar Site No.	Ramsar Site Name	Proximity	Website

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Great Barrier Reef Marine Park

Zone ID	Zone Type	State	Permit Description	IUCN

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Commonwealth Marine Area

Feature Name
EEZ and Territorial Sea

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Listed Threatened Ecological Communities

				Presence	
Community ID	**Community Name**	**Threatened Category**	**Website**	**Rank**	**Text**

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Listed Threatened Species

Species ID	Scientific Name	Common Name	Class	Simple Presence	Presence Text	Threatened Category	Migratory Status	Migratory Category	Marine Status	Cetacean Status	Website
85267	*Sphyrna lewini*	Scalloped Hammerhead	Shark	Known	Species or species habitat	Conservation Dependent					Species Profile and Threat
69402	*Thunnus maccoyii*	Southern Bluefin Tuna	Fish	Known	Breeding known to occur	Conservation Dependent					Species Profile and Threat
86432	*Limosa lapponica*	Northern Siberian Bar-	Bird	Known	Species or species habitat	Critically Endangered					Species Profile and Threat
1118	*Aipysurus foliosquama*	Leaf-scaled Seasnake	Reptile	Known	Species or species habitat	Critically Endangered			Listed		Species Profile and Threat
1115	*Aipysurus apraefrontalis*	Short-nosed Seasnake	Reptile	Known	Species or species habitat	Critically Endangered			Listed		Species Profile and Threat
847	*Numenius*	Eastern Curlew, Far	Bird	Known	Species or species habitat	Critically Endangered	Migratory	Migratory Wetlands	Listed		Species Profile and Threat
856	*Calidris ferruginea*	Curlew Sandpiper	Bird	Known	Species or species habitat	Critically Endangered	Migratory	Migratory Wetlands	Listed - overfly marine		Species Profile and Threat
1763	*Caretta caretta*	Loggerhead Turtle	Reptile	Known	Breeding known to occur	Endangered	Migratory	Migratory Marine Species	Listed		Species Profile and Threat
331	*Dasyurus hallucatus*	Northern Quoll, Digul	Mammal	May	Species or species habitat	Endangered					Species Profile and Threat
1768	*Dermochelys coriacea*	Leatherback Turtle,	Reptile	Known	Species or species habitat	Endangered	Migratory	Migratory Marine Species	Listed		Species Profile and Threat
942	*Erythrotriorchis radiatus*	Red Goshawk	Bird	May	Species or species habitat	Endangered					Species Profile and Threat
1060	*Macronectes giganteus*	Southern Giant-Petrel,	Bird	May	Species or species habitat	Endangered	Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
66647	*Petrogale lateralis*	Black-flanked Rock-	Mammal	Known	Species or species habitat	Endangered					Species Profile and Threat
36	*Balaenoptera musculus*	Blue Whale	Mammal	Known	Migration route known to	Endangered	Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat
40	*Eubalaena australis*	Southern Right Whale	Mammal	Likely	Species or species habitat	Endangered	Migratory (as Balaena	Migratory Marine Species		Cetacean	Species Profile and Threat
77037	*Rostratula australis*	Australian Painted Snipe	Bird	Likely	Species or species habitat	Endangered			Listed - overfly marine		Species Profile and Threat
88019	*Lagorchestes hirsutus*	Mala, Rufous Hare-	Mammal	Known	Translocated population	Endangered					Species Profile and Threat
59297	*Papasula abbotti*	Abbott's Booby	Bird	May	Species or species habitat	Endangered			Listed		Species Profile and Threat
59350	*Pezoporus occidentalis*	Night Parrot	Bird	May	Species or species habitat	Endangered					Species Profile and Threat
855	*Calidris canutus*	Red Knot, Knot	Bird	Known	Species or species habitat	Endangered	Migratory	Migratory Wetlands	Listed - overfly marine		Species Profile and Threat
59257	*Natator depressus*	Flatback Turtle	Reptile	Known	Breeding known to occur	Vulnerable	Migratory	Migratory Marine Species	Listed		Species Profile and Threat
25570	*Ctenotus zastictus*	Hamelin Ctenotus	Reptile	Likely	Species or species habitat	Vulnerable					Species Profile and Threat
64459	*Thalassarche impavida*	Campbell Albatross,	Bird	May	Species or species habitat	Vulnerable	Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
929	*Falco hypoleucos*	Grey Falcon	Bird	Likely	Species or species habitat	Vulnerable					Species Profile and Threat
66661	*Lagorchestes*	Spectacled Hare-wallaby	Mammal	Known	Species or species habitat	Vulnerable					Species Profile and Threat
64464	*Thalassarche carteri*	Indian Yellow-nosed	Bird	May	Species or species habitat	Vulnerable	Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
60756	*Pristis pristis*	Freshwater Sawfish,	Shark	Likely	Species or species habitat	Vulnerable	Migratory	Migratory Marine Species			Species Profile and Threat
877	*Charadrius leschenaultii*	Greater Sand Plover, Large	Bird	Known	Species or species habitat	Vulnerable	Migratory	Migratory Wetlands	Listed		Species Profile and Threat
68442	*Pristis zijsron*	Green Sawfish,	Shark	Known	Species or species habitat	Vulnerable	Migratory	Migratory Marine Species			Species Profile and Threat
64470	*Carcharodon carcharias*	White Shark, Great White	Shark	Known	Species or species habitat	Vulnerable	Migratory	Migratory Marine Species			Species Profile and Threat
66676	*Milyeringa veritas*	Cape Range Cave	Fish	Known	Species or species habitat	Vulnerable					Species Profile and Threat
66678	*Ophisternon candidum*	Blind Cave Eel	Fish	Known	Species or species habitat	Vulnerable					Species Profile and Threat
82790	*Rhinonicteris aurantia*	Pilbara Leaf-nosed Bat	Mammal	May	Species or species habitat	Vulnerable					Species Profile and Threat
89262	*Osphranter robustus*	Barrow Island Wallaroo,	Mammal	Likely	Species or species habitat	Vulnerable					Species Profile and Threat
1766	*Eretmochelys imbricata*	Hawksbill Turtle	Reptile	Known	Breeding known to occur	Vulnerable	Migratory	Migratory Marine Species	Listed		Species Profile and Threat
1765	*Chelonia mydas*	Green Turtle	Reptile	Known	Breeding known to occur	Vulnerable	Migratory	Migratory Marine Species	Listed		Species Profile and Threat
82950	*Sternula nereis nereis*	Australian Fairy Tern	Bird	Known	Breeding known to occur	Vulnerable					Species Profile and Threat
37	*Balaenoptera physalus*	Fin Whale	Mammal	Likely	Species or species habitat	Vulnerable	Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat
68752	*Carcharias taurus (west*	Grey Nurse Shark (west	Shark	Known	Species or species habitat	Vulnerable					Species Profile and Threat
34	*Balaenoptera borealis*	Sei Whale	Mammal	Likely	Species or species habitat	Vulnerable	Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat
26194	*Malurus leucopterus*	White-winged Fairy-wren	Bird	Likely	Species or species habitat	Vulnerable					Species Profile and Threat
68447	*Pristis clavata*	Dwarf Sawfish,	Shark	Known	Species or species habitat	Vulnerable	Migratory	Migratory Marine Species			Species Profile and Threat
86875	*Kumonga exleyi*	Cape Range Remipede	Crustacean	Likely	Species or species habitat	Vulnerable					Species Profile and Threat
66666	*Isoodon auratus*	Golden Bandicoot (Barrow	Mammal	Known	Species or species habitat	Vulnerable					Species Profile and Threat
88021	*Bettongia lesueur Barrow*	Boodie, Burrowing	Mammal	Known	Translocated population	Vulnerable					Species Profile and Threat
66680	*Rhincodon typus*	Whale Shark	Shark	May	Species or species habitat	Vulnerable	Migratory	Migratory Marine Species			Species Profile and Threat
174	*Macroderma gigas*	Ghost Bat	Mammal	Likely	Species or species habitat	Vulnerable					Species Profile and Threat

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Listed Migratory Species

				Presence							
Species ID	Scientific Name	Common Name	Class	Rank	Text	Threatened Category	Migratory Status	Migratory Category	Marine Status	Cetacean Status	Website
59257	*Natator depressus*	Flatback Turtle	Reptile	Known	Breeding known to occur	Vulnerable	Migratory	Migratory Marine Species	Listed		Species Profile and Threat
825	*Anous stolidus*	Common Noddy	Bird	Likely	Species or species habitat		Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
64459	*Thalassarche impavida*	Campbell Albatross,	Bird	May	Species or species habitat	Vulnerable	Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
83288	*Lamna nasus*	Porbeagle, Mackerel Shark	Shark	May	Species or species habitat		Migratory	Migratory Marine Species			Species Profile and Threat
64464	*Thalassarche carteri*	Indian Yellow-nosed	Bird	May	Species or species habitat	Vulnerable	Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
81322	*Orcaella heinsohni*	Australian Snubfin Dolphin	Mammal	Known	Species or species habitat		Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat
678	*Apus pacificus*	Fork-tailed Swift	Bird	Likely	Species or species habitat		Migratory	Migratory Marine Birds	Listed - overfly marine		Species Profile and Threat
1763	*Caretta caretta*	Loggerhead Turtle	Reptile	Known	Breeding known to occur	Endangered	Migratory	Migratory Marine Species	Listed		Species Profile and Threat
90033	*Mobula alfredi*	Reef Manta Ray, Coastal	Shark	Known	Species or species habitat		Migratory (as Manta	Migratory Marine Species			Species Profile and Threat
1768	*Dermochelys coriacea*	Leatherback Turtle,	Reptile	Known	Species or species habitat	Endangered	Migratory	Migratory Marine Species	Listed		Species Profile and Threat
60756	*Pristis pristis*	Freshwater Sawfish,	Shark	Likely	Species or species habitat	Vulnerable	Migratory	Migratory Marine Species			Species Profile and Threat
877	*Charadrius leschenaultii*	Greater Sand Plover, Large	Bird	Known	Species or species habitat	Vulnerable	Migratory	Migratory Wetlands	Listed		Species Profile and Threat
68442	*Pristis zijsron*	Green Sawfish,	Shark	Known	Species or species habitat	Vulnerable	Migratory	Migratory Marine Species			Species Profile and Threat
808	*Hydroprogne caspia*	Caspian Tern	Bird	Known	Breeding known to occur		Migratory	Migratory Marine Birds	Listed (as Sterna caspia)		Species Profile and Threat
64470	*Carcharodon carcharias*	White Shark, Great White	Shark	Known	Species or species habitat	Vulnerable	Migratory	Migratory Marine Species			Species Profile and Threat
59	*Physeter macrocephalus*	Sperm Whale	Mammal	May	Species or species habitat		Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat
1060	*Macronectes giganteus*	Southern Giant-Petrel,	Bird	May	Species or species habitat	Endangered	Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
662	*Hirundo rustica*	Barn Swallow	Bird	May	Species or species habitat		Migratory	Migratory Terrestrial	Listed - overfly marine		Species Profile and Threat
82849	*Sternula albifrons*	Little Tern	Bird	Known	Congregation or		Migratory	Migratory Marine Birds	Listed (as Sterna albifrons)		Species Profile and Threat
82845	*Onychoprion anaethetus*	Bridled Tern	Bird	Known	Breeding known to occur		Migratory	Migratory Marine Birds	Listed (as Sterna		Species Profile and Threat
28	*Dugong dugon*	Dugong	Mammal	Known	Breeding known to occur		Migratory	Migratory Marine Species	Listed		Species Profile and Threat
1077	*Calonectris leucomelas*	Streaked Shearwater	Bird	Likely	Species or species habitat		Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
90034	*Mobula birostris*	Giant Manta Ray	Shark	Known	Species or species habitat		Migratory (as Manta	Migratory Marine Species			Species Profile and Threat
1766	*Eretmochelys imbricata*	Hawksbill Turtle	Reptile	Known	Breeding known to occur	Vulnerable	Migratory	Migratory Marine Species	Listed		Species Profile and Threat
817	*Sterna dougallii*	Roseate Tern	Bird	Known	Breeding known to occur		Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
1765	*Chelonia mydas*	Green Turtle	Reptile	Known	Breeding known to occur	Vulnerable	Migratory	Migratory Marine Species	Listed		Species Profile and Threat
1022	*Sula leucogaster*	Brown Booby	Bird	Known	Breeding known to occur		Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
84108	*Carcharhinus longimanus*	Oceanic Whitetip Shark	Shark	May	Species or species habitat		Migratory	Migratory Marine Species			Species Profile and Threat
1021	*Sula dactylatra*	Masked Booby	Bird	Known	Breeding known to occur		Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
79073	*Isurus oxyrinchus*	Shortfin Mako, Mako	Shark	Likely	Species or species habitat		Migratory	Migratory Marine Species			Species Profile and Threat
36	*Balaenoptera musculus*	Blue Whale	Mammal	Known	Migration route known to	Endangered	Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat
37	*Balaenoptera physalus*	Fin Whale	Mammal	Likely	Species or species habitat	Vulnerable	Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat
994	*Phaethon rubricauda*	Red-tailed Tropicbird	Bird	Known	Breeding known to occur		Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
82947	*Isurus paucus*	Longfin Mako	Shark	Likely	Species or species habitat		Migratory	Migratory Marine Species			Species Profile and Threat
34	*Balaenoptera borealis*	Sei Whale	Mammal	Likely	Species or species habitat	Vulnerable	Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat
35	*Balaenoptera edeni*	Bryde's Whale	Mammal	Likely	Species or species habitat		Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat
882	*Charadrius veredus*	Oriental Plover, Oriental	Bird	May	Species or species habitat		Migratory	Migratory Wetlands	Listed - overfly marine		Species Profile and Threat
642	*Motacilla cinerea*	Grey Wagtail	Bird	May	Species or species habitat		Migratory	Migratory Terrestrial	Listed - overfly marine		Species Profile and Threat
644	*Motacilla flava*	Yellow Wagtail	Bird	May	Species or species habitat		Migratory	Migratory Terrestrial	Listed - overfly marine		Species Profile and Threat
874	*Calidris acuminata*	Sharp-tailed Sandpiper	Bird	Known	Species or species habitat		Migratory	Migratory Wetlands	Listed		Species Profile and Threat
952	*Pandion haliaetus*	Osprey	Bird	Known	Breeding known to occur		Migratory	Migratory Wetlands	Listed		Species Profile and Threat
46	*Orcinus orca*	Killer Whale, Orca	Mammal	May	Species or species habitat		Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat
83000	*Thalasseus bergii*	Greater Crested Tern	Bird	Known	Breeding known to occur		Migratory	Migratory Wetlands	Listed (as Sterna bergii)		Species Profile and Threat
1013	*Fregata minor*	Great Frigatebird, Greater	Bird	May	Species or species habitat		Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
1012	*Fregata ariel*	Lesser Frigatebird, Least	Bird	Known	Breeding known to occur		Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
68448	*Anoxypristis cuspidata*	Narrow Sawfish,	Shark	Likely	Species or species habitat		Migratory	Migratory Marine Species			Species Profile and Threat
1014	*Phaethon lepturus*	White-tailed Tropicbird	Bird	Known	Breeding known to occur		Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
40	*Eubalaena australis*	Southern Right Whale	Mammal	Likely	Species or species habitat	Endangered	Migratory (as Balaena	Migratory Marine Species		Cetacean	Species Profile and Threat
843	*Limnodromus*	Asian Dowitcher	Bird	May	Species or species habitat		Migratory	Migratory Wetlands	Listed - overfly marine		Species Profile and Threat
840	*Glareola maldivarum*	Oriental Pratincole	Bird	May	Species or species habitat		Migratory	Migratory Wetlands	Listed - overfly marine		Species Profile and Threat
844	*Limosa lapponica*	Bar-tailed Godwit	Bird	Known	Species or species habitat		Migratory	Migratory Wetlands	Listed		Species Profile and Threat
84292	*Ardenna pacifica*	Wedge-tailed Shearwater	Bird	Known	Breeding known to occur		Migratory	Migratory Marine Birds	Listed (as Puffinus		Species Profile and Threat

68447	*Pristis clavata*	Dwarf Sawfish,	Shark	Known	Species or species habitat	Vulnerable	Migratory	Migratory Marine Species			Species Profile and Threat
87942	*Sousa sahulensis*	Australian Humpback	Mammal	Known	Species or species habitat		Migratory (as Sousa	Migratory Marine Species		Cetacean	Species Profile and Threat
59309	*Actitis hypoleucos*	Common Sandpiper	Bird	Known	Species or species habitat		Migratory	Migratory Wetlands	Listed		Species Profile and Threat
832	*Tringa nebularia*	Common Greenshank,	Bird	Likely	Species or species habitat		Migratory	Migratory Wetlands	Listed - overfly marine		Species Profile and Threat
38	*Megaptera novaeangliae*	Humpback Whale	Mammal	Known	Breeding known to occur		Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat
66680	*Rhincodon typus*	Whale Shark	Shark	May	Species or species habitat	Vulnerable	Migratory	Migratory Marine Species			Species Profile and Threat
847	*Numenius*	Eastern Curlew, Far	Bird	Known	Species or species habitat	Critically Endangered	Migratory	Migratory Wetlands	Listed		Species Profile and Threat
858	*Calidris melanotos*	Pectoral Sandpiper	Bird	May	Species or species habitat		Migratory	Migratory Wetlands	Listed - overfly marine		Species Profile and Threat
82404	*Ardenna carneipes*	Flesh-footed Shearwater,	Bird	May	Species or species habitat		Migratory	Migratory Marine Birds	Listed (as Puffinus		Species Profile and Threat
78900	*Tursiops aduncus*	Spotted Bottlenose	Mammal	Known	Species or species habitat		Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat
856	*Calidris ferruginea*	Curlew Sandpiper	Bird	Known	Species or species habitat	Critically Endangered	Migratory	Migratory Wetlands	Listed - overfly marine		Species Profile and Threat
855	*Calidris canutus*	Red Knot, Knot	Bird	Known	Species or species habitat	Endangered	Migratory	Migratory Wetlands	Listed - overfly marine		Species Profile and Threat

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Commonwealth Lands

Commonwealth Land ID	Commonwealth Land	Agency	State
50193	Defence - LEARMONTH -	Defence	WA
50122	Defence - EXMOUTH VLF	Defence	WA
52236	Commonwealth Land -	Unknown	WA
50123	Defence - EXMOUTH VLF	Defence	WA
50001	Defence - LEARMONTH	Defence	WA

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Commonwealth Heritage Places

Place ID	Place Name	State	Heritage Class	Legal Status	Website
105255	Mermaid Reef - Rowley	WA	Natural	Listed place	Australian Heritage
105551	Learmonth Air Weapons	WA	Natural	Listed place	Australian Heritage

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Listed Marine Species

				Presence							
Species ID	Scientific Name	Common Name	Class	Rank	Text	Threatened Category	Migratory Status	Migratory Category	Marine Status	Cetacean Status	Website
59257	*Natator depressus*	Flatback Turtle	Reptile	Known	Breeding known to occur	Vulnerable	Migratory	Migratory Marine Species	Listed		Species Profile and Threat
66189	*Bulbonaricus brauni*	Braun's Pughead Pipefish,	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66188	*Bhanotia fasciolata*	Corrugated Pipefish,	Fish	May	Species or species habitat				Listed		Species Profile and Threat
825	*Anous stolidus*	Common Noddy	Bird	Likely	Species or species habitat		Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
66521	*Bubulcus ibis*	Cattle Egret	Bird	May	Species or species habitat				Listed - overfly marine		Species Profile and Threat
64459	*Thalassarche impavida*	Campbell Albatross,	Bird	May	Species or species habitat	Vulnerable	Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
66196	*Choeroichthys*	Muiron Island Pipefish	Fish	May	Species or species habitat				Listed		Species Profile and Threat
64464	*Thalassarche carteri*	Indian Yellow-nosed	Bird	May	Species or species habitat	Vulnerable	Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
1122	*Astrotia stokesii*	Stokes' Seasnake	Reptile	May	Species or species habitat				Listed		Species Profile and Threat
1121	*Aipysurus tenuis*	Brown-lined Seasnake	Reptile	May	Species or species habitat				Listed		Species Profile and Threat
1120	*Aipysurus laevis*	Olive Seasnake	Reptile	May	Species or species habitat				Listed		Species Profile and Threat
66717	*Doryrhamphus*	Many-banded Pipefish	Fish	May	Species or species habitat				Listed		Species Profile and Threat
678	*Apus pacificus*	Fork-tailed Swift	Bird	Likely	Species or species habitat		Migratory	Migratory Marine Birds	Listed - overfly marine		Species Profile and Threat
1763	*Caretta caretta*	Loggerhead Turtle	Reptile	Known	Breeding known to occur	Endangered	Migratory	Migratory Marine Species	Listed		Species Profile and Threat
1091	*Pelamis platurus*	Yellow-bellied Seasnake	Reptile	May	Species or species habitat				Listed		Species Profile and Threat
1768	*Dermochelys coriacea*	Leatherback Turtle,	Reptile	Known	Species or species habitat	Endangered	Migratory	Migratory Marine Species	Listed		Species Profile and Threat
66719	*Phoxocampus belcheri*	Black Rock Pipefish	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66186	*Acentronura larsonae*	Helen's Pygmy Pipehorse	Fish	May	Species or species habitat				Listed		Species Profile and Threat
877	*Charadrius leschenaultii*	Greater Sand Plover, Large	Bird	Known	Species or species habitat	Vulnerable	Migratory	Migratory Wetlands	Listed		Species Profile and Threat
808	*Hydroprogne caspia*	Caspian Tern	Bird	Known	Breeding known to occur		Migratory	Migratory Marine Birds	Listed (as Sterna caspia)		Species Profile and Threat
82326	*Chroicocephalus*	Silver Gull	Bird	Known	Breeding known to occur				Listed (as Larus		Species Profile and Threat
66183	*Solenostomus*	Robust Ghostpipefish,	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66194	*Choeroichthys*	Pacific Short-bodied	Fish	May	Species or species habitat				Listed		Species Profile and Threat
943	*Haliaeetus leucogaster*	White-bellied Sea-Eagle	Bird	Known	Species or species habitat				Listed		Species Profile and Threat
90682	*Onychoprion fuscatus*	Sooty Tern	Bird	Known	Breeding known to occur				Listed (as Sterna fuscata)		Species Profile and Threat
66219	*Halicampus brocki*	Brock's Pipefish	Fish	May	Species or species habitat				Listed		Species Profile and Threat
1060	*Macronectes giganteus*	Southern Giant-Petrel,	Bird	May	Species or species habitat	Endangered	Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
662	*Hirundo rustica*	Barn Swallow	Bird	May	Species or species habitat		Migratory	Migratory Terrestrial	Listed - overfly marine		Species Profile and Threat
82849	*Sternula albifrons*	Little Tern	Bird	Known	Congregation or		Migratory	Migratory Marine Birds	Listed (as Sterna albifrons)		Species Profile and Threat
82845	*Onychoprion anaethetus*	Bridled Tern	Bird	Known	Breeding known to occur		Migratory	Migratory Marine Birds	Listed (as Sterna		Species Profile and Threat
811	*Larus pacificus*	Pacific Gull	Bird	Known	Breeding known to occur				Listed		Species Profile and Threat
28	*Dugong dugon*	Dugong	Mammal	Known	Breeding known to occur		Migratory	Migratory Marine Species	Listed		Species Profile and Threat
1077	*Calonectris leucomelas*	Streaked Shearwater	Bird	Likely	Species or species habitat		Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
66279	*Syngnathoides*	Double-end Pipehorse,	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66272	*Solegnathus hardwickii*	Pallid Pipehorse,	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66273	*Solegnathus lettiensis*	Gunther's Pipehorse,	Fish	May	Species or species habitat				Listed		Species Profile and Threat
1766	*Eretmochelys imbricata*	Hawksbill Turtle	Reptile	Known	Breeding known to occur	Vulnerable	Migratory	Migratory Marine Species	Listed		Species Profile and Threat
817	*Sterna dougallii*	Roseate Tern	Bird	Known	Breeding known to occur		Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
1765	*Chelonia mydas*	Green Turtle	Reptile	Known	Breeding known to occur	Vulnerable	Migratory	Migratory Marine Species	Listed		Species Profile and Threat
66213	*Doryrhamphus*	Flagtail Pipefish,	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66202	*Corythoichthys*	Australian Messmate	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66281	*Trachyrhamphus*	Straightstick Pipefish, Long	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66200	*Corythoichthys*	Reticulate Pipefish, Yellow-	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66220	*Halicampus dunckeri*	Red-hair Pipefish,	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66221	*Halicampus grayi*	Mud Pipefish, Gray's	Fish	May	Species or species habitat				Listed		Species Profile and Threat
1100	*Hydrelaps darwiniensis*	Black-ringed Seasnake	Reptile	May	Species or species habitat				Listed		Species Profile and Threat
1022	*Sula leucogaster*	Brown Booby	Bird	Known	Breeding known to occur		Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
1104	*Hydrophis elegans*	Elegant Seasnake	Reptile	May	Species or species habitat				Listed		Species Profile and Threat
1021	*Sula dactylatra*	Masked Booby	Bird	Known	Breeding known to occur		Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
66206	*Cosmocampus banneri*	Roughridge Pipefish	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66205	*Corythoichthys schultzi*	Schultz's Pipefish	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66720	*Hippocampus*	Three-spot Seahorse, Low-	Fish	May	Species or species habitat				Listed		Species Profile and Threat

66280	*Trachyrhamphus*	Bentstick Pipefish, Bend	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66216	*Festucalex scalaris*	Ladder Pipefish	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66217	*Filicampus tigris*	Tiger Pipefish	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66210	*Doryrhamphus*	Banded Pipefish, Ringed	Fish	May	Species or species habitat				Listed		Species Profile and Threat
994	*Phaethon rubricauda*	Red-tailed Tropicbird	Bird	Known	Breeding known to occur		Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
66211	*Doryrhamphus excisus*	Bluestripe Pipefish, Indian	Fish	May	Species or species habitat				Listed		Species Profile and Threat
882	*Charadrius veredus*	Oriental Plover, Oriental	Bird	May	Species or species habitat		Migratory	Migratory Wetlands	Listed - overfly marine		Species Profile and Threat
642	*Motacilla cinerea*	Grey Wagtail	Bird	May	Species or species habitat		Migratory	Migratory Terrestrial	Listed - overfly marine		Species Profile and Threat
644	*Motacilla flava*	Yellow Wagtail	Bird	May	Species or species habitat		Migratory	Migratory Terrestrial	Listed - overfly marine		Species Profile and Threat
66225	*Halicampus spinirostris*	Spiny-snout Pipefish	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66224	*Halicampus nitidus*	Glittering Pipefish	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66226	*Haliichthys taeniophorus*	Ribboned Pipehorse,	Fish	May	Species or species habitat				Listed		Species Profile and Threat
874	*Calidris acuminata*	Sharp-tailed Sandpiper	Bird	Known	Species or species habitat		Migratory	Migratory Wetlands	Listed		Species Profile and Threat
952	*Pandion haliaetus*	Osprey	Bird	Known	Breeding known to occur		Migratory	Migratory Wetlands	Listed		Species Profile and Threat
83000	*Thalasseus bergii*	Greater Crested Tern	Bird	Known	Breeding known to occur		Migratory	Migratory Wetlands	Listed (as Sterna bergii)		Species Profile and Threat
1013	*Fregata minor*	Great Frigatebird, Greater	Bird	May	Species or species habitat		Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
1012	*Fregata ariel*	Lesser Frigatebird, Least	Bird	Known	Breeding known to occur		Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
1014	*Phaethon lepturus*	White-tailed Tropicbird	Bird	Known	Breeding known to occur		Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
66192	*Campichthys tricarinatus*	Three-keel Pipefish	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66255	*Micrognathus*	Tidepool Pipefish	Fish	May	Species or species habitat				Listed		Species Profile and Threat
843	*Limnodromus*	Asian Dowitcher	Bird	May	Species or species habitat		Migratory	Migratory Wetlands	Listed - overfly marine		Species Profile and Threat
840	*Glareola maldivarum*	Oriental Pratincole	Bird	May	Species or species habitat		Migratory	Migratory Wetlands	Listed - overfly marine		Species Profile and Threat
844	*Limosa lapponica*	Bar-tailed Godwit	Bird	Known	Species or species habitat		Migratory	Migratory Wetlands	Listed		Species Profile and Threat
77037	*Rostratula australis*	Australian Painted Snipe	Bird	Likely	Species or species habitat	Endangered			Listed - overfly marine		Species Profile and Threat
66198	*Choeroichthys suillus*	Pig-snouted Pipefish	Fish	May	Species or species habitat				Listed		Species Profile and Threat
84292	*Ardenna pacifica*	Wedge-tailed Shearwater	Bird	Known	Breeding known to occur		Migratory	Migratory Marine Birds	Listed (as Puffinus		Species Profile and Threat
66199	*Corythoichthys amplexus*	Fijian Banded Pipefish,	Fish	May	Species or species habitat				Listed		Species Profile and Threat
1116	*Aipysurus duboisii*	Dubois' Seasnake	Reptile	May	Species or species habitat				Listed		Species Profile and Threat
75601	*Hydrophis macdowelli*	Small-headed Seasnake	Reptile	May	Species or species habitat				Listed (as Hydrophis		Species Profile and Threat
1118	*Aipysurus foliosquama*	Leaf-scaled Seasnake	Reptile	Known	Species or species habitat	Critically Endangered			Listed		Species Profile and Threat
1124	*Disteira major*	Olive-headed Seasnake	Reptile	May	Species or species habitat				Listed		Species Profile and Threat
1123	*Disteira kingii*	Spectacled Seasnake	Reptile	May	Species or species habitat				Listed		Species Profile and Threat
670	*Merops ornatus*	Rainbow Bee-eater	Bird	May	Species or species habitat				Listed - overfly marine		Species Profile and Threat
1127	*Ephalophis greyi*	North-western Mangrove	Reptile	May	Species or species habitat				Listed		Species Profile and Threat
1125	*Emydocephalus annulatus*	Turtle-headed Seasnake	Reptile	May	Species or species habitat				Listed		Species Profile and Threat
59309	*Actitis hypoleucos*	Common Sandpiper	Bird	Known	Species or species habitat		Migratory	Migratory Wetlands	Listed		Species Profile and Threat
83425	*Chalcites osculans*	Black-eared Cuckoo	Bird	Known	Species or species habitat				Listed - overfly marine		Species Profile and Threat
1115	*Aipysurus apraefrontalis*	Short-nosed Seasnake	Reptile	Known	Species or species habitat	Critically Endangered			Listed		Species Profile and Threat
1117	*Aipysurus eydouxii*	Spine-tailed Seasnake	Reptile	May	Species or species habitat				Listed		Species Profile and Threat
832	*Tringa nebularia*	Common Greenshank,	Bird	Likely	Species or species habitat		Migratory	Migratory Wetlands	Listed - overfly marine		Species Profile and Threat
1114	*Acalyptophis peronii*	Horned Seasnake	Reptile	May	Species or species habitat				Listed		Species Profile and Threat
59297	*Papasula abbotti*	Abbott's Booby	Bird	May	Species or species habitat	Endangered			Listed		Species Profile and Threat
82949	*Sternula nereis*	Fairy Tern	Bird	Known	Breeding known to occur				Listed (as Sterna nereis)		Species Profile and Threat
87374	*Leioselasma czeblukovi*	Fine-spined Seasnake,	Reptile	May	Species or species habitat				Listed (as Hydrophis		Species Profile and Threat
87377	*Chitulia ornata*	Spotted Seasnake, Ornate	Reptile	May	Species or species habitat				Listed (as Hydrophis		Species Profile and Threat
66234	*Hippocampus angustus*	Western Spiny Seahorse,	Fish	May	Species or species habitat				Listed		Species Profile and Threat
847	*Numenius*	Eastern Curlew, Far	Bird	Known	Species or species habitat	Critically Endangered	Migratory	Migratory Wetlands	Listed		Species Profile and Threat
66231	*Hippichthys penicillus*	Beady Pipefish, Steep-	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66546	*Thalasseus bengalensis*	Lesser Crested Tern	Bird	Known	Breeding known to occur				Listed (as Sterna		Species Profile and Threat
66237	*Hippocampus kuda*	Spotted Seahorse, Yellow	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66236	*Hippocampus histrix*	Spiny Seahorse, Thorny	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66239	*Hippocampus*	Hedgehog Seahorse	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66238	*Hippocampus planifrons*	Flat-face Seahorse	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66212	*Doryrhamphus janssi*	Cleaner Pipefish, Janss'	Fish	May	Species or species habitat				Listed		Species Profile and Threat
858	*Calidris melanotos*	Pectoral Sandpiper	Bird	May	Species or species habitat		Migratory	Migratory Wetlands	Listed - overfly marine		Species Profile and Threat
82404	*Ardenna carneipes*	Flesh-footed Shearwater,	Bird	May	Species or species habitat		Migratory	Migratory Marine Birds	Listed (as Puffinus		Species Profile and Threat
856	*Calidris ferruginea*	Curlew Sandpiper	Bird	Known	Species or species habitat	Critically Endangered	Migratory	Migratory Wetlands	Listed - overfly marine		Species Profile and Threat

855	*Calidris canutus*	Red Knot, Knot	Bird	Known	Species or species habitat	Endangered	Migratory	Migratory Wetlands	Listed - overfly marine	Species Profile and Threat

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Whales and Other Cetaceans

				Presence							
Species ID	**Scientific Name**	**Common Name**	**Class**	**Rank**	**Text**	**Threatened Category**	**Migratory Status**	**Migratory Category**	**Marine Status**	**Cetacean Status**	**Website**
51	*Stenella attenuata*	Spotted Dolphin,	Mammal	May	Species or species habitat					Cetacean	Species Profile and Threat
57	*Kogia breviceps*	Pygmy Sperm Whale	Mammal	May	Species or species habitat					Cetacean	Species Profile and Threat
56	*Ziphius cavirostris*	Cuvier's Beaked Whale,	Mammal	May	Species or species habitat					Cetacean	Species Profile and Threat
52	*Stenella coeruleoalba*	Striped Dolphin,	Mammal	May	Species or species habitat					Cetacean	Species Profile and Threat
74	*Mesoplodon densirostris*	Blainville's Beaked Whale,	Mammal	May	Species or species habitat					Cetacean	Species Profile and Threat
81322	*Orcaella heinsohni*	Australian Snubfin Dolphin	Mammal	Known	Species or species habitat		Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat
59	*Physeter macrocephalus*	Sperm Whale	Mammal	May	Species or species habitat		Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat
48	*Pseudorca crassidens*	False Killer Whale	Mammal	Likely	Species or species habitat					Cetacean	Species Profile and Threat
29	*Stenella longirostris*	Long-snouted Spinner	Mammal	May	Species or species habitat					Cetacean	Species Profile and Threat
85043	*Kogia sima*	Dwarf Sperm Whale	Mammal	May	Species or species habitat					Cetacean	Species Profile and Threat
60	*Delphinus delphis*	Common Dolphin, Short-	Mammal	May	Species or species habitat					Cetacean	Species Profile and Threat
64	*Grampus griseus*	Risso's Dolphin, Grampus	Mammal	May	Species or species habitat					Cetacean	Species Profile and Threat
61	*Feresa attenuata*	Pygmy Killer Whale	Mammal	May	Species or species habitat					Cetacean	Species Profile and Threat
62	*Globicephala*	Short-finned Pilot Whale	Mammal	May	Species or species habitat					Cetacean	Species Profile and Threat
30	*Steno bredanensis*	Rough-toothed Dolphin	Mammal	May	Species or species habitat					Cetacean	Species Profile and Threat
33	*Balaenoptera*	Minke Whale	Mammal	May	Species or species habitat					Cetacean	Species Profile and Threat
36	*Balaenoptera musculus*	Blue Whale	Mammal	Known	Migration route known to	Endangered	Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat
37	*Balaenoptera physalus*	Fin Whale	Mammal	Likely	Species or species habitat	Vulnerable	Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat
34	*Balaenoptera borealis*	Sei Whale	Mammal	Likely	Species or species habitat	Vulnerable	Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat
35	*Balaenoptera edeni*	Bryde's Whale	Mammal	Likely	Species or species habitat		Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat
68417	*Tursiops truncatus s. str.*	Bottlenose Dolphin	Mammal	May	Species or species habitat					Cetacean	Species Profile and Threat
46	*Orcinus orca*	Killer Whale, Orca	Mammal	May	Species or species habitat		Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat
47	*Peponocephala electra*	Melon-headed Whale	Mammal	May	Species or species habitat					Cetacean	Species Profile and Threat
40	*Eubalaena australis*	Southern Right Whale	Mammal	Likely	Species or species habitat	Endangered	Migratory (as Balaena	Migratory Marine Species		Cetacean	Species Profile and Threat
68418	*Tursiops aduncus*	Indian Ocean Bottlenose	Mammal	Likely	Species or species habitat					Cetacean	Species Profile and Threat
87942	*Sousa sahulensis*	Australian Humpback	Mammal	Known	Species or species habitat		Migratory (as Sousa	Migratory Marine Species		Cetacean	Species Profile and Threat
38	*Megaptera novaeangliae*	Humpback Whale	Mammal	Known	Breeding known to occur		Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat
78900	*Tursiops aduncus*	Spotted Bottlenose	Mammal	Known	Species or species habitat		Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat

Back to Summary

Critical Habitats

Critical Habitat ID	Critical Habitat Name	Presence	Website

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-Apr-2023

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:	1
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	22
Listed Migratory Species:	36

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:	59
Whales and Other Cetaceans:	25
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
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:	33
Key Ecological Features (Marine):	2
Biologically Important Areas:	5
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
EEZ and Territorial Sea

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
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	Species or species habitat may occur within area
FISH		
Thunnus maccoyii Southern Bluefin Tuna [69402]	Conservation Dependent	Breeding known to occur within area
MAMMAL		

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
REPTILE		
Aipysurus apraefrontalis Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat known to occur within area
Aipysurus foliosquama Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat likely to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat likely 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 likely 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 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 likely 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
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat likely to occur within area
Migratory Marine Species		

Scientific Name	Threatened Category	Presence Text
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 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
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 likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat likely 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 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
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
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

Scientific Name	Threatened Category	Presence Text
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 may 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
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
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
[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 likely to occur within area
[Phaethon lepturus fulvus](#) Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Species or species habitat may occur within area
Fish		
[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 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
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 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
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
Reptile		
Acalyptophis peronii Horned Seasnake [1114]		Species or species habitat may occur within area
Aipysurus apraefrontalis Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat known to occur within area
Aipysurus duboisii Dubois' Seasnake [1116]		Species or species habitat may occur within area
Aipysurus eydouxii Spine-tailed Seasnake [1117]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Aipysurus foliosquama Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat likely to occur within area
Aipysurus laevis Olive Seasnake [1120]		Species or species habitat may occur within area
Aipysurus tenuis Brown-lined Seasnake [1121]		Species or species habitat may occur within area
Astrotia stokesii Stokes' Seasnake [1122]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat likely to occur within area
Chitulia ornata as Hydrophis ornatus Spotted Seasnake, Ornate Reef Seasnake [87377]		Species or species habitat may occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
Disteira kingii Spectacled Seasnake [1123]		Species or species habitat may occur within area
Disteira major Olive-headed Seasnake [1124]		Species or species habitat may occur within area
Ephalophis greyi North-western Mangrove Seasnake [1127]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat likely to occur within area
Hydrophis elegans Elegant Seasnake [1104]		Species or species habitat may occur within area
Hydrophis macdowelli as Hydrophis mcdowelli Small-headed Seasnake [75601]		Species or species habitat may occur within area
Leioselasma czeblukovi as Hydrophis czeblukovi Fine-spined Seasnake, Geometrical Seasnake [87374]		Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Congregation or aggregation known to occur within area
Pelamis platurus Yellow-bellied Seasnake [1091]		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 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

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 as Kogia simus Dwarf Sperm Whale [85043]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]		Breeding known to occur within area
Orcaella heinsohni as Orcaella brevirostris 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
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 as Sousa chinensis 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 may 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

Habitat Critical to the Survival of Marine Turtles		
Scientific Name	Behaviour	Presence
Aug - Sep		

Scientific Name	Behaviour	Presence
Natator depressus Flatback Turtle [59257]	Nesting	Known to occur

Extra Information

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
Project Highclere Cable Lay and Operation	2022/09203		Completed
Controlled action			
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
Equus Gas Fields Development Project, Carnarvon Basin	2012/6301	Controlled Action	Completed
Not controlled action			
'Goodwyn A' Low Pressure Train Project	2003/914	Not Controlled Action	Completed
Development of Mutineer and Exeter petroleum fields for oil production, Permit	2003/1033	Not Controlled Action	Completed
Maia-Gaea Exploration wells	2000/17	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
Project Highclere Geophysical Survey	2021/9023	Not Controlled Action	Completed
Searipple gas and condensate field development	2000/89	Not Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
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
Western Flank Gas Development	2005/2464	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
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 sesmic survey	2006/2781	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
Decommissioning of the Legendre facilities	2010/5681	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
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	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		Manner)	
Greater Western Flank Phase 1 gas Development	2011/5980	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
Offshore Drilling Campaign	2011/5830	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
Tidepole Maz 3D Seismic Survey Campaign	2007/3706	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

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
Glomar Shoals	North-west

Biologically Important Areas

Scientific Name	Behaviour	Presence
Marine Turtles		

Scientific Name	Behaviour	Presence
[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
[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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Protected Matters Search Tool

Report Generated - 2:55PM - 08 June 2023

Matters of National Environment Significance	Count
World Heritage Properties	1
National Heritage Places	1
Wetlands of International Importance (Ramsar Wetlands)	0
Great Barrier Reef Marine Park	0
Commonwealth Marine Area	1
Listed Threatened Ecological Communities	0
Listed Threatened Species	47
Listed Migratory Species	64

Other Matters Protected by the EPBC Act	Count
Commonwealth Lands	5
Commonwealth Heritage Places	2
Listed Marine Species	110
Whales and Other Cetaceans	28
Critical Habitats	0
Commonwealth Reserves Terrestrial	0
Australian Marine Parks	4
Habitat Critical to the Survival of Marine Turtles	4

Extra Information	Count
State and Territory Reserves	28
Regional Forest Agreements	0
Nationally Important Wetlands	2

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 and is accurate at the time of generation.
Please see the caveat for interpretation of information provided here. Consider carefully the age of information for decision making.

EPBC Act Referrals	23
Key Ecological Features	1
Biologically Important Areas	32
Bioregional Assessments	0
Geological and Bioregional Assessments	0

Report Metadata	Caveat

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World Heritage Places

Place ID	Place Name	State	Legal Status	Natural Values	Cultural Values	Website
106208	The Ningaloo Coast	WA	Declared property	vii,x		Australian Heritage

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National Heritage Places

Place ID	Place Name	State	Heritage Class	Legal Status	Website
105881	The Ningaloo Coast	WA	Natural	Listed place	Australian Heritage

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Wetlands of International Importance (Ramsar Wetlands)

Ramsar Site No.	Ramsar Site Name	Proximity	Website

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Great Barrier Reef Marine Park

Zone ID	Zone Type	State	Permit Description	IUCN

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Commonwealth Marine Area

Feature Name
EEZ and Territorial Sea

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Listed Threatened Ecological Communities

				Presence	
Community ID	**Community Name**	**Threatened Category**	**Website**	**Rank**	**Text**

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Listed Threatened Species

Species ID	Scientific Name	Common Name	Class	Simple Presence	Presence Text	Threatened Category	Migratory Status	Migratory Category	Marine Status	Cetacean Status	Website
85267	*Sphyrna lewini*	Scalloped Hammerhead	Shark	Known	Species or species habitat	Conservation Dependent					Species Profile and Threat
69402	*Thunnus maccoyii*	Southern Bluefin Tuna	Fish	Known	Breeding known to occur	Conservation Dependent					Species Profile and Threat
86432	*Limosa lapponica*	Northern Siberian Bar-	Bird	Known	Species or species habitat	Critically Endangered					Species Profile and Threat
1118	*Aipysurus foliosquama*	Leaf-scaled Seasnake	Reptile	Known	Species or species habitat	Critically Endangered			Listed		Species Profile and Threat
1115	*Aipysurus apraefrontalis*	Short-nosed Seasnake	Reptile	Known	Species or species habitat	Critically Endangered			Listed		Species Profile and Threat
847	*Numenius*	Eastern Curlew, Far	Bird	Known	Species or species habitat	Critically Endangered	Migratory	Migratory Wetlands	Listed		Species Profile and Threat
856	*Calidris ferruginea*	Curlew Sandpiper	Bird	Known	Species or species habitat	Critically Endangered	Migratory	Migratory Wetlands	Listed - overfly marine		Species Profile and Threat
1763	*Caretta caretta*	Loggerhead Turtle	Reptile	Known	Breeding known to occur	Endangered	Migratory	Migratory Marine Species	Listed		Species Profile and Threat
331	*Dasyurus hallucatus*	Northern Quoll, Digul	Mammal	May	Species or species habitat	Endangered					Species Profile and Threat
1768	*Dermochelys coriacea*	Leatherback Turtle,	Reptile	Known	Species or species habitat	Endangered	Migratory	Migratory Marine Species	Listed		Species Profile and Threat
942	*Erythrotriorchis radiatus*	Red Goshawk	Bird	May	Species or species habitat	Endangered					Species Profile and Threat
1060	*Macronectes giganteus*	Southern Giant-Petrel,	Bird	May	Species or species habitat	Endangered	Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
66647	*Petrogale lateralis*	Black-flanked Rock-	Mammal	Known	Species or species habitat	Endangered					Species Profile and Threat
36	*Balaenoptera musculus*	Blue Whale	Mammal	Known	Migration route known to	Endangered	Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat
40	*Eubalaena australis*	Southern Right Whale	Mammal	Likely	Species or species habitat	Endangered	Migratory (as Balaena	Migratory Marine Species		Cetacean	Species Profile and Threat
77037	*Rostratula australis*	Australian Painted Snipe	Bird	Likely	Species or species habitat	Endangered			Listed - overfly marine		Species Profile and Threat
88019	*Lagorchestes hirsutus*	Mala, Rufous Hare-	Mammal	Known	Translocated population	Endangered					Species Profile and Threat
59297	*Papasula abbotti*	Abbott's Booby	Bird	May	Species or species habitat	Endangered			Listed		Species Profile and Threat
59350	*Pezoporus occidentalis*	Night Parrot	Bird	May	Species or species habitat	Endangered					Species Profile and Threat
855	*Calidris canutus*	Red Knot, Knot	Bird	Known	Species or species habitat	Endangered	Migratory	Migratory Wetlands	Listed - overfly marine		Species Profile and Threat
59257	*Natator depressus*	Flatback Turtle	Reptile	Known	Breeding known to occur	Vulnerable	Migratory	Migratory Marine Species	Listed		Species Profile and Threat
25570	*Ctenotus zastictus*	Hamelin Ctenotus	Reptile	Likely	Species or species habitat	Vulnerable					Species Profile and Threat
64459	*Thalassarche impavida*	Campbell Albatross,	Bird	May	Species or species habitat	Vulnerable	Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
929	*Falco hypoleucos*	Grey Falcon	Bird	Likely	Species or species habitat	Vulnerable					Species Profile and Threat
66661	*Lagorchestes*	Spectacled Hare-wallaby	Mammal	Known	Species or species habitat	Vulnerable					Species Profile and Threat
64464	*Thalassarche carteri*	Indian Yellow-nosed	Bird	May	Species or species habitat	Vulnerable	Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
60756	*Pristis pristis*	Freshwater Sawfish,	Shark	Likely	Species or species habitat	Vulnerable	Migratory	Migratory Marine Species			Species Profile and Threat
877	*Charadrius leschenaultii*	Greater Sand Plover, Large	Bird	Known	Species or species habitat	Vulnerable	Migratory	Migratory Wetlands	Listed		Species Profile and Threat
68442	*Pristis zijsron*	Green Sawfish,	Shark	Known	Species or species habitat	Vulnerable	Migratory	Migratory Marine Species			Species Profile and Threat
64470	*Carcharodon carcharias*	White Shark, Great White	Shark	Known	Species or species habitat	Vulnerable	Migratory	Migratory Marine Species			Species Profile and Threat
66676	*Milyeringa veritas*	Cape Range Cave	Fish	Known	Species or species habitat	Vulnerable					Species Profile and Threat
66678	*Ophisternon candidum*	Blind Cave Eel	Fish	Known	Species or species habitat	Vulnerable					Species Profile and Threat
82790	*Rhinonicteris aurantia*	Pilbara Leaf-nosed Bat	Mammal	May	Species or species habitat	Vulnerable					Species Profile and Threat
89262	*Osphranter robustus*	Barrow Island Wallaroo,	Mammal	Likely	Species or species habitat	Vulnerable					Species Profile and Threat
1766	*Eretmochelys imbricata*	Hawksbill Turtle	Reptile	Known	Breeding known to occur	Vulnerable	Migratory	Migratory Marine Species	Listed		Species Profile and Threat
1765	*Chelonia mydas*	Green Turtle	Reptile	Known	Breeding known to occur	Vulnerable	Migratory	Migratory Marine Species	Listed		Species Profile and Threat
82950	*Sternula nereis nereis*	Australian Fairy Tern	Bird	Known	Breeding known to occur	Vulnerable					Species Profile and Threat
37	*Balaenoptera physalus*	Fin Whale	Mammal	Likely	Species or species habitat	Vulnerable	Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat
68752	*Carcharias taurus (west*	Grey Nurse Shark (west	Shark	Known	Species or species habitat	Vulnerable					Species Profile and Threat
34	*Balaenoptera borealis*	Sei Whale	Mammal	Likely	Species or species habitat	Vulnerable	Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat
26194	*Malurus leucopterus*	White-winged Fairy-wren	Bird	Likely	Species or species habitat	Vulnerable					Species Profile and Threat
68447	*Pristis clavata*	Dwarf Sawfish,	Shark	Known	Species or species habitat	Vulnerable	Migratory	Migratory Marine Species			Species Profile and Threat
86875	*Kumonga exleyi*	Cape Range Remipede	Crustacean	Likely	Species or species habitat	Vulnerable					Species Profile and Threat
66666	*Isoodon auratus*	Golden Bandicoot (Barrow	Mammal	Known	Species or species habitat	Vulnerable					Species Profile and Threat
88021	*Bettongia lesueur Barrow*	Boodie, Burrowing	Mammal	Known	Translocated population	Vulnerable					Species Profile and Threat
66680	*Rhincodon typus*	Whale Shark	Shark	May	Species or species habitat	Vulnerable	Migratory	Migratory Marine Species			Species Profile and Threat
174	*Macroderma gigas*	Ghost Bat	Mammal	Likely	Species or species habitat	Vulnerable					Species Profile and Threat

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Listed Migratory Species

				Presence							
Species ID	Scientific Name	Common Name	Class	Rank	Text	Threatened Category	Migratory Status	Migratory Category	Marine Status	Cetacean Status	Website
59257	*Natator depressus*	Flatback Turtle	Reptile	Known	Breeding known to occur	Vulnerable	Migratory	Migratory Marine Species	Listed		Species Profile and Threat
825	*Anous stolidus*	Common Noddy	Bird	Likely	Species or species habitat		Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
64459	*Thalassarche impavida*	Campbell Albatross,	Bird	May	Species or species habitat	Vulnerable	Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
83288	*Lamna nasus*	Porbeagle, Mackerel Shark	Shark	May	Species or species habitat		Migratory	Migratory Marine Species			Species Profile and Threat
64464	*Thalassarche carteri*	Indian Yellow-nosed	Bird	May	Species or species habitat	Vulnerable	Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
81322	*Orcaella heinsohni*	Australian Snubfin Dolphin	Mammal	Known	Species or species habitat		Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat
678	*Apus pacificus*	Fork-tailed Swift	Bird	Likely	Species or species habitat		Migratory	Migratory Marine Birds	Listed - overfly marine		Species Profile and Threat
1763	*Caretta caretta*	Loggerhead Turtle	Reptile	Known	Breeding known to occur	Endangered	Migratory	Migratory Marine Species	Listed		Species Profile and Threat
90033	*Mobula alfredi*	Reef Manta Ray, Coastal	Shark	Known	Species or species habitat		Migratory (as Manta	Migratory Marine Species			Species Profile and Threat
1768	*Dermochelys coriacea*	Leatherback Turtle,	Reptile	Known	Species or species habitat	Endangered	Migratory	Migratory Marine Species	Listed		Species Profile and Threat
60756	*Pristis pristis*	Freshwater Sawfish,	Shark	Likely	Species or species habitat	Vulnerable	Migratory	Migratory Marine Species			Species Profile and Threat
877	*Charadrius leschenaultii*	Greater Sand Plover, Large	Bird	Known	Species or species habitat	Vulnerable	Migratory	Migratory Wetlands	Listed		Species Profile and Threat
68442	*Pristis zijsron*	Green Sawfish,	Shark	Known	Species or species habitat	Vulnerable	Migratory	Migratory Marine Species			Species Profile and Threat
808	*Hydroprogne caspia*	Caspian Tern	Bird	Known	Breeding known to occur		Migratory	Migratory Marine Birds	Listed (as Sterna caspia)		Species Profile and Threat
64470	*Carcharodon carcharias*	White Shark, Great White	Shark	Known	Species or species habitat	Vulnerable	Migratory	Migratory Marine Species			Species Profile and Threat
59	*Physeter macrocephalus*	Sperm Whale	Mammal	May	Species or species habitat		Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat
1060	*Macronectes giganteus*	Southern Giant-Petrel,	Bird	May	Species or species habitat	Endangered	Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
662	*Hirundo rustica*	Barn Swallow	Bird	May	Species or species habitat		Migratory	Migratory Terrestrial	Listed - overfly marine		Species Profile and Threat
82849	*Sternula albifrons*	Little Tern	Bird	Known	Congregation or		Migratory	Migratory Marine Birds	Listed (as Sterna albifrons)		Species Profile and Threat
82845	*Onychoprion anaethetus*	Bridled Tern	Bird	Known	Breeding known to occur		Migratory	Migratory Marine Birds	Listed (as Sterna		Species Profile and Threat
28	*Dugong dugon*	Dugong	Mammal	Known	Breeding known to occur		Migratory	Migratory Marine Species	Listed		Species Profile and Threat
1077	*Calonectris leucomelas*	Streaked Shearwater	Bird	Likely	Species or species habitat		Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
90034	*Mobula birostris*	Giant Manta Ray	Shark	Known	Species or species habitat		Migratory (as Manta	Migratory Marine Species			Species Profile and Threat
1766	*Eretmochelys imbricata*	Hawksbill Turtle	Reptile	Known	Breeding known to occur	Vulnerable	Migratory	Migratory Marine Species	Listed		Species Profile and Threat
817	*Sterna dougallii*	Roseate Tern	Bird	Known	Breeding known to occur		Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
1765	*Chelonia mydas*	Green Turtle	Reptile	Known	Breeding known to occur	Vulnerable	Migratory	Migratory Marine Species	Listed		Species Profile and Threat
1022	*Sula leucogaster*	Brown Booby	Bird	Known	Breeding known to occur		Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
84108	*Carcharhinus longimanus*	Oceanic Whitetip Shark	Shark	May	Species or species habitat		Migratory	Migratory Marine Species			Species Profile and Threat
1021	*Sula dactylatra*	Masked Booby	Bird	Known	Breeding known to occur		Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
79073	*Isurus oxyrinchus*	Shortfin Mako, Mako	Shark	Likely	Species or species habitat		Migratory	Migratory Marine Species			Species Profile and Threat
36	*Balaenoptera musculus*	Blue Whale	Mammal	Known	Migration route known to	Endangered	Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat
37	*Balaenoptera physalus*	Fin Whale	Mammal	Likely	Species or species habitat	Vulnerable	Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat
994	*Phaethon rubricauda*	Red-tailed Tropicbird	Bird	Known	Breeding known to occur		Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
82947	*Isurus paucus*	Longfin Mako	Shark	Likely	Species or species habitat		Migratory	Migratory Marine Species			Species Profile and Threat
34	*Balaenoptera borealis*	Sei Whale	Mammal	Likely	Species or species habitat	Vulnerable	Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat
35	*Balaenoptera edeni*	Bryde's Whale	Mammal	Likely	Species or species habitat		Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat
882	*Charadrius veredus*	Oriental Plover, Oriental	Bird	May	Species or species habitat		Migratory	Migratory Wetlands	Listed - overfly marine		Species Profile and Threat
642	*Motacilla cinerea*	Grey Wagtail	Bird	May	Species or species habitat		Migratory	Migratory Terrestrial	Listed - overfly marine		Species Profile and Threat
644	*Motacilla flava*	Yellow Wagtail	Bird	May	Species or species habitat		Migratory	Migratory Terrestrial	Listed - overfly marine		Species Profile and Threat
874	*Calidris acuminata*	Sharp-tailed Sandpiper	Bird	Known	Species or species habitat		Migratory	Migratory Wetlands	Listed		Species Profile and Threat
952	*Pandion haliaetus*	Osprey	Bird	Known	Breeding known to occur		Migratory	Migratory Wetlands	Listed		Species Profile and Threat
46	*Orcinus orca*	Killer Whale, Orca	Mammal	May	Species or species habitat		Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat
83000	*Thalasseus bergii*	Greater Crested Tern	Bird	Known	Breeding known to occur		Migratory	Migratory Wetlands	Listed (as Sterna bergii)		Species Profile and Threat
1013	*Fregata minor*	Great Frigatebird, Greater	Bird	May	Species or species habitat		Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
1012	*Fregata ariel*	Lesser Frigatebird, Least	Bird	Known	Breeding known to occur		Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
68448	*Anoxypristis cuspidata*	Narrow Sawfish,	Shark	Likely	Species or species habitat		Migratory	Migratory Marine Species			Species Profile and Threat
1014	*Phaethon lepturus*	White-tailed Tropicbird	Bird	Known	Breeding known to occur		Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
40	*Eubalaena australis*	Southern Right Whale	Mammal	Likely	Species or species habitat	Endangered	Migratory (as Balaena	Migratory Marine Species		Cetacean	Species Profile and Threat
843	*Limnodromus*	Asian Dowitcher	Bird	May	Species or species habitat		Migratory	Migratory Wetlands	Listed - overfly marine		Species Profile and Threat
840	*Glareola maldivarum*	Oriental Pratincole	Bird	May	Species or species habitat		Migratory	Migratory Wetlands	Listed - overfly marine		Species Profile and Threat
844	*Limosa lapponica*	Bar-tailed Godwit	Bird	Known	Species or species habitat		Migratory	Migratory Wetlands	Listed		Species Profile and Threat
84292	*Ardenna pacifica*	Wedge-tailed Shearwater	Bird	Known	Breeding known to occur		Migratory	Migratory Marine Birds	Listed (as Puffinus		Species Profile and Threat

68447	*Pristis clavata*	Dwarf Sawfish,	Shark	Known	Species or species habitat	Vulnerable	Migratory	Migratory Marine Species			Species Profile and Threat
87942	*Sousa sahulensis*	Australian Humpback	Mammal	Known	Species or species habitat		Migratory (as Sousa	Migratory Marine Species		Cetacean	Species Profile and Threat
59309	*Actitis hypoleucos*	Common Sandpiper	Bird	Known	Species or species habitat		Migratory	Migratory Wetlands	Listed		Species Profile and Threat
832	*Tringa nebularia*	Common Greenshank,	Bird	Likely	Species or species habitat		Migratory	Migratory Wetlands	Listed - overfly marine		Species Profile and Threat
38	*Megaptera novaeangliae*	Humpback Whale	Mammal	Known	Breeding known to occur		Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat
66680	*Rhincodon typus*	Whale Shark	Shark	May	Species or species habitat	Vulnerable	Migratory	Migratory Marine Species			Species Profile and Threat
847	*Numenius*	Eastern Curlew, Far	Bird	Known	Species or species habitat	Critically Endangered	Migratory	Migratory Wetlands	Listed		Species Profile and Threat
858	*Calidris melanotos*	Pectoral Sandpiper	Bird	May	Species or species habitat		Migratory	Migratory Wetlands	Listed - overfly marine		Species Profile and Threat
82404	*Ardenna carneipes*	Flesh-footed Shearwater,	Bird	May	Species or species habitat		Migratory	Migratory Marine Birds	Listed (as Puffinus		Species Profile and Threat
78900	*Tursiops aduncus*	Spotted Bottlenose	Mammal	Known	Species or species habitat		Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat
856	*Calidris ferruginea*	Curlew Sandpiper	Bird	Known	Species or species habitat	Critically Endangered	Migratory	Migratory Wetlands	Listed - overfly marine		Species Profile and Threat
855	*Calidris canutus*	Red Knot, Knot	Bird	Known	Species or species habitat	Endangered	Migratory	Migratory Wetlands	Listed - overfly marine		Species Profile and Threat

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Commonwealth Lands

Commonwealth Land ID	Commonwealth Land	Agency	State
50193	Defence - LEARMONTH -	Defence	WA
50122	Defence - EXMOUTH VLF	Defence	WA
52236	Commonwealth Land -	Unknown	WA
50123	Defence - EXMOUTH VLF	Defence	WA
50001	Defence - LEARMONTH	Defence	WA

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Commonwealth Heritage Places

Place ID	Place Name	State	Heritage Class	Legal Status	Website
105255	Mermaid Reef - Rowley	WA	Natural	Listed place	Australian Heritage
105551	Learmonth Air Weapons	WA	Natural	Listed place	Australian Heritage

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Listed Marine Species

				Presence							
Species ID	Scientific Name	Common Name	Class	Rank	Text	Threatened Category	Migratory Status	Migratory Category	Marine Status	Cetacean Status	Website
59257	*Natator depressus*	Flatback Turtle	Reptile	Known	Breeding known to occur	Vulnerable	Migratory	Migratory Marine Species	Listed		Species Profile and Threat
66189	*Bulbonaricus brauni*	Braun's Pughead Pipefish,	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66188	*Bhanotia fasciolata*	Corrugated Pipefish,	Fish	May	Species or species habitat				Listed		Species Profile and Threat
825	*Anous stolidus*	Common Noddy	Bird	Likely	Species or species habitat		Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
66521	*Bubulcus ibis*	Cattle Egret	Bird	May	Species or species habitat				Listed - overfly marine		Species Profile and Threat
64459	*Thalassarche impavida*	Campbell Albatross,	Bird	May	Species or species habitat	Vulnerable	Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
66196	*Choeroichthys*	Muiron Island Pipefish	Fish	May	Species or species habitat				Listed		Species Profile and Threat
64464	*Thalassarche carteri*	Indian Yellow-nosed	Bird	May	Species or species habitat	Vulnerable	Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
1122	*Astrotia stokesii*	Stokes' Seasnake	Reptile	May	Species or species habitat				Listed		Species Profile and Threat
1121	*Aipysurus tenuis*	Brown-lined Seasnake	Reptile	May	Species or species habitat				Listed		Species Profile and Threat
1120	*Aipysurus laevis*	Olive Seasnake	Reptile	May	Species or species habitat				Listed		Species Profile and Threat
66717	*Doryrhamphus*	Many-banded Pipefish	Fish	May	Species or species habitat				Listed		Species Profile and Threat
678	*Apus pacificus*	Fork-tailed Swift	Bird	Likely	Species or species habitat		Migratory	Migratory Marine Birds	Listed - overfly marine		Species Profile and Threat
1763	*Caretta caretta*	Loggerhead Turtle	Reptile	Known	Breeding known to occur	Endangered	Migratory	Migratory Marine Species	Listed		Species Profile and Threat
1091	*Pelamis platurus*	Yellow-bellied Seasnake	Reptile	May	Species or species habitat				Listed		Species Profile and Threat
1768	*Dermochelys coriacea*	Leatherback Turtle,	Reptile	Known	Species or species habitat	Endangered	Migratory	Migratory Marine Species	Listed		Species Profile and Threat
66719	*Phoxocampus belcheri*	Black Rock Pipefish	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66186	*Acentronura larsonae*	Helen's Pygmy Pipehorse	Fish	May	Species or species habitat				Listed		Species Profile and Threat
877	*Charadrius leschenaultii*	Greater Sand Plover, Large	Bird	Known	Species or species habitat	Vulnerable	Migratory	Migratory Wetlands	Listed		Species Profile and Threat
808	*Hydroprogne caspia*	Caspian Tern	Bird	Known	Breeding known to occur		Migratory	Migratory Marine Birds	Listed (as Sterna caspia)		Species Profile and Threat
82326	*Chroicocephalus*	Silver Gull	Bird	Known	Breeding known to occur				Listed (as Larus		Species Profile and Threat
66183	*Solenostomus*	Robust Ghostpipefish,	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66194	*Choeroichthys*	Pacific Short-bodied	Fish	May	Species or species habitat				Listed		Species Profile and Threat
943	*Haliaeetus leucogaster*	White-bellied Sea-Eagle	Bird	Known	Species or species habitat				Listed		Species Profile and Threat
90682	*Onychoprion fuscatus*	Sooty Tern	Bird	Known	Breeding known to occur				Listed (as Sterna fuscata)		Species Profile and Threat
66219	*Halicampus brocki*	Brock's Pipefish	Fish	May	Species or species habitat				Listed		Species Profile and Threat
1060	*Macronectes giganteus*	Southern Giant-Petrel,	Bird	May	Species or species habitat	Endangered	Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
662	*Hirundo rustica*	Barn Swallow	Bird	May	Species or species habitat		Migratory	Migratory Terrestrial	Listed - overfly marine		Species Profile and Threat
82849	*Sternula albifrons*	Little Tern	Bird	Known	Congregation or		Migratory	Migratory Marine Birds	Listed (as Sterna albifrons)		Species Profile and Threat
82845	*Onychoprion anaethetus*	Bridled Tern	Bird	Known	Breeding known to occur		Migratory	Migratory Marine Birds	Listed (as Sterna		Species Profile and Threat
811	*Larus pacificus*	Pacific Gull	Bird	Known	Breeding known to occur				Listed		Species Profile and Threat
28	*Dugong dugon*	Dugong	Mammal	Known	Breeding known to occur		Migratory	Migratory Marine Species	Listed		Species Profile and Threat
1077	*Calonectris leucomelas*	Streaked Shearwater	Bird	Likely	Species or species habitat		Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
66279	*Syngnathoides*	Double-end Pipehorse,	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66272	*Solegnathus hardwickii*	Pallid Pipehorse,	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66273	*Solegnathus lettiensis*	Gunther's Pipehorse,	Fish	May	Species or species habitat				Listed		Species Profile and Threat
1766	*Eretmochelys imbricata*	Hawksbill Turtle	Reptile	Known	Breeding known to occur	Vulnerable	Migratory	Migratory Marine Species	Listed		Species Profile and Threat
817	*Sterna dougallii*	Roseate Tern	Bird	Known	Breeding known to occur		Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
1765	*Chelonia mydas*	Green Turtle	Reptile	Known	Breeding known to occur	Vulnerable	Migratory	Migratory Marine Species	Listed		Species Profile and Threat
66213	*Doryrhamphus*	Flagtail Pipefish,	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66202	*Corythoichthys*	Australian Messmate	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66281	*Trachyrhamphus*	Straightstick Pipefish, Long	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66200	*Corythoichthys*	Reticulate Pipefish, Yellow-	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66220	*Halicampus dunckeri*	Red-hair Pipefish,	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66221	*Halicampus grayi*	Mud Pipefish, Gray's	Fish	May	Species or species habitat				Listed		Species Profile and Threat
1100	*Hydrelaps darwiniensis*	Black-ringed Seasnake	Reptile	May	Species or species habitat				Listed		Species Profile and Threat
1022	*Sula leucogaster*	Brown Booby	Bird	Known	Breeding known to occur		Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
1104	*Hydrophis elegans*	Elegant Seasnake	Reptile	May	Species or species habitat				Listed		Species Profile and Threat
1021	*Sula dactylatra*	Masked Booby	Bird	Known	Breeding known to occur		Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
66206	*Cosmocampus banneri*	Roughridge Pipefish	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66205	*Corythoichthys schultzi*	Schultz's Pipefish	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66720	*Hippocampus*	Three-spot Seahorse, Low-	Fish	May	Species or species habitat				Listed		Species Profile and Threat

66280	*Trachyrhamphus*	Bentstick Pipefish, Bend	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66216	*Festucalex scalaris*	Ladder Pipefish	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66217	*Filicampus tigris*	Tiger Pipefish	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66210	*Doryrhamphus*	Banded Pipefish, Ringed	Fish	May	Species or species habitat				Listed		Species Profile and Threat
994	*Phaethon rubricauda*	Red-tailed Tropicbird	Bird	Known	Breeding known to occur		Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
66211	*Doryrhamphus excisus*	Bluestripe Pipefish, Indian	Fish	May	Species or species habitat				Listed		Species Profile and Threat
882	*Charadrius veredus*	Oriental Plover, Oriental	Bird	May	Species or species habitat		Migratory	Migratory Wetlands	Listed - overfly marine		Species Profile and Threat
642	*Motacilla cinerea*	Grey Wagtail	Bird	May	Species or species habitat		Migratory	Migratory Terrestrial	Listed - overfly marine		Species Profile and Threat
644	*Motacilla flava*	Yellow Wagtail	Bird	May	Species or species habitat		Migratory	Migratory Terrestrial	Listed - overfly marine		Species Profile and Threat
66225	*Halicampus spinirostris*	Spiny-snout Pipefish	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66224	*Halicampus nitidus*	Glittering Pipefish	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66226	*Haliichthys taeniophorus*	Ribboned Pipehorse,	Fish	May	Species or species habitat				Listed		Species Profile and Threat
874	*Calidris acuminata*	Sharp-tailed Sandpiper	Bird	Known	Species or species habitat		Migratory	Migratory Wetlands	Listed		Species Profile and Threat
952	*Pandion haliaetus*	Osprey	Bird	Known	Breeding known to occur		Migratory	Migratory Wetlands	Listed		Species Profile and Threat
83000	*Thalasseus bergii*	Greater Crested Tern	Bird	Known	Breeding known to occur		Migratory	Migratory Wetlands	Listed (as Sterna bergii)		Species Profile and Threat
1013	*Fregata minor*	Great Frigatebird, Greater	Bird	May	Species or species habitat		Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
1012	*Fregata ariel*	Lesser Frigatebird, Least	Bird	Known	Breeding known to occur		Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
1014	*Phaethon lepturus*	White-tailed Tropicbird	Bird	Known	Breeding known to occur		Migratory	Migratory Marine Birds	Listed		Species Profile and Threat
66192	*Campichthys tricarinatus*	Three-keel Pipefish	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66255	*Micrognathus*	Tidepool Pipefish	Fish	May	Species or species habitat				Listed		Species Profile and Threat
843	*Limnodromus*	Asian Dowitcher	Bird	May	Species or species habitat		Migratory	Migratory Wetlands	Listed - overfly marine		Species Profile and Threat
840	*Glareola maldivarum*	Oriental Pratincole	Bird	May	Species or species habitat		Migratory	Migratory Wetlands	Listed - overfly marine		Species Profile and Threat
844	*Limosa lapponica*	Bar-tailed Godwit	Bird	Known	Species or species habitat		Migratory	Migratory Wetlands	Listed		Species Profile and Threat
77037	*Rostratula australis*	Australian Painted Snipe	Bird	Likely	Species or species habitat	Endangered			Listed - overfly marine		Species Profile and Threat
66198	*Choeroichthys suillus*	Pig-snouted Pipefish	Fish	May	Species or species habitat				Listed		Species Profile and Threat
84292	*Ardenna pacifica*	Wedge-tailed Shearwater	Bird	Known	Breeding known to occur		Migratory	Migratory Marine Birds	Listed (as Puffinus		Species Profile and Threat
66199	*Corythoichthys amplexus*	Fijian Banded Pipefish,	Fish	May	Species or species habitat				Listed		Species Profile and Threat
1116	*Aipysurus duboisii*	Dubois' Seasnake	Reptile	May	Species or species habitat				Listed		Species Profile and Threat
75601	*Hydrophis macdowelli*	Small-headed Seasnake	Reptile	May	Species or species habitat				Listed (as Hydrophis		Species Profile and Threat
1118	*Aipysurus foliosquama*	Leaf-scaled Seasnake	Reptile	Known	Species or species habitat	Critically Endangered			Listed		Species Profile and Threat
1124	*Disteira major*	Olive-headed Seasnake	Reptile	May	Species or species habitat				Listed		Species Profile and Threat
1123	*Disteira kingii*	Spectacled Seasnake	Reptile	May	Species or species habitat				Listed		Species Profile and Threat
670	*Merops ornatus*	Rainbow Bee-eater	Bird	May	Species or species habitat				Listed - overfly marine		Species Profile and Threat
1127	*Ephalophis greyi*	North-western Mangrove	Reptile	May	Species or species habitat				Listed		Species Profile and Threat
1125	*Emydocephalus annulatus*	Turtle-headed Seasnake	Reptile	May	Species or species habitat				Listed		Species Profile and Threat
59309	*Actitis hypoleucos*	Common Sandpiper	Bird	Known	Species or species habitat		Migratory	Migratory Wetlands	Listed		Species Profile and Threat
83425	*Chalcites osculans*	Black-eared Cuckoo	Bird	Known	Species or species habitat				Listed - overfly marine		Species Profile and Threat
1115	*Aipysurus apraefrontalis*	Short-nosed Seasnake	Reptile	Known	Species or species habitat	Critically Endangered			Listed		Species Profile and Threat
1117	*Aipysurus eydouxii*	Spine-tailed Seasnake	Reptile	May	Species or species habitat				Listed		Species Profile and Threat
832	*Tringa nebularia*	Common Greenshank,	Bird	Likely	Species or species habitat		Migratory	Migratory Wetlands	Listed - overfly marine		Species Profile and Threat
1114	*Acalyptophis peronii*	Horned Seasnake	Reptile	May	Species or species habitat				Listed		Species Profile and Threat
59297	*Papasula abbotti*	Abbott's Booby	Bird	May	Species or species habitat	Endangered			Listed		Species Profile and Threat
82949	*Sternula nereis*	Fairy Tern	Bird	Known	Breeding known to occur				Listed (as Sterna nereis)		Species Profile and Threat
87374	*Leioselasma czeblukovi*	Fine-spined Seasnake,	Reptile	May	Species or species habitat				Listed (as Hydrophis		Species Profile and Threat
87377	*Chitulia ornata*	Spotted Seasnake, Ornate	Reptile	May	Species or species habitat				Listed (as Hydrophis		Species Profile and Threat
66234	*Hippocampus angustus*	Western Spiny Seahorse,	Fish	May	Species or species habitat				Listed		Species Profile and Threat
847	*Numenius*	Eastern Curlew, Far	Bird	Known	Species or species habitat	Critically Endangered	Migratory	Migratory Wetlands	Listed		Species Profile and Threat
66231	*Hippichthys penicillus*	Beady Pipefish, Steep-	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66546	*Thalasseus bengalensis*	Lesser Crested Tern	Bird	Known	Breeding known to occur				Listed (as Sterna		Species Profile and Threat
66237	*Hippocampus kuda*	Spotted Seahorse, Yellow	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66236	*Hippocampus histrix*	Spiny Seahorse, Thorny	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66239	*Hippocampus*	Hedgehog Seahorse	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66238	*Hippocampus planifrons*	Flat-face Seahorse	Fish	May	Species or species habitat				Listed		Species Profile and Threat
66212	*Doryrhamphus janssi*	Cleaner Pipefish, Janss'	Fish	May	Species or species habitat				Listed		Species Profile and Threat
858	*Calidris melanotos*	Pectoral Sandpiper	Bird	May	Species or species habitat		Migratory	Migratory Wetlands	Listed - overfly marine		Species Profile and Threat
82404	*Ardenna carneipes*	Flesh-footed Shearwater,	Bird	May	Species or species habitat		Migratory	Migratory Marine Birds	Listed (as Puffinus		Species Profile and Threat
856	*Calidris ferruginea*	Curlew Sandpiper	Bird	Known	Species or species habitat	Critically Endangered	Migratory	Migratory Wetlands	Listed - overfly marine		Species Profile and Threat

855	*Calidris canutus*	Red Knot, Knot	Bird	Known	Species or species habitat	Endangered	Migratory	Migratory Wetlands	Listed - overfly marine	Species Profile and Threat

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Whales and Other Cetaceans

				Presence							
Species ID	**Scientific Name**	**Common Name**	**Class**	**Rank**	**Text**	**Threatened Category**	**Migratory Status**	**Migratory Category**	**Marine Status**	**Cetacean Status**	**Website**
51	*Stenella attenuata*	Spotted Dolphin,	Mammal	May	Species or species habitat					Cetacean	Species Profile and Threat
57	*Kogia breviceps*	Pygmy Sperm Whale	Mammal	May	Species or species habitat					Cetacean	Species Profile and Threat
56	*Ziphius cavirostris*	Cuvier's Beaked Whale,	Mammal	May	Species or species habitat					Cetacean	Species Profile and Threat
52	*Stenella coeruleoalba*	Striped Dolphin,	Mammal	May	Species or species habitat					Cetacean	Species Profile and Threat
74	*Mesoplodon densirostris*	Blainville's Beaked Whale,	Mammal	May	Species or species habitat					Cetacean	Species Profile and Threat
81322	*Orcaella heinsohni*	Australian Snubfin Dolphin	Mammal	Known	Species or species habitat		Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat
59	*Physeter macrocephalus*	Sperm Whale	Mammal	May	Species or species habitat		Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat
48	*Pseudorca crassidens*	False Killer Whale	Mammal	Likely	Species or species habitat					Cetacean	Species Profile and Threat
29	*Stenella longirostris*	Long-snouted Spinner	Mammal	May	Species or species habitat					Cetacean	Species Profile and Threat
85043	*Kogia sima*	Dwarf Sperm Whale	Mammal	May	Species or species habitat					Cetacean	Species Profile and Threat
60	*Delphinus delphis*	Common Dolphin, Short-	Mammal	May	Species or species habitat					Cetacean	Species Profile and Threat
64	*Grampus griseus*	Risso's Dolphin, Grampus	Mammal	May	Species or species habitat					Cetacean	Species Profile and Threat
61	*Feresa attenuata*	Pygmy Killer Whale	Mammal	May	Species or species habitat					Cetacean	Species Profile and Threat
62	*Globicephala*	Short-finned Pilot Whale	Mammal	May	Species or species habitat					Cetacean	Species Profile and Threat
30	*Steno bredanensis*	Rough-toothed Dolphin	Mammal	May	Species or species habitat					Cetacean	Species Profile and Threat
33	*Balaenoptera*	Minke Whale	Mammal	May	Species or species habitat					Cetacean	Species Profile and Threat
36	*Balaenoptera musculus*	Blue Whale	Mammal	Known	Migration route known to	Endangered	Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat
37	*Balaenoptera physalus*	Fin Whale	Mammal	Likely	Species or species habitat	Vulnerable	Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat
34	*Balaenoptera borealis*	Sei Whale	Mammal	Likely	Species or species habitat	Vulnerable	Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat
35	*Balaenoptera edeni*	Bryde's Whale	Mammal	Likely	Species or species habitat		Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat
68417	*Tursiops truncatus s. str.*	Bottlenose Dolphin	Mammal	May	Species or species habitat					Cetacean	Species Profile and Threat
46	*Orcinus orca*	Killer Whale, Orca	Mammal	May	Species or species habitat		Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat
47	*Peponocephala electra*	Melon-headed Whale	Mammal	May	Species or species habitat					Cetacean	Species Profile and Threat
40	*Eubalaena australis*	Southern Right Whale	Mammal	Likely	Species or species habitat	Endangered	Migratory (as Balaena	Migratory Marine Species		Cetacean	Species Profile and Threat
68418	*Tursiops aduncus*	Indian Ocean Bottlenose	Mammal	Likely	Species or species habitat					Cetacean	Species Profile and Threat
87942	*Sousa sahulensis*	Australian Humpback	Mammal	Known	Species or species habitat		Migratory (as Sousa	Migratory Marine Species		Cetacean	Species Profile and Threat
38	*Megaptera novaeangliae*	Humpback Whale	Mammal	Known	Breeding known to occur		Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat
78900	*Tursiops aduncus*	Spotted Bottlenose	Mammal	Known	Species or species habitat		Migratory	Migratory Marine Species		Cetacean	Species Profile and Threat

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Critical Habitats

Critical Habitat ID	Critical Habitat Name	Presence	Website

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Commonwealth Reserves Terrestrial

Protected Area ID	Protected Area Name	Reserve Type	State	Jurisdiction	Environment

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Australian Marine Parks

Zone ID	Park Name	Zone & IUCN Categories	Network
nwartmuz03	Argo-Rowley Terrace	Multiple Use Zone (IUCN	North-west
nwartmuz02	Argo-Rowley Terrace	Multiple Use Zone (IUCN	North-west
nwmernpz01	Mermaid Reef	National Park Zone (IUCN	North-west
nwartspt04	Argo-Rowley Terrace	Special Purpose Zone	North-west

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Habitat Critical to the Survival of Marine Turtles

Species ID	Scientific Name	Common Name	Behaviour	Presence	Season	Website
59257	Natator depressus	Flatback Turtle	Nesting	Known to occur	Aug - Sep	Species Profile and Threat
1763	Caretta caretta	Loggerhead Turtle	Nesting	Known to occur	Nov-Feb	Species Profile and Threat
1766	Eretmochelys imbricata	Hawksbill Turtle	Nesting	Known to occur	Nov - May	Species Profile and Threat
1765	Chelonia mydas	Green Turtle	Nesting	Known to occur	Dec - Jan	Species Profile and Threat

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State and Territory Reserves

Protected Area ID	Protected Area Name	Reserve Type	State	Jurisdiction	Environment
WA_33834	Serrurier Island	Nature Reserve	WA	State	Terrestrial
WA_41080	Unnamed WA41080	5(1)(h) Reserve	WA	State	Terrestrial
WA_40828	Unnamed WA40828	5(1)(h) Reserve	WA	State	Terrestrial
WA_33902	Lowendal Islands	Nature Reserve	WA	State	Terrestrial
WA_53770	Cape Range (South)	National Park	WA	State	Terrestrial
WA_38728	Boodie, Double Middle	Nature Reserve	WA	State	Terrestrial
WA_40323	Airlie Island	Nature Reserve	WA	State	Terrestrial
WA_33811	Bedout Island	Nature Reserve	WA	State	Terrestrial
WA_11648	Barrow Island	Nature Reserve	WA	State	Terrestrial
WA_40729	Jurabi Coastal Park	5(1)(h) Reserve	WA	State	Terrestrial
WA_44668	North Sandy Island	Nature Reserve	WA	State	Terrestrial
WA_42196	Montebello Islands	Conservation Park	WA	State	Terrestrial
WA_27288	Cape Range	National Park	WA	State	Terrestrial
WA_44665	Unnamed WA44665	5(1)(h) Reserve	WA	State	Terrestrial
WA_44666	Bessieres Island	Nature Reserve	WA	State	Terrestrial
WA_40322	Unnamed WA40322	5(1)(h) Reserve	WA	State	Terrestrial
WA_44667	Unnamed WA44667	5(1)(h) Reserve	WA	State	Terrestrial
WA_44672	Unnamed WA44672	5(1)(h) Reserve	WA	State	Terrestrial
WA_31775	Muiron Islands	Nature Reserve	WA	State	Terrestrial
035	Barrow Island	Marine Management Area	WA	State	Marine
372	Great Sandy Island	Nature Reserve	WA	State	Marine
382	Thevenard Island	Nature Reserve	WA	State	Marine
242	Montebello Islands	Marine Park	WA	State	Marine
149	Barrow Island	Marine Park	WA	State	Marine
273	Muiron Islands	Marine Management Area	WA	State	Marine
180	Rowley Shoals	Marine Park	WA	State	Marine

261	Ningaloo	Marine Park	WA	State	Marine
375	Montebello Islands	Conservation Park	WA	State	Marine

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Regional Forest Agreements

RFA Region	State	Website

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Nationally Important Wetlands

Reference Code	Wetland Name	State	Website
WA006	Cape Range Subterranean	WA	Australian Wetlands
EXT007	Mermaid Reef	EXT	Australian Wetlands

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EPBC Act Referrals

Reference Number	Title of referral	Jurisdiction	Industry Type	Stage	Stage Description	Referral Outcome	Website
2011/5942	Gorgon Gas Development	WA	Mining	Post-Approval	Approval Decision Made	Controlled Action	EPBC Referral List
2018/8319	Browse to North West	CM	Mining	Approval	S132 - Awaiting		EPBC Referral List
2005/2141	Greater Gorgon	WA	Telecommunications	Completed	Withdrawn	Controlled Action	EPBC Referral List
2003/1294	Gorgon Gas Development	WA	Energy Generation and	Post-Approval	Approval Decision Made	Controlled Action	EPBC Referral Detail
2015/7423	Thevenard Island	WA	Energy Generation and	Completed	Referral Decision Made	Not Controlled Action	EPBC Referral List
2012/6463	Westralia SPAN Marine	CM	Exploration (mineral, oil	Post-Approval	Referral Decision Made	Not Controlled Action	EPBC Referral List
2006/3141	West Panaeus 3D seismic	CM	Exploration (mineral, oil	Post-Approval	Referral Decision Made	Not Controlled Action	EPBC Referral List
2004/1926	HCA05X Macedon	CM	Exploration (mineral, oil	Completed	Referral Decision Made	Not Controlled Action	EPBC Referral List
2001/227	Simpson Oil Field	WA	Mining	Post-Approval	Approval Decision Made	Controlled Action	EPBC Referral List
2001/263	Spool Base Facility	WA	Manufacturing	Completed	Referral Decision Made	Not Controlled Action	EPBC Referral List
2014/7250	Airlie Island soil and	WA	Science and Research	Completed	Referral Decision Made	Not Controlled Action	EPBC Referral List
2021/8967	Yardie Creek Road	WA	Transport - Land	Assessment Approach	Assessment Method	Controlled Action	EPBC Referral List
2007/3260	Deep Water Northwest	WA	Exploration (mineral, oil	Post-Approval	Referral Decision Made	Not Controlled Action	EPBC Referral List
2005/2037	'Kate' 3D marine seismic	CM	Exploration (mineral, oil	Post-Approval	Referral Decision Made	Not Controlled Action	EPBC Referral List
2008/4469	Construct and operate	WA	Energy Generation and	Post-Approval	Approval Decision Made	Controlled Action	EPBC Referral List
2015/7522	Improving rabbit	NSW	Natural Resources	Completed	Referral Decision Made	Not Controlled Action	EPBC Referral List
2005/2151	2D and 3D seismic surveys	WA	Exploration (mineral, oil	Post-Approval	Referral Decision Made	Not Controlled Action	EPBC Referral List
2005/2017	Ocean Bottom Cable	WA	Exploration (mineral, oil	Post-Approval	Referral Decision Made	Not Controlled Action	EPBC Referral List
2008/4111	Development of Browse	CM	Energy Generation and	Completed	Withdrawn	Controlled Action	EPBC Referral List
2012/6618	Outer Canning exploration	CM	Exploration (mineral, oil	Post-Approval	Referral Decision Made	Not Controlled Action	EPBC Referral List
2011/6175	3D Marine Seismic Survey	WA	Exploration (mineral, oil	Completed	Withdrawn	Referral Decision	EPBC Referral List
2012/6680	Highlands 3D Marine	CM	Exploration (mineral, oil	Completed	Withdrawn	Action Clearly	EPBC Referral List
2010/5393	Offshore Canning Multi	WA	Exploration (mineral, oil	Post-Approval	Referral Decision Made	Not Controlled Action	EPBC Referral List

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Key Ecological Features

Name	Region	Website
Mermaid Reef and	North-west	Key Ecological Feature

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Biologically Important Areas

Species ID	Scientific Name	Common Name	Species Group	Behaviour	Presence	Website
28	Dugong dugon	Dugong	Dugong	Breeding	Known to occur	Species Profile and Threat
28	Dugong dugon	Dugong	Dugong	Calving	Known to occur	Species Profile and Threat
28	Dugong dugon	Dugong	Dugong	Foraging (high density	Known to occur	Species Profile and Threat
28	Dugong dugon	Dugong	Dugong	Nursing	Known to occur	Species Profile and Threat
1763	Caretta caretta	Loggerhead Turtle	Marine Turtles	Internesting buffer	Known to occur	Species Profile and Threat
1763	Caretta caretta	Loggerhead Turtle	Marine Turtles	Nesting	Known to occur	Species Profile and Threat
1765	Chelonia mydas	Green Turtle	Marine Turtles	Basking	Known to occur	Species Profile and Threat
1765	Chelonia mydas	Green Turtle	Marine Turtles	Foraging	Known to occur	Species Profile and Threat
1765	Chelonia mydas	Green Turtle	Marine Turtles	Internesting	Known to occur	Species Profile and Threat
1765	Chelonia mydas	Green Turtle	Marine Turtles	Internesting buffer	Known to occur	Species Profile and Threat
1765	Chelonia mydas	Green Turtle	Marine Turtles	Mating	Known to occur	Species Profile and Threat
1765	Chelonia mydas	Green Turtle	Marine Turtles	Nesting	Known to occur	Species Profile and Threat
1766	Eretmochelys imbricata	Hawksbill Turtle	Marine Turtles	Foraging	Known to occur	Species Profile and Threat
1766	Eretmochelys imbricata	Hawksbill Turtle	Marine Turtles	Internesting	Known to occur	Species Profile and Threat
1766	Eretmochelys imbricata	Hawksbill Turtle	Marine Turtles	Internesting buffer	Known to occur	Species Profile and Threat
1766	Eretmochelys imbricata	Hawksbill Turtle	Marine Turtles	Mating	Known to occur	Species Profile and Threat
1766	Eretmochelys imbricata	Hawksbill Turtle	Marine Turtles	Nesting	Known to occur	Species Profile and Threat
59257	Natator depressus	Flatback Turtle	Marine Turtles	Foraging	Known to occur	Species Profile and Threat
59257	Natator depressus	Flatback Turtle	Marine Turtles	Internesting buffer	Known to occur	Species Profile and Threat
59257	Natator depressus	Flatback Turtle	Marine Turtles	Mating	Known to occur	Species Profile and Threat
59257	Natator depressus	Flatback Turtle	Marine Turtles	Nesting	Known to occur	Species Profile and Threat
84292	Ardenna pacifica	Wedge-tailed Shearwater	Seabirds	Breeding	Known to occur	Species Profile and Threat
1012	Fregata ariel	Lesser Frigatebird	Seabirds	Breeding	Known to occur	Species Profile and Threat
1014	Phaethon lepturus	White-tailed Tropicbird	Seabirds	Breeding	Known to occur	Species Profile and Threat
817	Sterna dougallii	Roseate Tern	Seabirds	Breeding	Known to occur	Species Profile and Threat
82850	Sternula albifrons sinensis	Little Tern	Seabirds	Resting	Known to occur	Species Profile and Threat
82949	Sternula nereis	Fairy Tern	Seabirds	Breeding	Known to occur	Species Profile and Threat

1022	Sula leucogaster	Brown Booby	Seabirds	Breeding	Known to occur	Species Profile and Threat
66546	Thalasseus bengalensis	Lesser Crested Tern	Seabirds	Breeding	Known to occur	Species Profile and Threat
81317	Balaenoptera musculus	Pygmy Blue Whale	Whales	Distribution	Known to occur	Species Profile and Threat
81317	Balaenoptera musculus	Pygmy Blue Whale	Whales	Migration	Known to occur	Species Profile and Threat
38	Megaptera novaeangliae	Humpback Whale	Whales	Migration (north and	Known to occur	Species Profile and Threat

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Bioregional Assessments

SubRegion	BioRegion	Website

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Geological and Bioregional Assessments

Name	State	Website

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Report Metadata

Request Type	pmst2_exp
Request Category	jasper studio
Request Parameters	json
Request time	2:55PM
Request date	08 June 2023

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Caveat

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation (EPBC) Act 1999. The report provides the mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species, listed threatened ecological communities and other information could be useful as an indicator of potential habitat value. The mapped locations have been collated from a range of data sources at various resolutions as acknowledged at the end of this report.

Not all species listed under the EPBC Act have been mapped (see below) and therefore this report is a general guide only. Where data is available to support mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information to inform a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery, thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps, thematic spatial data and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived 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 point locations and environmental data layers.

Where very little information is available for species or a large number of maps are required in a short time-frame, maps are derived or supplemented either with 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

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered vagrants
- some recently listed species and ecological communities – as there may be a delay of several days in the mapping being made available for reporting after a listing event
- some terrestrial species that overfly the Commonwealth marine area
- some listed migratory and listed marine species, which are not listed as threatened species
- migratory species that are very widespread, vagrant, or only occur 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, may only have been mapped for recorded breeding sites
- seals which may 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.

Nationally Important Wetlands are not a Matter of National Environmental Significance and do not have protection under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). They may however provide habitat and support other listed species that are protected under the EPBC Act.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

APPENDIX C-3: DEPARTMENT OF PLANNING, LAND, HERITAGE AND ABORIGINAL ENQUIRY SYSTEM RESULTS

Aboriginal Heritage Inquiry System

List of Registered Aboriginal Sites

Search Criteria

No Registered Aboriginal Sites in Shapefile - 20230419_LambertWestAngelOpsRevision_OA/Lambert West Angel Ops Revision

Disclaimer

The *Aboriginal Heritage Act 1972* preserves all Aboriginal sites in Western Australia whether or not they are registered. Aboriginal sites exist that are not recorded on the Register of Aboriginal Sites, and some registered sites may no longer exist.

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 email the details to the Department at AboriginalHeritage@dplh.wa.gov.au and we will make every effort to rectify it as soon as possible.

Copyright

Coordinate Accuracy

Coordinates (Easting/Northing metres) are based on the GDA 94 Datum. Accuracy is shown as a code in brackets following the coordinates.

Aboriginal Heritage Inquiry System

List of Other Heritage Places

Search Criteria

No Other Heritage Places in Shapefile - 20230419_LambertWestAngelOpsRevision_OA/Lambert West Angel Ops Revision

Disclaimer

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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 email the details to the Department at AboriginalHeritage@dplh.wa.gov.au and we will make every effort to rectify it as soon as possible.

Copyright

Coordinate Accuracy

Coordinates (Easting/Northing metres) are based on the GDA 94 Datum. Accuracy is shown as a code in brackets following the coordinates.

Aboriginal Heritage Inquiry System

List of Registered Aboriginal Sites

Search Criteria

2 Registered Aboriginal Sites in Shapefile - LW_Consultation_EMBA. Warning: Search area complex so results may be inaccurate. Contact DPLH for assistance.

Disclaimer

The Aboriginal Heritage Act 1972 preserves all Aboriginal sites in Western Australia whether or not they are registered. Aboriginal sites exist that are not recorded on the Register of Aboriginal Sites, and some registered sites may no longer exist.

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 email the details to the Department at AboriginalHeritage@dplh.wa.gov.au and we will make every effort to rectify it as soon as possible.

Copyright

Coordinate Accuracy

Coordinates (Easting/Northing metres) are based on the GDA 94 Datum. Accuracy is shown as a code in brackets following the coordinates.

Terminology (NB that some terminology has varied over the life of the legislation)

Place ID/Site ID: This a unique ID assigned by the Department of Planning, Lands and Heritage to the place.
Status:

- Registered Site: The place has been assessed as meeting Section 5 of the Aboriginal Heritage Act 1972.
- Other Heritage Place which includes:
  - Stored Data / Not a Site: The place has been assessed as not meeting Section 5 of the Aboriginal Heritage Act 1972.
  - Lodged: Information has been received in relation to the place, but an assessment has not been completed at this stage to determine if it meets Section 5 of the Aboriginal Heritage Act 1972.

Access and Restrictions:

- File Restricted = No: Availability of information that the Department of Planning, Lands and Heritage holds in relation to the place is not restricted in any way.
- File Restricted = Yes: Some of the information that the Department of Planning, Lands and Heritage holds in relation to the place is restricted if it is considered culturally sensitive. This information will only be made available if the Department of Planning, Lands and Heritage receives written approval from the informants who provided the information. To request access please contact AboriginalHeritage@dplh.wa.gov.au.
- Boundary Restricted = No: Place location is shown as accurately as the information lodged with the Registrar allows.
- 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 4km^2) provides a general indication of where the place 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.
- Restrictions:
  - No Restrictions: Anyone can view the information.
  - Male Access Only: Only males can view restricted information.
  - Female Access Only: Only females can view restricted information.

Legacy ID: This is the former unique number that the former Department of Aboriginal Sites assigned to the place. This has been replaced by the Place ID / Site ID.

Aboriginal Heritage Inquiry System

List of Registered Aboriginal Sites

ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
873	MONTEBELLO IS: NOALA CAVE.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Rockshelter, BP Dating: 27,220 +/- 640	*Registered Knowledge Holder names available from DPLH	348188mE 7741053mN Zone 50 [Reliable]	P07287
926	MONTEBELLO IS: HAYNES CAVE.	No	No	No Gender Restrictions	Registered Site	Artefacts / Scatter, Midden / Scatter, Rockshelter, Arch Deposit	*Registered Knowledge Holder names available from DPLH	348289mE 7741005mN Zone 50 [Reliable]	P07286

Aboriginal Heritage Inquiry System

List of Other Heritage Places

Search Criteria

4 Other Heritage Places in Shapefile - LW_Consultation_EMBA

Disclaimer

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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 email the details to the Department at AboriginalHeritage@dplh.wa.gov.au and we will make every effort to rectify it as soon as possible.

Copyright

Coordinate Accuracy

Coordinates (Easting/Northing metres) are based on the GDA 94 Datum. Accuracy is shown as a code in brackets following the coordinates.

Terminology (NB that some terminology has varied over the life of the legislation)

Place ID/Site ID: This a unique ID assigned by the Department of Planning, Lands and Heritage to the place.
Status:

- Registered Site: The place has been assessed as meeting Section 5 of the Aboriginal Heritage Act 1972.
- Other Heritage Place which includes:
  - Stored Data / Not a Site: The place has been assessed as not meeting Section 5 of the Aboriginal Heritage Act 1972.
  - Lodged: Information has been received in relation to the place, but an assessment has not been completed at this stage to determine if it meets Section 5 of the Aboriginal Heritage Act 1972.

Access and Restrictions:

- File Restricted = No: Availability of information that the Department of Planning, Lands and Heritage holds in relation to the place is not restricted in any way.
- File Restricted = Yes: Some of the information that the Department of Planning, Lands and Heritage holds in relation to the place is restricted if it is considered culturally sensitive. This information will only be made available if the Department of Planning, Lands and Heritage receives written approval from the informants who provided the information. To request access please contact AboriginalHeritage@dplh.wa.gov.au.
- Boundary Restricted = No: Place location is shown as accurately as the information lodged with the Registrar allows.
- 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 4km^2) provides a general indication of where the place 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.
- Restrictions:
  - No Restrictions: Anyone can view the information.
  - Male Access Only: Only males can view restricted information.
  - Female Access Only: Only females can view restricted information.

Legacy ID: This is the former unique number that the former Department of Aboriginal Sites assigned to the place. This has been replaced by the Place ID / Site ID.

Aboriginal Heritage Inquiry System

List of Other Heritage Places

ID	Name	File Restricted	Boundary Restricted	Restrictions	Status	Type	Knowledge Holders	Coordinate	Legacy ID
8951	BARROW ISLAND	No	No	No Gender Restrictions	Stored Data / Not a Site	Artefacts / Scatter	*Registered Knowledge Holder names available from DPLH	335137mE 7705156mN Zone 50 [Unreliable]	P03542
11801	COASTAL MIDDEN, 5 MILE	No	No	No Gender Restrictions	Lodged	Artefacts / Scatter, Midden / Scatter	*Registered Knowledge Holder names available from DPLH	195638mE 7582655mN Zone 50 [Unreliable]	P00345
36200	John Wayne Country Rockshelter	No	No	No Gender Restrictions	Lodged	Artefacts / Scatter, Rockshelter	*Registered Knowledge Holder names available from DPLH	332623mE 7707495mN Zone 50 [Reliable]	
39191	Warnangura (Cape Range) Cultural Precinct	Yes	No	No Gender Restrictions	Lodged	Artefacts / Scatter, Ceremonial, Engraving, Midden / Scatter, Mythological, Rockshelter, Named Place, Water Source	*Registered Knowledge Holder names available from DPLH	804815mE 7536655mN Zone 49 [Reliable]	

APPENDIX D: OIL SPILL PREPAREDNESS AND RESPONSE STRATEGY SELECTION AND EVALUATION

Oil Spill Preparedness and Response Mitigation Assessment for the Angel Operations Environmental Plan

Corporate HSE

Hydrocarbon Spill Preparedness

August 2022
Revision 2a

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EXECUTIVE SUMMARY

Woodside Energy Limited (Woodside) has developed its oil spill preparedness and response position for Angel 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 Acceptable levels. 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 described in the Environment Plan (EP). This document then outlines 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 Scenario	**MEE[1]-01-02A: Unplanned subsurface release of Angel condensate from the AP3 production well representing worst-case loss of containment after a loss of well control at 19° 30' 38.50" S, 116° 36' 18.59" E** 107,779 m^3 over 68 days of Angel Condensate. 3.8% residual component of 4096 m^3	Section 2.2 and 2.2
	MEE-02-03A: Unplanned subsurface release of Lambert Deep Rich Fluid from the Tie-in location at North Rankin Complex representing worst-case loss of containment of the export line at 19° 35' 09'' S, 116° 08' 22''E. 6100 m^3 over 12 hours Lambert Deep Rich Fluid. 0.9% residual component of 54.9 m^3. MEE-01-02A and MEE-02-03B were established as the WCCS and carried forward for response planning purposes as the impacts of MEE-02-03A, MEE-04, CS-01 and CS-02 were deemed to be lesser in nature and scale.	
	MEE-02-03B: Unplanned surface release of Lambert Deep Rich Fluid from the Angel platform representing worst-case loss of containment of the export pipeline/riser at 19° 29' 54'' S, 116° 35' 52'' E. 5600 m^3 over 42 hours Lambert Deep Rich Fluid. 0.9% residual component of 50.4 m^3.	
	MEE-04: Hydrocarbon release of marine diesel oil (MDO) caused by vessel collision – breach of installation vessel fuel tanks due to collision with third party vessel, including commercial shipping/ fisheries. Instantaneous release of 105 m^3 MDO 5% residual component of 5.25 m^3.	
	Credible Scenario-01 (CS-01): Hydrocarbon release of Lambert Deep Condensate from the LDA02 production well caused by loss of well control at 19° 16' 12" S, 116° 28' 59" E. 31,185 m^3 over 77 days Lambert Deep Condensate 9.9% residual of 3087 m^3	
	Credible Scenario-02 (CS-02): Hydrocarbon release due to vessel collision (instantaneous release) at 19° 16' 12" S **116° 28' 59" E**	

[1] Major Environmental Event

	Instantaneous release of 1000m^3 MDO 5% residual component of 50 m^3	
Hydrocarbon Properties	**Angel Condensate** Angel condensate is a mixture of volatile and persistent hydrocarbons with high proportions of volatile and semi-volatile components. In favourable evaporation conditions, about 67.0% of the oil mass should evaporate within the first 12 hours (BP < 180 °C); a further 23.8% should evaporate within the first 24 hours (180 °C < BP < 265 °C); and a further 5.4% should evaporate over several days (265 °C < BP < 380 °C). Approximately 3.8% of the oil is shown to be persistent.	Section 2.2.3 Section 6.7 of the EP Appendix A of the First Strike Plan
	Lambert Deep Rich Fluid (Condensate) Lambert Deep Rich Fluid is a mixture of volatile and persistent hydrocarbons with high proportions of volatile and semi-volatile components. In favourable evaporation conditions, about 52.9% of the oil mass should evaporate within the first 12 hours (BP < 180 °C); a further 41.8% should evaporate within the first 24 hours (180 °C < BP < 265 °C); and a further 4.3% should evaporate over several days (265 °C < BP < 380 °C). Approximately 0.9% of the oil is shown to be persistent.	
	Lambert Deep Condensate Lambert Deep Condensate is a mixture of volatile and persistent hydrocarbons with high proportions of volatile and semi-volatile components. In favourable evaporation conditions, about 41.8% of the oil mass should evaporate within the first 12 hours (BP < 180 °C); up to a further 24.6% could evaporate within the first 24 hours (180 °C < BP < 265 °C); and a further 23.8% should evaporate over several days (265 °C < BP < 380 °C). Approximately 9.9% of the oil is shown to be persistent.	
	MDO MDO is a mixture of volatile and persistent hydrocarbons with low proportions of highly volatile and residual components. In general, about 6% of the oil mass should evaporate within the first 12 hours (BP < 180 °C); a further 35% should evaporate within the first 24 hours (180 °C < BP < 265 °C); and a further 54% should evaporate over several days (265 °C < BP < 380 °C). Approximately 5% of the oil is shown to be persistent. The aromatic content of the oil is approximately 3%.	
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 condensate scenarios and 200 replicate simulations were completed for the MDO 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.	**Section** Error! Reference source not found.

Deterministic modelling

Deterministic modelling was then undertaken for scenarios MEE-01-02A (CS-2A), MEE-02-03A (CS-3A), MEE-02-03B (CS-3B) and Credible Scenario-01 (CS-01) as the worst-case credible scenarios (WCCS) to establish the following for response planning purposes:

- Minimum time to floating hydrocarbon contact with the offshore edge(s) of any shoreline receptor polygon (at a concentration of 10 g/m^2)
- 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)
- Minimum time to entrained/ dissolved hydrocarbon contact with the offshore edges of any receptor polygon (at a threshold of 100 ppb)

Deterministic modelling was not undertaken for MEE-04 or Credible Scenario-02b (CS-02b) but the stochastic results have been included here to ensure complete response planning. Results as follows:

	MEE-01-02A: Hydrocarbon release from 107,779 m^3 of Angel condensate over 68 days	MEE-02-03A: Hydrocarbon release from 6,100 m^3 of Lambert Rich Deep Fluid over 12 hours	MEE-02-03B: Hydrocarbon release 5,600 m^3 of Lambert Rich Deep Fluid over 42 hours	MEE-04: Hydrocarbon release caused by vessel collision (instantaneous release of 105 m^3 MDO)	CS-01: Hydrocarbon release of 31,185 m^3 of Lambert Deep Condensate from the Lambert West well over 77 days	CS-02b: Hydrocarbon release caused by vessel collision (instantaneous release of 1000 m^3 MDO)
Minimum time to floating hydrocarbon contact with the offshore edge(s) of any shoreline receptor polygon (at a	Model 23, Q1 64.2 days at Muiron Islands	*No contact at threshold*	*No contact at threshold*	*No contact at threshold*	*No contact at threshold*	*No contact at threshold*

	concentration of 10 g/m^2)							
	Minimum time to shoreline contact (above 100 g/m^2)	Model 1, Q3 23.4 days at Southern Pilbara Islands (3 m^3)	*No contact at threshold*	*No contact at threshold*	*No contact at threshold*	*No contact at threshold*	*No contact at threshold*	
	Largest volume ashore at any single Response Protection Area (RPA) (above 100 g/m^2)	Model 10, Q2 57 m^3 at Montebello Islands and Marine Park (45.8 days)	*No contact at threshold*	*No contact at threshold*	*No contact at threshold*	*No contact at threshold*	*No contact at threshold*	
	Largest total shoreline accumulation (above 100 g/m^2) all shorelines	Model 23, Q1 46 m^3 at Muiron Islands and MMA (64 days)	*No contact at threshold*	*No contact at threshold*	*No contact at threshold*	*No contact at threshold*	*No contact at threshold*	
	Minimum time to entrained/ dissolved hydrocarbon contact with the offshore edges of any receptor polygon (at a threshold of 100 ppb)	Glomar Shoals – 92 hours	Rankin Bank – 71 hours	Glomar Shoals – 46 hours	Rankin Bank (timing unavailable)	Rankin Bank – 255 hours	Rankin Bank – 125 hours	

Net Environmental Benefit Analysis	Operational monitoring, source control via relief well drilling, source control via capping stack[2], source control (vessel), source control blowout preventer (BOP) intervention, 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 Acceptable level for the risk presented in Section 2 and Section 3, without the implementation of considered additional, alternative or improved control measures.	Section 5 Section 6 Section 7

[2] *Note: Capping stack is not applicable for operating wells and in shallow water depths, however, it may be feasible for other wells in the Angel and Lambert Deep fields and will be assessed on a case-by-case basis.*

1 INTRODUCTION

1.1 Overview

Woodside Energy Ltd (Woodside) has developed its oil spill preparedness and response position for the Angel 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 2009 (Environment Regulations) relating to hydrocarbon spill response arrangements.

- The Angel Operations Environment Plan (EP)
- Oil Pollution Emergency Arrangements (OPEA) (Australia)
- The Angel Operations Oil Pollution Emergency Plan (OPEP) including:
  - First Strike Plan (FSP)
  - Relevant Operations Plans
  - Relevant Tactical Response Plans (TRPs)
  - Relevant Supporting Plans
  - Data Directory.

The purpose of this document is to demonstrate 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 Acceptable levels.

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 Acceptable levels. 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 described in the EP. This document then outlines 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 Petroleum Activity Program 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, outlining 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 operations and the operational NEBA (Section 4). Planning, coordination and resource management are initiated by the Incident

Management Team (IMT). 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 so 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.

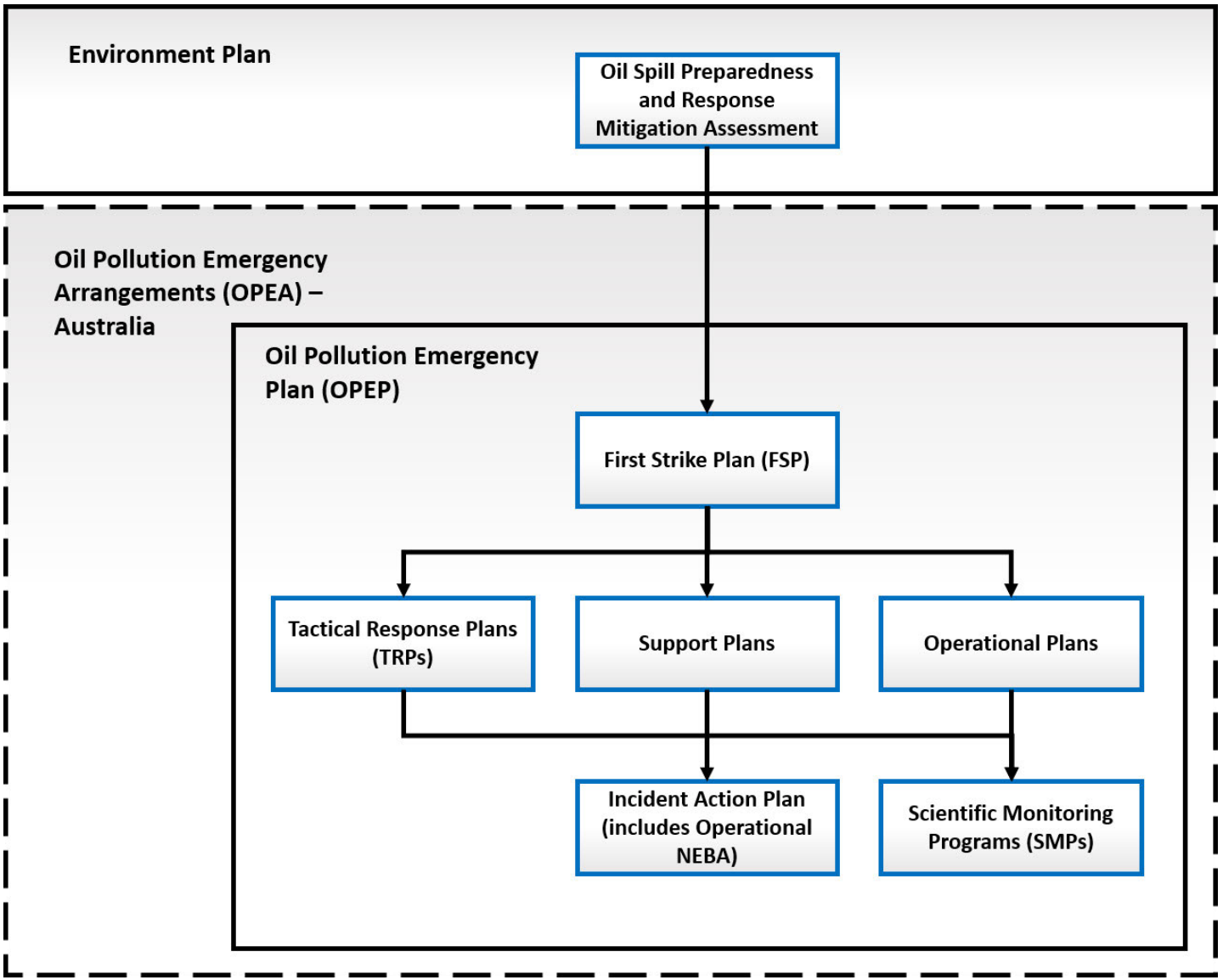

Figure 1-1: Woodside hydrocarbon spill document structure

Table 1-1: Hydrocarbon Spill preparedness and response – document references

Document	Document overview	Stakeholders	Relevant information	Document subsections (if applicable)
Angel Operations Environment Plan (EP)	Demonstrates that potential adverse impacts on the environment associated with the Angel 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.	National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) Woodside internal	EP Section 6 (Environmental Risk Assessment, Performance Outcomes, Standards and Measurement Criteria). EP Section 7 (Implementation strategy – including emergency preparedness and response). EP Section 7 (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 Angel 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.	
Angel 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)	Site-based IMT for initial response, activation and notification. CIMT for initial response, activation and notification.	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.	

Document	Document overview	Stakeholders	Relevant information	Document subsections (if applicable)
	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 Incident Management Team (IMT).	CIMT: Control function in an ongoing spill response for activity-specific response information.	Details and forms for use in immediate response. Activation process for oil spill trajectory 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 required once the resources arrive. Details on how to implement resources to undertake a response.	Operational monitoring Source Control Emergency Response Planning Guidelines Vessel shipboard oil pollution emergency plan (SOPEP) Protection and deflection Shoreline clean-up Oiled wildlife Scientific monitoring

Document	Document overview	Stakeholders	Relevant information	Document subsections (if applicable)
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 Angel 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 Accommodation & Catering Plan – Australia Transport Management Plan – Australia Waste Management Plan – Australia Health and Safety Support Plan Hydrocarbon Spill Responder Health Monitoring Guidelines People and Global Capability (Surge Labour Requirements) Support Plan (Land Based) Security Support Plan Stakeholder Engagement Support Plan Guidance for Hydrocarbon Spill Claims Management Communications Support Plan – Australia

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 outlines 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 Angel Operations 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.

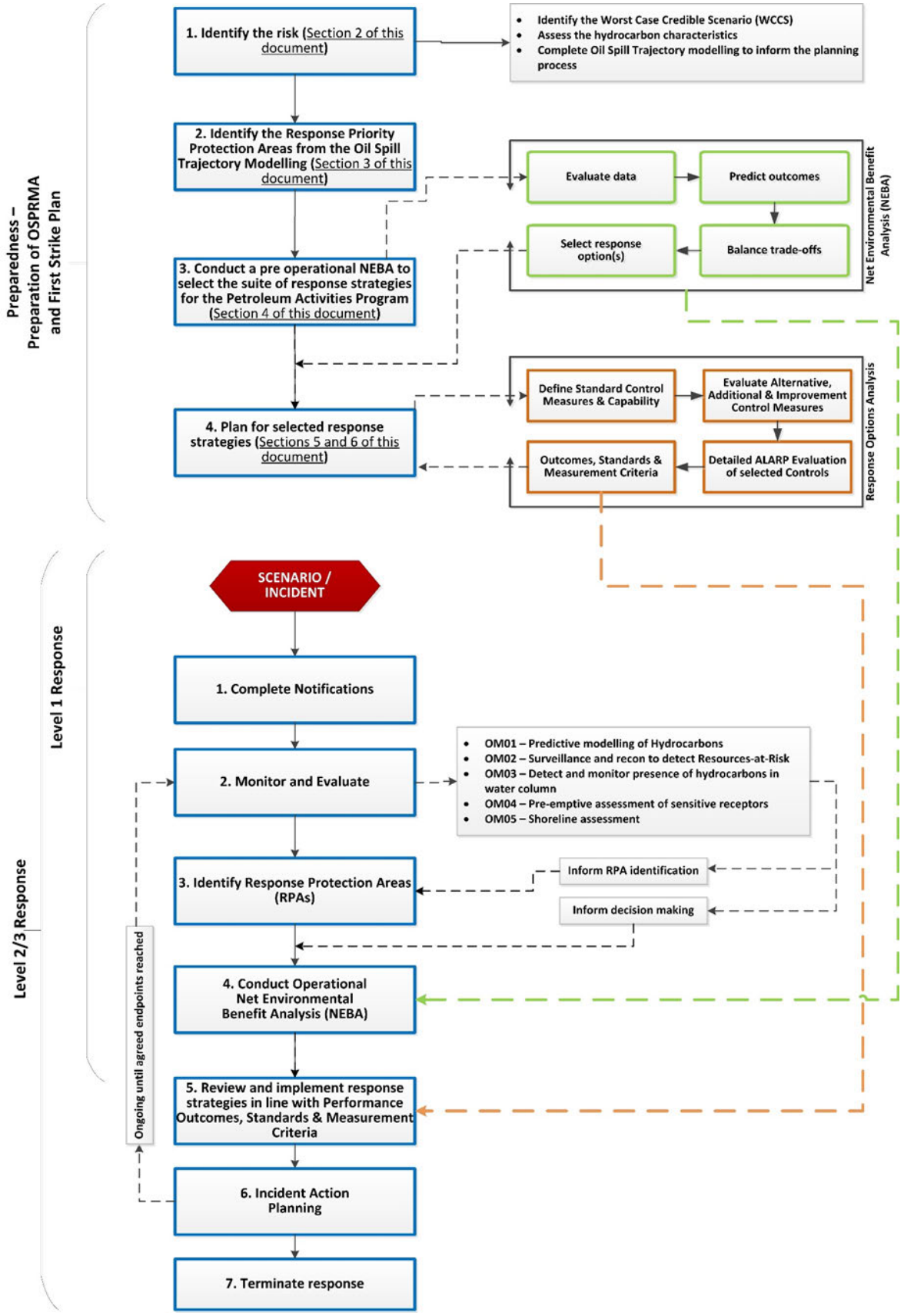

Figure 2-1: Response planning and selection process

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.

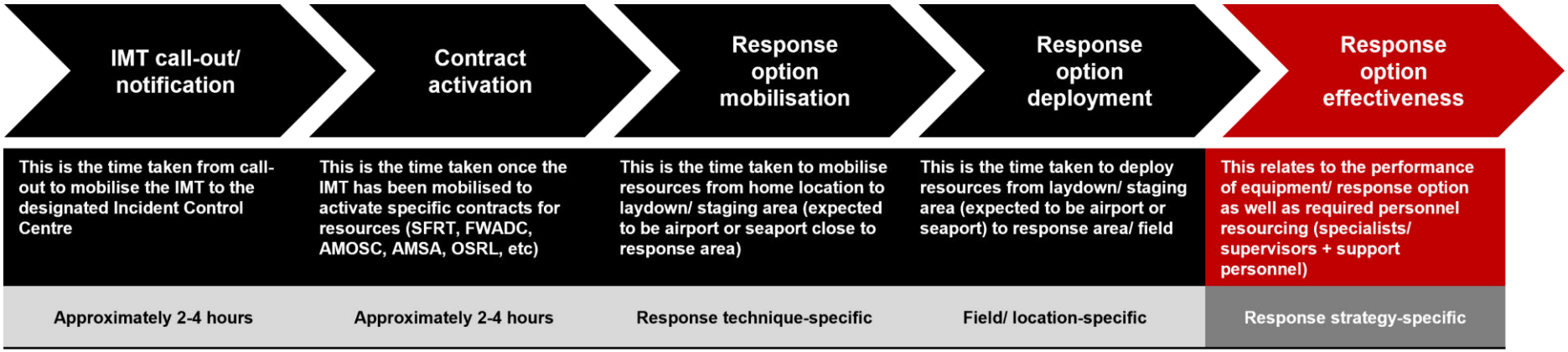

Figure 2-2: Response planning assumption – timing, resourcing and effectiveness

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 6 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. Three 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 for the activity is 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, 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.

2.2.1 Operations activities

The unplanned subsurface release of condensate from an Angel production well representing worst-case loss of containment after a loss of well control scenario (MEE-01-2A) and an unplanned surface release of Lambert Deep Rich Fluid from the Angel platform representing a worst-case loss of containment of the export pipeline/riser scenario (MEE-02-3B) have been modelled and are considered to determine the WCCSs for response planning purposes. Lambert Deep Fluid, whilst a higher ratio of aromatics and waxes, relative to aliphatics, are offset by the higher volume from Angel Condensate scenarios. Similarly, MEE-02-3A is deemed to be of lesser nature and scale.

As the loss of well control scenario did not result in surface oil at response thresholds (>50 g/m^2), the hydrocarbon release caused by loss of containment of the export pipeline/riser (MEE-02-3B) is considered the worst case when responding to floating hydrocarbons, given the large volume released over a short period of time.

2.2.2 Tie-back activities

Credible Scenarios-01 and -02 (CS-01 and CS-02) relate to the unplanned release of hydrocarbons during tie-back activities resulting from a loss of well containment from LDA02 well and from a heavy-lift vessel collision respectively.

Whilst the LDA02 well will subsequently be operated as part of ongoing Angel Operations activities, the spill scenario (CS-01) remains lesser in extent than the existing worst-case loss of well containment from AP3 production well (MEE-01-2A), and therefore the latter continues to be used for response planning purposes.

The CS-02 vessel collision scenario is lesser in extent and impact than other existing Angel Operations scenarios and, additionally, will only be relevant during the tie-back activities therefore has not been used for response planning within the Angel Operations OSPRMA and Oil Pollution First Strike Plan.

An additional Oil Pollution First Strike Plan for Lambert West Drilling activities has, however, been prepared to address feasible response options for scenarios CS-01 and CS-02 for the duration of the short-term tie-back activities (see Section 3.5 of the EP for timing).

Table 2-1: Petroleum Activities Program credible spill scenarios

Credible Spill Scenarios	Scenario selected for planning purposes	Scenario description	Maximum credible volume released (liquid m^3)	Incident level	Hydrocarbon type	Residual proportion	Residual volume (m^3)
MEE-01-02A (WCCS)	Yes	Subsea hydrocarbon release caused by AP3 well loss of containment. Uncontrolled subsea release of 107,779 m^3 of Angel condensate. 4096 m^3/day over 68 days	107,779 m^3	3	Angel Condensate	3.8%	4096 m^3 over 68 days (60 m^3 per day)
MEE-02-03A	No	MEE-02-03A: Hydrocarbon release caused by loss of subsea flowlines and infrastructure containment. Uncontrolled subsurface release of 6100 m^3 of Lambert Deep Rich Fluid over 12 hours.	6100 m^3	2	Lambert Deep Rich Fluid	0.9%	54.9 m^3
MEE-02-03B	Yes	MEE-02-03B: Hydrocarbon release caused by loss of export pipeline containment. Uncontrolled surface release of 5600 m^3 of Lambert Deep Rich Fluid over 42 hours.	5600 m^3	2	Lambert Deep Rich Fluid	0.9%	50.4 m^3

Credible Spill Scenarios	Scenario selected for planning purposes	Scenario description	Maximum credible volume released (liquid m^3)	Incident level	Hydrocarbon type	Residual proportion	Residual volume (m^3)
MEE-03	No	Hydrocarbon release caused by loss of structural integrity	As per MEE-02, MEE-04				
MEE-04	Yes	Hydrocarbon release caused by marine vessel loss of separation over a 10-minute period	105 m^3	2	MDO	5%	5.25 m^3
MEE-05	No	Hydrocarbon Release caused by a loss of control of suspended load	As per MEE-01 and MEE-03				
CS-01	No	Hydrocarbon release of Lambert Deep Condensate from the LDA02 well caused by loss of well control over 77 days	31,185 m^3	3	Lambert Deep Condensate	9.9%	3,087 m^3 (40 m^3 per day)
CS-02	No	Hydrocarbon release due to vessel collision during tie-back activities (instantaneous release).	1000 m^3	2	MDO	5%	50 m^3

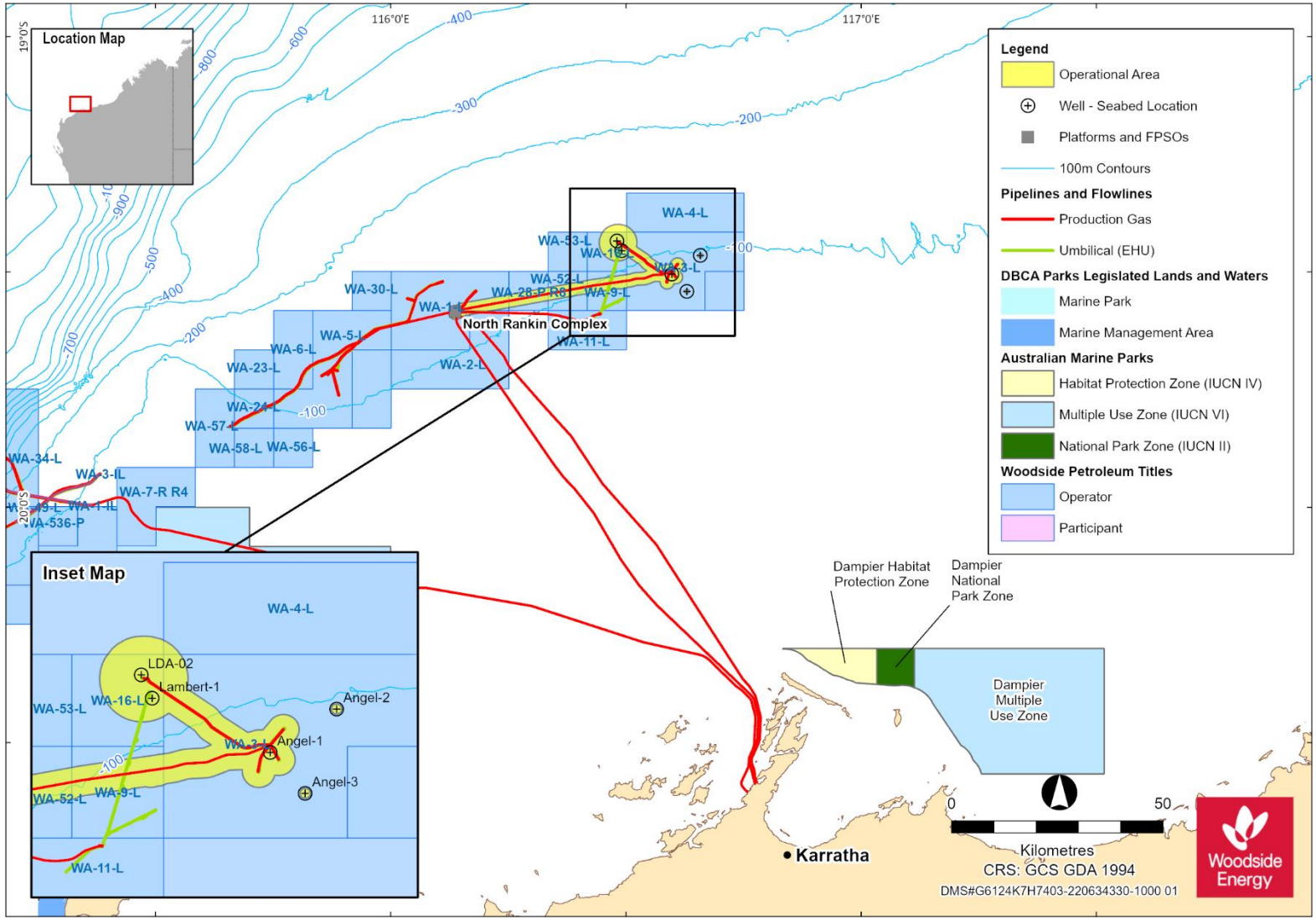

Figure 2-3: Location of the Operational Area

2.2.3 Hydrocarbon characteristics

Hydrocarbon characteristics, including modelled weathering data and ecotoxicity, are included in Section 6 of the EP.

Angel Condensate

Angel condensate is a mixture of volatile and persistent hydrocarbons with high proportions of volatile and semi-volatile components. In favourable evaporation conditions, about 67.0% of the oil mass should evaporate within the first 12 hours (BP < 180 °C); a further 23.8% should evaporate within the first 24 hours (180 °C < BP < 265 °C); and a further 5.4% should evaporate over several days (265 °C < BP < 380 °C). Approximately 3.8% of the oil is shown to be persistent.

The whole oil has a low asphaltene content (< 0.5%), indicating a low propensity for the mixture to take up water to form water-in-oil emulsion over the weathering cycle.

Soluble, aromatic, hydrocarbons contribute approximately 8.3% by mass of the whole oil. Around 5.8% by mass is highly soluble and highly volatile. A further 2.5% by mass has semi-to-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.

Lambert Deep Rich Fluid (Condensate)

Lambert Deep Rich Fluid is a mixture of volatile and persistent hydrocarbons with high proportions of volatile and semi-volatile components. In favourable evaporation conditions, about 52.9% of the oil mass should evaporate within the first 12 hours (BP < 180 °C); a further 41.8% should evaporate within the first 24 hours (180 °C < BP < 265 °C); and a further 4.3% should evaporate over several days (265 °C < BP < 380 °C). Approximately 0.9% of the oil is shown to be persistent.

The whole oil has no asphaltenes, indicating no propensity for the mixture to take up water to form water-in-oil emulsion over the weathering cycle.

Soluble, aromatic, hydrocarbons contribute approximately 13.3% by mass of the whole oil. Around 7.1% by mass is highly soluble and highly volatile. A further 5.6% by mass has semi-to-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.

Lambert Deep Condensate

Lambert Deep Condensate is a mixture of volatile and persistent hydrocarbons with high proportions of volatile and semi-volatile components. In favourable evaporation conditions, about 41.8% of the oil mass should evaporate within the first 12 hours (BP < 180 °C); up to a further 24.6% could evaporate within the first 24 hours (180 °C < BP < 265 °C); and a further 23.8% should evaporate over several days (265 °C < BP < 380 °C). Approximately 9.9% of the oil is shown to be persistent.

The whole oil has a low asphaltene content (< 0.1%), indicating a low propensity for the mixture to take up water to form water-in-oil emulsion over the weathering cycle.

Soluble, aromatic hydrocarbons contribute approximately 26.1% by mass of the whole oil. 10.5% by mass is highly soluble and highly volatile. A further 15.6% by mass has semi-to-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.

MDO

MDO is typically classed as an International Tanker Owners 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.

MDO is a mixture of volatile and persistent hydrocarbons with low proportions of highly volatile and residual components. In general, about 6% of the oil mass should evaporate within the first 12 hours (boiling point < 180°C); a further 35% should evaporate within the first 24 hours (180°C < boiling point < 265°C); and a further 54% 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%.

The mass balance forecast for the constant-wind case for MDO shows that about 41% 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.

The increased level of entrainment in the variable-wind case results in a higher percentage of biological and photochemical degradation, where the decay of the floating slicks and oil droplets in the water column occurs at an approximate rate of 2.4% per day with an accumulated total of ~16% after seven days, in comparison to a rate of ~0.2% per day and an accumulated total of 1.3% after seven days in the constant-wind case. 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.

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 impact 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 MEE-01-2A and MEE-02-3B 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/m^2

- 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 CIMT 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) (Section 2.2). 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[3]	Code 3 – Dull metallic colours	5 to 50
50	Predicted minimum floating oil threshold for containment and recovery and surface dispersant application [4]	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/m2. However, substantial variations occur in the thickness of the oil within the slick, and most fresh crude oils spread within a few hours, so overall the average thickness is 0.1 mm (or approx. 100 g/m2) (International Tanker Owners Pollution Federation [ITOPF] 2011). Additionally, the recommended rate of application for surface dispersant is typically 1-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, 2015) 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 (10) 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, approx. 5 – 50 µm)

[3] 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.

[4] 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.

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. 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, 2014).

Figure 2-4 below 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. Wind-rows, 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 for offshore response operations (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 wind-rows).

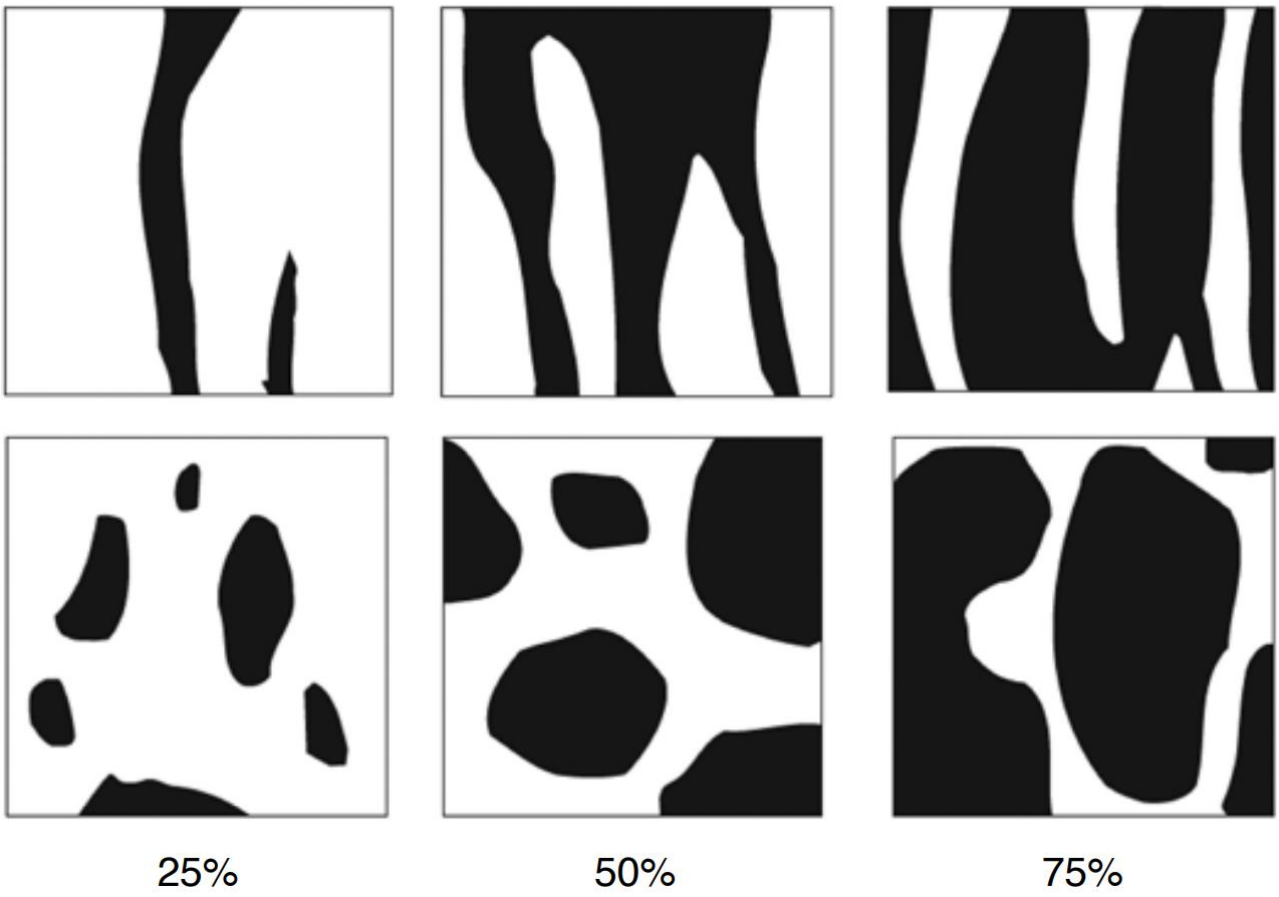

Figure 2-4: Proportion of total area coverage (AMSA, 2014)

Figure 2-5 illustrates the general relationships between on-water response techniques and slick thickness. Wind-rows, 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.

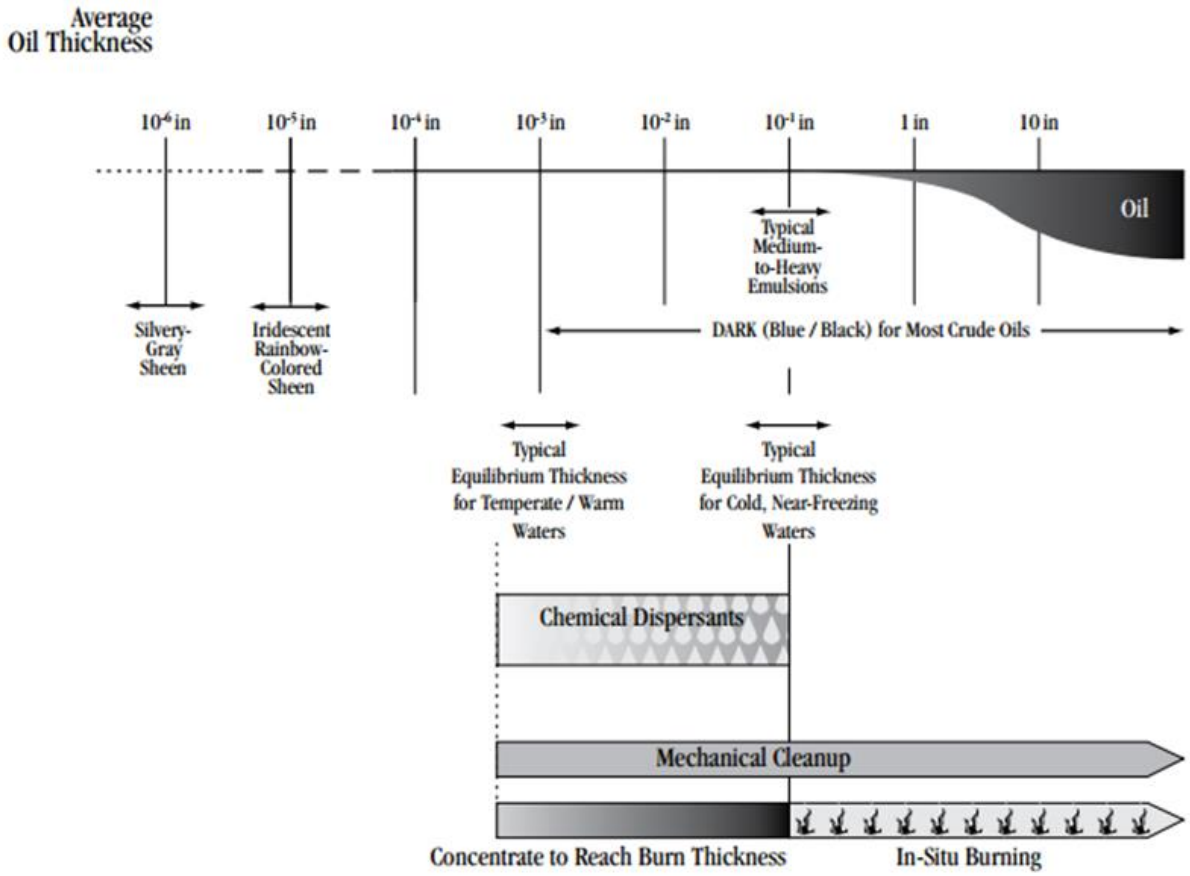

Figure 2-5: Oil thickness versus potential response options (from Allen and Dale 1996)

Wind and wave influence on the feasibility of response operations are also considered below (adapted from NOAA 2013):

- Mechanical Clean-up: Effectiveness drops significantly because of entrainment and/or splash-over as short period waves develop beyond 2–3 ft. (0.6–0.9m) in height. The ability to contain and recover oil decreases rapidly as the slick thickness becomes less than a thousandth of an inch (0.025 mm) (i.e., very low oil encounter rates). Waves and wind can also be limiting factors for the safe operation of vessels and aircraft.
- Dispersants: 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) where 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 (approx. 50 g/m^2) to hundredths of an inch (approx. 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 threshold (cSt)	Description	European Maritime Safety Authority (EMSA)	Viscosity at sea temperature (cSt)
5000*	Predicted optimum viscosity for surface dispersant operations	Generally possible to disperse	500-5000
15,000*	Predicted maximum viscosity for effective surface dispersant operations	Sometimes possible to disperse	5000-15,000

*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 15,000 mPa (15,000 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 15,000 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 – 15,000 cSt at sea temperature above pour point are sometimes possible to disperse, with products beyond 15,000 cSt at sea temperature below pour point are generally impossible to disperse.

To support decision making and response planning, a threshold of 15,000 cSt at sea temperature was chosen as a conservative estimate of maximum viscosity for surface dispersant spraying operations.

The thresholds described above are compared with the modelling results for the WCCS (Table 2-1).

2.3.4 Spill modelling results

Details of the scenario and modelling inputs are included along with deterministic results in **Error! R eference source not found.**.

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: Spill modelling results

Scenario description	Results					
	MEE-01-2A: Hydrocarbon release caused by well loss of containment	**MEE-02-3A: Hydrocarbon release caused by loss of subsea flowlines and infrastructure containment**	**MEE-02-3B: Hydrocarbon release caused by loss of export pipeline containment**	**MEE-04: Hydrocarbon release due to loss of marine vessel separation**	**CS-01: Hydrocarbon release caused by well loss of containment during tie-back activities**	**CS-02: Hydrocarbon release due to loss of marine vessel separation during tie-back activities**
WCCS – total volume released Refer to Section 2.2.3 for detailed hydrocarbon characteristics	**MEE-01-02A**: Unplanned subsurface release of Angel condensate from the AP3 production well representing worst-case loss of containment after a loss of well control. Subsurface – 107,779 m^3 over 68 days	**MEE-02-03A:** Unplanned subsurface release of Lambert Deep Rich Fluid from the Tie-in location at North Rankin Complex representing worst-case loss of containment of the export line. 6100 m^3 over 12 hours	**MEE-02-03B:** Unplanned surface release of Lambert Deep Rich Fluid from the Angel platform representing worst-case loss of containment of the export pipeline/riser. 5600 m^3 over 42 hours	**MEE-04:** Hydrocarbon release of MDO caused by vessel collision – breach of installation vessel fuel tanks due to collision with third party vessel, including commercial shipping/ fisheries. Instantaneous release of 105 m^3 of MDO	**CS-01:** Unplanned subsurface release of Lambert Deep condensate from the Lambert West well representing worst-case loss of containment after a loss of well control. Surface – 2187 m^3 over 5 days Subsurface – 28,998 m^3 over 72 days	**CS-02:** Hydrocarbon release of MDO caused by vessel collision – breach of installation vessel fuel tanks due to collision with third party vessel, including commercial shipping/ fisheries. Instantaneous release of 1000 m^3 of MDO
WCCS – residual volume remaining post-weathering	3.8% residue of 4096 m^3	0.9% residue or 54.9 m^3	0.9% residue or 50.4 m^3	5% residual component of 5.25 m^3	9.9% residual component of 3087 m^3	5% residual component of 50 m^3
Location	19° 30' 38.50" S, 116° 36' 18.59" E	19° 35' 09" S, 116° 08' 22"E	19° 29' 54" S, 116° 35' 52" E	116° 26' 48" E, 19° 35' 21" S	19° 16' 12" S 116° 28' 59" E	19° 16' 12" S 116° 28' 59" E
Deterministic modelling results						
Maximum cumulative area for contact by floating	*No contact at threshold*	Model 13, Q1	Model 6, Q4	*No contact at threshold*	*No contact at threshold*	*No contact at threshold*

oil (at concentrations in excess of 50 g/m^2)		11.7 km^2 (open ocean)	17.6 km^2 (open ocean)			
Minimum time to floating hydrocarbon contact with the offshore edge(s) of any shoreline receptor polygon (at a concentration of 10 g/m^2)	Model 23, Q1 64.2 days at Muiron Islands	*No contact at threshold*	*No contact at threshold*	*No contact at threshold*	*No contact at threshold*	*No contact at threshold*
Minimum time to commencement of hydrocarbon accumulation at any shoreline receptor (at a concentration of 100 g/m^2)	Model 1, Q3 23.4 days at Southern Pilbara Islands (3 m^3)	*No contact at threshold*	*No contact at threshold*	*No contact at threshold*	*No contact at threshold*	*No contact at threshold*
Maximum cumulative hydrocarbon volume accumulated at any individual shoreline receptor (at a concentration of 100 g/m^2)	Model 10, Q2 57 m^3 at Montebello Islands and Marine Park (45.8 days)	*No contact at threshold*	*No contact at threshold*	*No contact at threshold*	*No contact at threshold*	*No contact at threshold*
Maximum cumulative hydrocarbon volume accumulated across all shoreline receptors contacted by	Model 23, Q1 46 m^3 at Muiron Islands and MMA (64 days)	*No contact at threshold*	*No contact at threshold*	*No contact at threshold*	*No contact at threshold*	*No contact at threshold*

accumulated hydrocarbons (at a concentration 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)	Glomar Shoals – 92 hours	Rankin Bank – 71 hours	Glomar Shoals – 46 hours	Rankin Bank (timing unavailable)	Rankin Bank – 255 hours	Rankin Bank – 125 hours
The full list of response protection areas (RPAs) predicted from modelling is available in Table 3-1						

As shown in Table 2-6, modelling predicts that surface hydrocarbons at response threshold (>50 g/m^2) will be present in open water within 6 km of the MEE-02-03A subsea flowline release and within 8 km of the MEE-02-03B surface flowline release. MEE-01-02 Loss of Well Containment (LOWC), CS-01 LOWC and CS-02 MDO vessel spill do not result in surface oil at response threshold (>50 g/m^2). MEE-02-03B has the greater surface area of 17.6 km^2, which is predicted to be present at response thresholds for the first 12 hours after a spill event.

Due to the volatile nature of Angel Condensate (3.8% residue), Lambert Deep Rich Fluid (0.9% residue) and MDO (5% residue), surface dispersant is not deemed an appropriate response technique. Corralling of such hydrocarbons during containment and recovery also poses a significant safety risk due to low flash points therefore these response techniques are not feasible.

Additional safety considerations that may prevent an offshore response include high winds (>20 knots), waves and/or sea states (>1.5m waves) and high ambient temperatures.

As shown in analysis of the deterministic results, modelling predicts the following:

2.3.4.1 Hydrocarbon release caused by loss of well containment (MEE-01-2A)

- Fastest shoreline contact at 100 g/m^2 is at the Southern Pilbara Islands (23.4 days).
- Glomar Shoals is predicted to receive fastest entrained oil concentrations at the 100 ppb threshold after 3.8 days
- 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.

2.3.4.2 Hydrocarbon release caused by loss of export pipeline containment (MEE-02-3B)

- No shoreline receptors are predicted to be contacted by oil at response thresholds (>100 g/m^2). Shoreline contact at 10 g/m^2 is limited to Pilbara Islands – Southern Island Group (15 days).
- Glomar Shoals is predicted to receive fastest entrained oil concentrations at the 100 ppb threshold after 1.9 days.
- Spreading and weathering of the surface oil occurs rapidly due to the loss of light, volatile components and the spreading will reduce the effectiveness and available surface area for containment and recovery and surface dispersant operations as shown in the figures below.
- 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.

From the above results and discussion, the following modelling runs have been selected as the basis of response planning:

- deterministic model run 1 (Q3) has been selected for MEE-01-02A as the run with the fastest shoreline contact at response threshold (>100 g/m^2)
- deterministic model run 23 (Q1) has been selected for MEE-01-02A as the run with the broadest spread of shoreline contact at response threshold (>100 g/m^2)
- deterministic model run 6 (Q4) has been selected for MEE-02-03B as the run with the broadest spread of floating hydrocarbons at response threshold (>50 g/m^2)
- stochastic modelling has been used for MEE-04.

3 IDENTIFY RESPONSE PROTECTION AREAS (RPAs)

In a response, operational monitoring programs – 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.

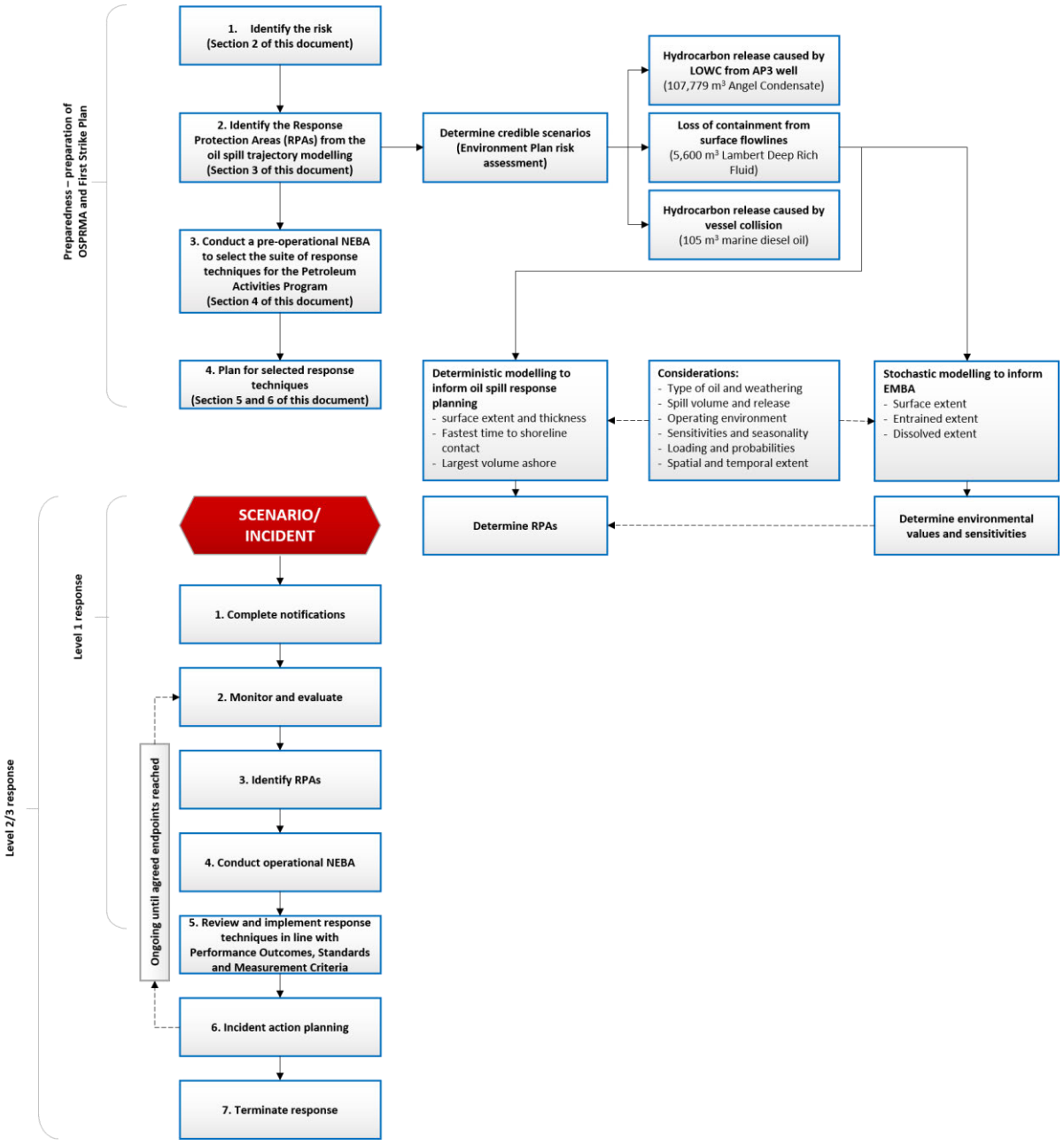

Figure 3-1: Identify Response Protection Areas (RPAs) flowchart

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 the following:

- a number of 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)

RPAs are 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 2.3.4). It is important to note that 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 4 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 Response Protection Areas (RPAs) potentially contacted from stochastic modelling (as per EMBA definition) (see Section 4 of the EP). Other PPA 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 of the EP) for each respective spill scenario. The pre-operational NEBA (Section 4) considers the results from the stochastic modelling to ensure all feasible response techniques are considered 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 [5]	Maximum shoreline accumulation (above 100 g/m^2) in m^3 [6]	Minimum time to shoreline contact (above 100 g/m^2) in days [7]	Maximum shoreline accumulation (above 100 g/m^2) in m^3 [8]	Minimum time to shoreline contact (above 100 g/m^2) in days [9] –	Maximum shoreline accumulation (above 100 g/m^2) in m^3 [10]
			MEE-01-02A		MEE-02-03B		MEE-04	
Muiron Islands/ Muiron Islands MMA	Marine Management Area	IUCN VI – Protected area with sustainable use of natural resources IUCN IA – Strict Nature Reserve	Day 25.6 (8 m^3) Run 1, Q3	46m^3 (64 days) Run 23, Q1	*No contact*	*No contact*	*No contact*	*No contact*
Southern Pilbara Islands – Peak Island	State Marine Park Australian Marine Park	IUCN IV – Recreational Use Zone	Day 23.1 (3 m^3) Run 1, Q3	23m^3 (62.9 days) Run 23, Q1	*No contact*	*No contact*	*No contact*	*No contact*
Sunday Island	Marine Management Area		Day 75.4 (3 m3) Run 23, Q1	3m^3 (75.4 days) Run 23, Q1	*No contact*	*No contact*	*No contact*	*No contact*

[5] This volume and time represent the first time to contact on defined shoreline polygon and the maximum volume ashore for that 24 hour period.
[6] This volume and time represent the maximum volume ashore on defined shoreline polygon for any 24 hour time period
[7] This volume and time represent the first time to contact on defined shoreline polygon and the maximum volume ashore for that 24 hour period.
[8] This volume and time represent the maximum volume ashore on defined shoreline polygon for any 24 hour time period
[9] This volume and time represent the first time to contact on defined shoreline polygon and the maximum volume ashore for that 24 hour period.
[10] 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.

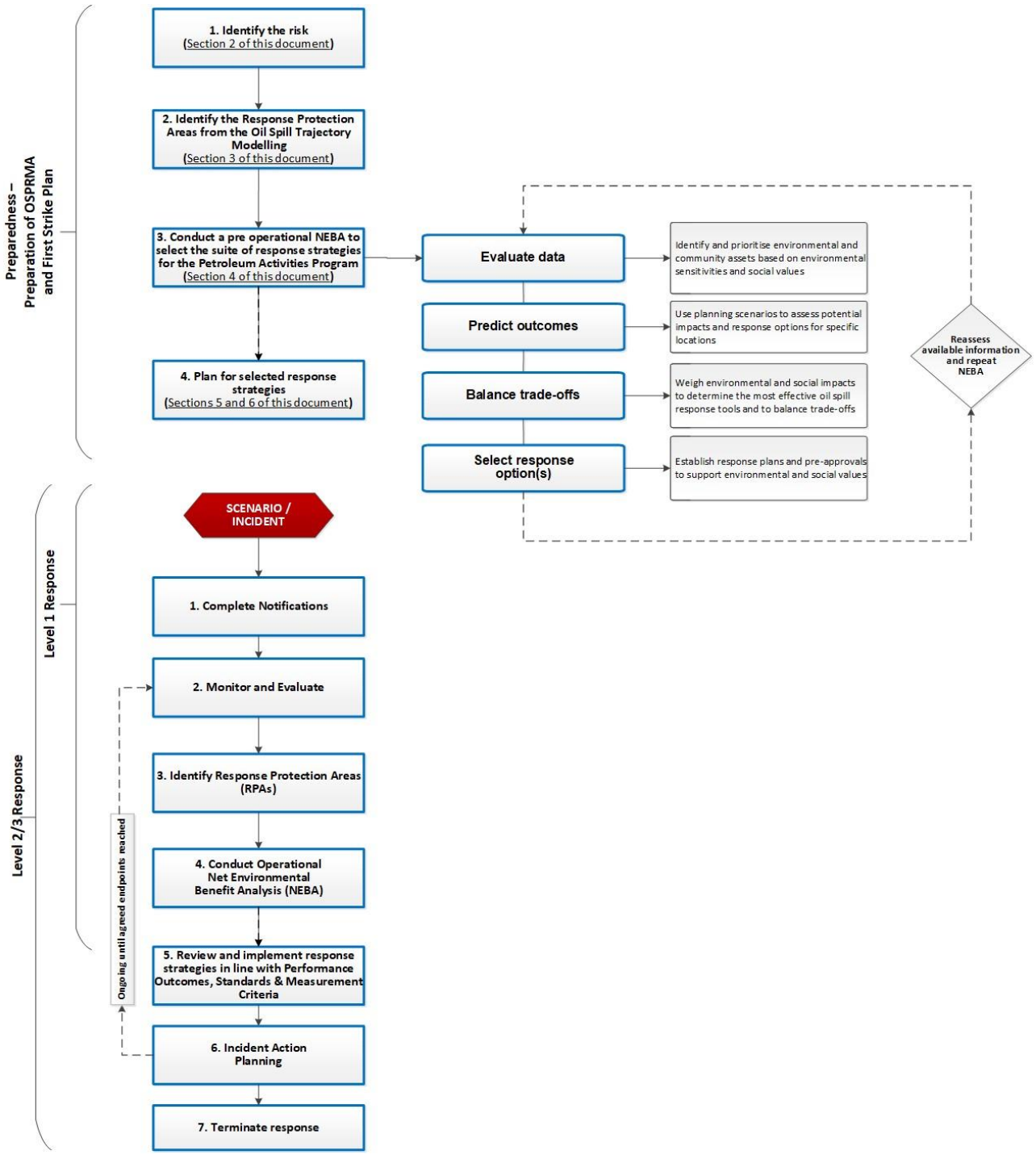

Figure 4-1: Net Environmental Benefit Analysis (NEBA) flowchart

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 (Section 2.3.3) and the surface concentrations (Section 2.3.3.1) from the deterministic 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.

4.2 Stage 1: Evaluate data

Woodside identifies and prioritises environmental and community assets based on environmental sensitivities and social values, informed through the use of 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 activities.

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 2-2 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 effectiveness/ feasibility 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 effectiveness/ feasibility of the response to select the response techniques carried forward to the ALARP assessment. The NEBA can be found in Annex A.

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)
- Waste management
- Post spill/ scientific monitoring

Table 4-1, Table 4-2 and

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 – condensate release caused by loss of well containment

Response Technique	Effectiveness	Feasibility	Decision	Rationale for the decision
Hydrocarbon: Condensate				
Techniques feasible during operations phase				
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 can be an effective way to limit the quantity of hydrocarbon entering the marine environment.	Response not considered feasible for production wells, vertical Xmas trees or in shallow water depths.	**No**	This response is not feasible for the Angel production wells.
Source control via relief well drilling	A loss of well containment is predicted to be over 68 days for MEE-01-02A. 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	SSDI is not predicted to be effective on the subsea hydrocarbon release due to shallow water depth, oil properties and predicted gas release volumes. Entrained oil plume likely to be increased resulting in greater spatial extent of entrained oil.	SSDI is not considered a feasible response where water depths are <100 m. Furthermore, modelling predicts that the LOWC scenarios will not result in any floating oil at response thresholds (>50 g/m^2) and shoreline impacts at response threshold (>100 g/m^2) are not predicted until day 23.4 (MEE-01-2A) therefore the use of subsea dispersant would not provide a net environmental benefit.	**No**	SSDI is not considered feasible due to the shallow water depth. Additionally, a spill from AP3 well is not predicted to result in surface oil at threshold with a long lead-time to shoreline impacts. The use of SSDI would therefore increase dispersed/entrained hydrocarbon levels and exposure of subsea biota to potentially higher toxicity substances without providing a net environmental benefit. General safety risks associated with responding in close proximity to well release of volatile hydrocarbons.
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.	Dispersants are not generally considered a feasible response technique when applied on thin surface films such as condensate as the dispersant droplets tend to pass through the surface films without binding to the hydrocarbon. Modelling of Angel and Lambert Deep Condensate spills predict that floating oil will be prone to rapid spreading and evaporation and will not reach the required minimum threshold (>50 g/m^2) for surface dispersant to be effective at any RPA or in open waters.	**No**	Use of surface dispersant may potentially be an appropriate technique if operational monitoring detects surface hydrocarbons present at appropriate concentrations, a net environmental benefit can be determined, and the safety of response personnel can be ensured. However, no surface hydrocarbons is predicted to reach any sensitive receptors or open ocean at the minimum concentration threshold (>50 g/m^2) required for this response option to be effective.

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.	Furthermore, this technique may be prevented from being undertaken due to personnel safety issues arising from predicted high local concentrations of atmospheric volatiles.		Outside of these parameters, the use of surface dispersant would be unwarranted and could unnecessarily introduce additional chemical substances to the marine environment. The additional entrainment would also increase exposure of subsea species and habitats to hydrocarbons without any net environmental benefit.
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. This is unlikely to be an effective method on condensate and may cause emulsification.
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 Angel and Lambert Deep Condensate spills predict that floating oil will be prone to rapid spreading and evaporation and will not reach the required minimum threshold (>50 g/m^2) for containment and recovery to be feasible at any RPA or in open waters. Predicted low effectiveness – typical expectation is less than 10% of hydrocarbon released can be contained and recovered. Deepwater Horizon/Macondo was approx. 3–5% with the largest containment and recovery operation ever conducted. Meteorological conditions and sea-state must allow the deployment of booms and skimmers. Surface hydrocarbon would need to be corralled to a sufficient thickness to permit efficient recovery by skimmers. Volatile nature of the hydrocarbon likely to lead to unsafe conditions near release location.	**No**	Potential to slightly reduce the magnitude, probability of, extent of, contact with and accumulation on shorelines receptors if and when appropriate encounter rates can be achieved and in conditions that are safe for response personnel. Surface concentrations will not meet the 50 g/m^2 minimum concentration required for response options to be deployed. Containment and recovery of condensate poses a significant safety risk due to low flash points. Corralling low flash point substances should be avoided, therefore this response technique is not feasible.
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-01-02A, the first shoreline contact is predicted from shoreline accumulation hydrocarbon in 23.4 Days (at Southern Pilbara Islands – Peak Island, 3 m^3) allowing adequate time to deploy this technique. No shoreline contact is predicted for CS-01. As only a small amount of oil will take a long time to spread to shorelines, this technique potentially may be used if operational monitoring techniques detect oil heading to sensitive receptors.	**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 may be employed to minimise hydrocarbon contact providing net environmental benefit.

Response Technique	Effectiveness	Feasibility	Decision	Rationale for the decision
		Protection strategies can be used for targeted protection of sensitive resources. Access to sensitive areas may cause more negative impact than 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-01-02A, the first shoreline contact is predicted from shoreline accumulation hydrocarbon in 23.4 Days (at Southern Pilbara Islands – Peak Island, 3 m^3) allowing adequate time to deploy this technique. No shoreline contact is predicted for CS-01. 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.
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 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 Angel 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.
Additional techniques feasible during drilling and tie-back activities				
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.	Response may be feasible during drilling and tie-back activities will be assessed on a case-by-case basis. 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 drilling and 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 77 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 – Lambert Deep Rich Fluid loss of containment from subsea flowlines and infrastructure and/or export pipeline (MEE-02-03A and MEE-02-3B)

Response Technique	Effectiveness	Feasibility	Decision	Rationale for the decision
Hydrocarbon: Lambert Deep Rich Fluid				
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 Lambert Deep Rich Fluid 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	Not applicable for a flowline release	Not applicable for a flowline release	N/A	Not applicable for a flowline release
Source control via debris clearance and capping stack	Not applicable for a flowline release	Not applicable for a flowline release	N/A	Not applicable for a flowline release
Source control via relief well drilling	Not applicable for a flowline release	Not applicable for a flowline release	N/A	Not applicable for a flowline release
Subsea Dispersant Injection (SSDI)	Not applicable for a flowline release	Not applicable for a flowline release	N/A	Not applicable for a flowline release
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.	Dispersants are not generally considered a feasible response technique when applied on thin surface films such as condensate as the dispersant droplets tend to pass through the surface films without binding to the hydrocarbon. Modelling of Lambert Deep Rich Fluid 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 surface dispersant to be effective within any RPA. However, floating oil at >50 g/m^2 does reach threshold in open waters but only within the first 12 hours of a spill. Residues are also predicted to be very low – around 50.4 m^3 (0.9%) – with no shoreline impacts predicted. The use of surface dispersant would therefore not provide an environmental benefit and would increase dispersed/entrained hydrocarbon levels which can potentially have higher toxicity to biota in shallow water than naturally dispersed hydrocarbons. Additionally, this technique may be prevented from being undertaken due to personnel safety issues arising from predicted high local concentrations of atmospheric volatiles.	No	Use of surface dispersant is not deemed to be an appropriate technique for use on highly volatile, low residue condensate and would unnecessarily introduce additional chemical substances to the marine environment. The additional entrainment would also increase exposure of subsea species and habitats to hydrocarbons without any net environmental benefit. Furthermore, atmospheric volatile levels would make in unsafe for response personnel.

Response Technique	Effectiveness	Feasibility	Decision	Rationale for the decision
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. Also, there is a lack of equipment and trained personnel available in Australia.
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.	Predicted low effectiveness – typical expectation is less than 10% of hydrocarbon released can be contained and recovered. Deepwater Horizon/Macondo was approx. 3–5% with the largest containment and recovery operation ever conducted. Modelling of Lambert Deep Rich Fluid 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 effective within any RPA. However, floating oil at >50 g/m^2 does reach threshold in open waters but only within the first 12 hours of a spill. Residues are also predicted to be very low – around 50.4 m^3 (0.9%). Surface hydrocarbon would need to be corralled to a sufficient thickness to permit efficient recovery by skimmers, however, corralling a volatile, low flash point substance poses a significant safety risk and should be avoided. Meteorological conditions and sea-state must also allow the deployment of booms and skimmers.	No	Potential to slightly reduce the magnitude, probability of, extent of, contact with and accumulation on shorelines receptors if and when appropriate encounter rates can be achieved and in conditions that are safe for response personnel. Surface concentrations will meet the 50 g/m2 minimum concentration required for response options to be deployed, however, corralling a volatile hydrocarbon such as Lambert Deep Rich Fluid poses a significant safety risk due to low flash points and thus should be avoided. This response technique is therefore not recommended.
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.	For MEE-02-03A and MEE-02-03B, modelling predicts that there will be no surface oil at threshold after 12 hours and no shoreline impacts at feasible response thresholds.	No	For MEE-02-03A and MEE-02-03B, modelling predicts that there will be no surface oil at threshold after 12 hours and no shoreline impacts at feasible response 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/m^2.	For MEE-02-03A and MEE-02-03B, modelling predicts that no shoreline receptors will be contacted at threshold.	No	For MEE-02-03A and MEE-02-03B, modelling predicts that there will be no shoreline impacts at feasible response thresholds.
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 Lambert Deep Rich Fluid 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. Operational monitoring 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 Wildlife Response Operational Plan as and where required. In addition, any rehabilitation could only be undertaken by trained specialists.	Yes	This technique may prevent impact to and/or treat oiled wildlife providing net environmental benefit.

Table 4-3: Response technique evaluation – MDO release from vessel collision (MEE-04)

Response Technique	Effectiveness	Feasibility	Decision	Rationale for the decision
Hydrocarbon: MDO				
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 MDO 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.	MDO is prone to rapid spreading and evaporation and is not suitable for surface dispersant application. Furthermore, modelling predicts that floating oil will not reach the required threshold (>50 g/m2) for containment and recovery to be feasible within any RPA or in open waters. The volatile nature of MDO 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 MDO is unnecessary 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 MDO 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.	MDO is prone to rapid spreading and evaporation and is deemed unsuitable for effective containment and recovery operations. Furthermore, modelling predicts that floating oil will not reach the required threshold (>50 g/m^2) for containment and recovery to be feasible within any RPA or in open waters. The volatile nature of MDO 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 MDO. 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.	A MDO spill would be prone to rapid spreading and evaporation and modelling predicts that no shoreline receptors will be contacted at threshold. The maximum accumulated volume is predicted to be <1 m^3. Furthermore, the volatile nature of MDO 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/m^2.	A MDO spill would be prone to rapid spreading and evaporation and the modelling predicts that no shoreline receptors will be contacted at threshold – any minor contact is significantly below any threshold concentration that would allow a response to be feasible. The maximum accumulated volume is predicted to be <1 m^3. Furthermore, the volatile nature of MDO 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 MDO 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. Operational monitoring 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 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. 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. 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. 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 clearly 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 purpose of 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 trouble taken in financial, safety, design/storage/installation, capital/lease, and/or operations/maintenance terms to adopt a control measure.
- Where the predicted change to environmental impact is compared 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, Response Protection Areas (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 Karratha/Dampier to the spill event location means that multiple logistical options are available to monitor the spill in relatively short timeframes.

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:

- Operational monitoring will be undertaken from the outset of a spill. This is needed to assess the nature of the spill and track its location. The data collected from the operational monitoring will inform the need for any additional operational monitoring, deployment of response techniques and may assist post-spill scientific monitoring. It also informs when the spill has entered State Waters and control of the incident passes to WA DoT.
- Surface hydrocarbons at >10 g/m^2 are predicted to be present in open water within 382 km of AP3 subsea well (MEE-01-02A), 25 km from the spill site (MEE-02-03B) and 48 km of the spill site (MEE-04).
- The shortest timeframes that shoreline contact from floating oil at >100 g/m^2 is predicted to be 23.4 days at Southern Pilbara – Islands (3 m^3, MEE-01-02A). No shoreline contact is predicted at threshold concentrations for MEE-02-03B or MEE-04.
- The shortest time to contact for oil at concentrations of entrained hydrocarbons greater than 100 ppb at shoreline receptors is 3.8 days at Glomar Shoals (MEE-01-02A), 1.9 days at Glomar Shoals (MEE-02-03B) and up to 354 km from the spill site, with a maximum at Montebello Marine Park (MEE-04 – timeframe not available).
- 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 worst case spill may be up to 68 days (MEE-01-02A) with response operations completing in month 4 based on the predicted time to complete shoreline clean-up operations.

- The location, trajectory and fate of the spill will be verified by real-time spill tracking via modelling, direct observation and remote sensing (OM01, OM02, OM03, OM04 and OM05).

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/vessel and ready for deployment 24/7	1, 3A, 3C, 4
		2.2	Deploy tracking buoy from facility 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 Common Operating Picture (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	2 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

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)**
		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 Shoreline Contamination Assessment Technique (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 vessel for deploying the monitoring systems with a dedicated winch, A-frame or Hiab and ancillaries to deploy the equipment.	1, 2, 3C, 3D, 4
		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.	
		5.5	Use of Autonomous Underwater Vehicles (AUVs) for hydrocarbon presence and detection may be used as a contingency if the operational SIMA confirms conventional methods are unsafe or not possible.	1, 2, 3C, 4
6	Pre-emptive assessment of sensitive receptors	6.1	10 days prior to any impact predicted by OM01/02/03, and in agreement with WA DoT (for Level 2/3 incidents), deployment of 2 specialists from resource pool in establishing the status of sensitive receptors.	1, 2, 3B, 3C, 4
		6.2	Daily reports provided to IMT 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	10 days prior to any impact predicted by OM01/02/03, and in agreement with WA DoT (for Level 2/3 incidents), deployment of 1 specialist(s) in Shoreline Contamination Assessment Techniques (SCAT) from resource pool for each of the Response Protection Areas (RPAs) with predicted impacts	1, 2, 3B, 3C, 4
		7.2	SCAT reports provided to IMT daily detailing the assessed areas to maximise effective utilisation of resources	1, 3B, 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)**
8	Management of Environmental Impact of the response risks	8.1	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
		8.2	Shallow draft vessels will be used to access remote shorelines to minimise the impacts associated with seabed disturbance on approach to the shorelines	1
		8.3	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 ensure there is 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 credible scenario for a loss of well containment is considered to be loss of well control during drilling operations. This scenario would result in an uncontrolled flow from the well as outlined in the EP. In the event of a loss of well containment, the primary response would be source control and well intervention.

The Woodside Source Control Response Procedure includes the process for the IMT to mobilise resources for BOP intervention, Subsea First Response Toolkit (SFRT) support, and capping support. This plan has pre-identified vessel specifications and contracts required for SFRT debris clearance work and Woodside monitors the availability and location of these vessels.

Woodside is a signatory to a 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 were to occur. The MoU commits the signatories to share rigs, equipment, personnel and services to assist another operator in need. Dynamically positioned and most jack-up rigs are not suitable for the Angel wells water depths, therefore a moored MODU would be required.

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.

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 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) if present (only present after installation of the completion)
  - a relief well is drilled and first attempt at well kill within 68 days (AP3 well, MEE-01-02A) or 77 days (LDA02 well, CS-01)
  - a capping stack is in place (not applicable for operating wells). During construction a capping stack may be deployed in shallow water depths following assessment of the conditions on a case-by-case basis.
- 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 worst-case spill may be up to 68 days (MEE-01-02A) with response operations completing in month 4 based on the predicted time to complete shoreline clean-up operations.

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	
Capping stack feasibility	Capping stack deployment is not considered feasible for all conditions due to the shallow water depths. Associated personnel safety issues make it unsafe to deploy equipment in close proximity to the release location. For the wells in the Angel and Lambert Deep fields, conventional/ vertical capping stack deployment may be feasible. 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.
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 for the Angel wells would be relief well drilling. The following approaches outline Woodside's hierarchy for relief well drilling: • Primary relief well – review internal drilling programs and MODU availability to source an appropriate rig operating within Australia with an approved Safety Case • Alternate relief well – source and contract a MODU through APPEA MOU that is operating within Australia with an approved Safety Case • Contingency relief well – 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 150T in shallow water and 250T in deeper water • At least 90m in length • Deck has water/electricity supply • Deck capacity to hold at least 110T 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	Hot Stab and/or well intervention attempt made using ROV and SFRT within 11 days.	1, 3B, 3C
		9.5	Wild Well Control Inc (WWCI) staff available all year round to assist with the mobilisation, deployment and well intervention equipment.	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	MODU mobilised to site for relief well drilling within 21 days.	1, 3C
		9.8	First well kill attempt completed within 68 days (AP3 well) or 77 days (LDA02 well).	1, 3B, 3C
		9.9	Open communication line(s) to be maintained between IMT and infield operations to ensure awareness of progress against plan(s).	1, 3A, 3B
		9.10	Monthly monitoring of the availability of MODUs through existing market intelligence including current Safety Case	3C

Environmental Performance Outcome		To stop the flow of hydrocarbons into the marine environment		
Control measure		**Performance Standard**		**Measurement Criteria (Section 5.10)**
			history, to meet specifications for relief well drilling. Titleholders of suitable MODUs notified.	
10	Support vessels	10.1	Monthly monitoring of availability of larger vessels through existing Frame Agreements and market intelligence to meet specifications for source control.	3C
		10.2	Frame agreements for Infield Support Vessels (ISVs) require vessels 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 if 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 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 grossly 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 MDO 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 6.8 of the EP. The vessel master's roles and responsibilities are described in EP Section 7.3.

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.

Deterministic modelling conducted predicts that there will be no potential shoreline impact at threshold for MEE-02-03B or MEE-04. Therefore, the following section addresses protection and deflection operations for the MEE-01-02A loss of well containment scenario only.

5.4.1 Response need based on predicted consequence parameters

Angel loss of well containment (MEE-01-02A)

The following statements identify the key parameters upon which a response need can be based:

- There is no floating oil predicted above threshold (50 g/m^2).
- The shortest timeframe that shoreline contact from floating oil at 100 g/m^2 is predicted to be 23.4 days at Southern Pilbara Islands – Peak Island (3 m^3), which may be viable for deflection away from sensitivities.
- Predictive modelling (OM01), direct observation/surveillance (OM02) and, where appropriate, hydrocarbon detection in water (OM03), will be employed from the outset of a spill to track the oil, assess where and when appropriate response techniques can be deployed and to identify when the spill enters State Waters. When RPAs at threat of impact can be accurately deduced, this will trigger the undertaking of pre-emptive assessments of sensitive receptors at risk (OM04), to direct any protection and deflection operations. OM04 would be undertaken in liaison with WA DoT (if a Level 2/3 incident and within State Waters).
- Following pre-emptive assessments of sensitive receptors at risk, and in agreement of prioritisation with WA DoT (if a Level 2/3 incident and within State Waters), protection and deflection operations would commence until agreed termination criteria are reached.
- Arrangements for support organisations who provide specialist services (trained personnel, protection and deflection equipment) and/or resources should be tested regularly; and
- 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	• 1 x 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 x trained supervisors - 8-10 x 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 5 days prior to a predicted impact.	1, 3A, 3C, 4
		12.2	In liaison with WA DoT (for Level 2/3 incidents), mobilise teams to RPAs 5 days prior to predicted impact. 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 5 days prior to predicted impact for each identified RPA. Expected to be 1 RPA within 23.4 days (operation as detailed above).	1, 3A, 3B, 4
		12.4	12 trained personnel available (2 supervisors plus 10 additional personnel) 5 days prior to predicted impact for each identified RPA. 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	Contract in place with 3rd party providers to access equipment	1, 3A, 3C, 4
		13.2	Equipment mobilised from closest stockpile 5 days prior to predicted impact.	1, 3A, 3C, 4
		13.3	Supplementary equipment mobilised from State, AMOSC, AMSA stockpiles 5 days prior to predicted impact.	1, 3C, 3D, 4
		13.4	Contract in place with 3rd party providers to access equipment	1, 3A, 3C, 4
14	Management of Environmenta 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

Environmental Performance Outcome	To stop hydrocarbons encountering particularly sensitive areas		
Control measure	**Performance Standard**		**Measurement Criteria (Section 5.10)**
	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, during the subsea and surface releases the capability available exceeds the need identified. It indicates that the shoreline protection and deflection capability have the following expected performance:

- Existing capability allows for mobilisation and deployment of shoreline protection operations by day 2 (if required). Given that no shoreline contact is predicted at >100 g/m^2 until day 23.4, the existing capability is considered sufficient to mobilise and deploy protection at RPAs prior to hydrocarbon contact, guided by the ongoing operational monitoring.
- TRPs have been developed for identified RPAs that are predicted to be impacted except in 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.

5.5 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 Cleanup 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. It 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).

Deterministic modelling conducted predicts that there will be no potential shoreline impact at threshold for MEE-02-03B or MEE-04. Therefore, the following section addresses protection and deflection operations for the MEE-01-02A loss of well containment scenario only.

5.5.1 Response need based on predicted consequence parameters

Angel loss of well containment (MEE-01-02A)

The following statements identify the key parameters upon which a response need can be based:

- The shortest timeframe that shoreline contact from accumulated oil above threshold (>100 g/m^2) is predicted to be 23.4 days at Southern Pilbara Islands (3 m^3).
- Pre-emptive assessment and shoreline assessments (OM04 and OM05) will be mobilised prior to shoreline contact which is predicted to occur on day 23.4 at Southern Pilbara Islands – Peak Island (3 m^3).
- The duration of the spill may be up to 68 days with response operations extending up to month 4 based on the predicted time to complete shoreline clean-up operations.
- Predictive modelling (OM01), direct observation/surveillance (OM02) and, where appropriate, hydrocarbon detection in water (OM03), will be employed from the outset of a spill to track the oil, assess where and when appropriate response techniques can be deployed and when the spill enters State Waters. When RPAs at threat of impact can be accurately deduced, this will trigger the undertaking of pre-emptive assessments of sensitive receptors at risk (OM04) and, subsequently, shoreline assessments (OM05) to establish the extent and distribution of oiling and thus direct any shoreline clean-up operations. OM04 and

OM05 would be undertaken in liaison with WA DoT (if a Level 2/3 incident and within State Waters).

- Following Shoreline Assessment, and agreement of prioritisation with WA DoT (if a Level 2/3 event), clean-up operations would commence until agreed termination criteria are reached.
- Prior to predicted impact, and in line with the relevant TRP and in agreement with WA DoT (if a Level 2/3 event), rubbish removal and segregation will be undertaken along the shoreline to minimise additional oiled waste volumes.
- 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, a number of assumptions are required to estimate the response need for shoreline clean-up. These assumptions have been 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 x trained supervisor • 8–10 x 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 clean 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.

Technique	Description	Shoreline type		Application
		Recommended	Not recommended	
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.
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 1 shoreline clean-up team to each contaminated RPA comprised of: • 1-2 trained specialists per operation • 8-10 personnel/labour hire • Personnel sourced through resource pool 5 days prior to predicted impact upon request from the IMT.	1, 2, 3A, 3B, 3C, 4
		15.2	Relevant TRPs will be identified in the first strike plan for activation 5 days prior to operational monitoring predicting impacts.	1, 3A, 3C, 4
		15.3	Relevant TRPs available for shoreline contacted 5 days prior to operational monitoring predicting impacts.	1, 3A, 3C, 4
		15.4	Clean-up operations for shorelines in line with results and recommendations from SCAT outputs.	1, 3A, 3B
		15.5	All shorelines zoned and marked before clean-up operations commence to prevent secondary contamination and minimise the mixing of clean and oiled sediment and shoreline substrates.	
		15.6	In liaison with WA DoT (for Level 2/3 incidents), mobilise and deploy 1 shoreline clean-up operation to each site where operational monitoring predicts an accumulation 5 days prior to impact.	1, 2, 3A, 3C, 4
		15.7	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
		15.8	Open communication line to be maintained between IMT 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 5 days prior to predicted impact.	
		16.3	Supplementary equipment mobilised from State, AMOSC, AMSA stockpiles 5 days prior to predicted impact.	1, 3C, 3D, 4

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)**
		16.4	Supplementary equipment mobilised from OSRL 5 days prior to predicted impact.	
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	Shoreline access route (foot, car, vessel and helicopter) with the least environmental impact identified will be selected by a specialist in SCAT operations.	
		17.5	Limiting vegetation removal to only that vegetation that has been moderately or heavily oiled	
		17.6	Oversight by trained personnel who are aware of the risks.	
		17.7	Trained unit leaders 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 capability can cover all required shoreline clean-up operations for the PAP and thus meets the need identified for this activity. The shoreline clean-up capability has the following expected performance (if required during a response):

- Existing capability allows for mobilisation and deployment of shoreline clean-up operations by day 2 (if required). Given that no shoreline contact is predicted at threshold (>100 g/m^2) until day 23.4, the existing capability is considered sufficient to mobilise and deploy protection at RPAs prior to hydrocarbon contact, guided by the ongoing operational monitoring.
- Woodside has the capacity to mobilise and deploy up to 105-140 shoreline clean-up teams (approx. 1,260-1,680 responders in total) by week 3 using existing labour hire contracts with Woodside, AMOSC, Core Group, AMSA, WA DoT and OSRL team leads.
- Assessment of response capability indicates that for a worst-case scenario the actual teams required would meet the available capability and the response would be completed by the end of month 4.

- 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 accommodation and transport of personnel in the Exmouth to Port Hedland region 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 identified RPAs that are predicted to be impacted except in 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 the 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 wildlife, 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 Priority 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.

Table 5-10 outlines the wildlife response protection areas for this activity. At the time of a spill, identification and allocation of wildlife response priority 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 of the *Angel Operations Environment Plan*.

At the time of a spill, identification and allocation of wildlife response priority areas should also take into consideration any key biological activities.

For WA, although somewhat out-dated, 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 Response Protection Areas and open ocean

Species	Open ocean	Southern Pilbara Islands	Murion Islands	Sunday Island	Gascoyne MP
Marine turtles (including foraging and inter-nesting areas and significant nesting beaches)	✓	✓	✓	✓	✓
Whale sharks (migration to and from waters at Ningaloo)	✓		✓	✓	✓
Seabirds and/or migratory shorebirds	✓	✓	✓	✓	✓
Cetaceans – migratory whales	✓		✓	✓	✓
Cetaceans – dolphins and porpoises	✓	✓	✓	✓	✓
Sea snakes	✓	✓	✓	✓	✓

The following statements identify the key parameters upon which a wildlife response need can be based:

- The shortest timeframe that shoreline contact from accumulated oil above threshold is predicted to be 23.4 days at Southern Pilbara Islands – Peak Island (3 m^3).
- Pre-emptive assessment and shoreline assessments (OM04 and OM05) will be mobilised prior to shoreline contact which is predicted to occur on day 23.4 at Southern Pilbara Islands – Peak Island (3 m3).
- The offshore location of the release site is expected to initially result in low numbers of at-risk or impacted wildlife.
- As the surface oil approaches shorelines, potential for oiled wildlife impacts are likely to increase.
- It is estimated that an oiled wildlife response would be between medium and high, as defined in the WA OWRP (**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 hand over 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).

5.6.2 Environmental performance based on need

Table 5-12: Environmental Performance – Oiled Wildlife Response

Environmental Performance Outcome		Oiled Wildlife Response is conducted in accordance with the Western Australian Oiled Wildlife Response Plan (WAOWRP, 2022) to ensure it is conducted in accordance with legislative requirements to house, release or euthanise wildlife under the *Biodiversity Conservation Act 2016*.		
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 5 days prior to 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 oiled wildlife response 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:

- Mobilisation of operational monitoring (OM01-05) to identify wildlife and RPAs contacted or at imminent risk of contact by hydrocarbons.
- 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.

Woodside would establish a wildlife collection point at the RPA for identified oiled wildlife collection and sorting. From these locations, recovered wildlife would be transported to a central treatment location at Dampier or Exmouth.

5.7 Waste Management

Waste management is considered a support technique to shoreline clean-up and wildlife response. 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 wildlife response, and/or
- Solids/semi-solids (oily solids, garbage, contaminated materials) and debris (e.g. seaweed, sand, woods, and plastics) collected during shoreline clean-up and wildlife response.

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 ensure continuous response operations can be maintained.

All waste management activities will follow the *Environment Protection (Controlled Waste) Regulations 2004* 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 (Veolia Waste Management) 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.
	OWR – 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 720 m^3 waste storage capacity by month 3.	
		22.3	Recovered hydrocarbons and wastes will be transferred to licensed treatment facility for reprocessing or disposal.	
		22.4	Teams will segregate liquid and solid wastes at the earliest opportunity.	
		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.	

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.

It indicates that the waste management capability has the following expected performance:

- The largest shoreline waste volumes predicted for MEE-01-02A are 720 m^3 during month 3 and up to 288 m^3 during month 4 with a maximum of 1008 m^3 of waste expected across all shoreline clean-up operations during the response. The capability available exceeds the need identified.
- Veolia has the capacity to treat up to 120,000 m^3 overall waste volumes. The waste management requirements are within Woodside's and its service providers existing capacity.
- 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.

5.8 Scientific monitoring

A scientific monitoring program (SMP) would be activated following a level two or three 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 Environment that Maybe Affected (EMBA) and in particular, any identified Pre-emptive Baseline Areas (PBAs) for the credible spill scenarios or other identified unplanned hydrocarbon releases associated with the operational activities (refer to Table 2-1: PAP credible spill scenarios).

The outputs of the stochastic hydrocarbon spill modelling were used to assess the environmental risk of the hydrocarbon affected area as delineated by the ecological impact EMBA and social-cultural EMBA based on exceedance of environmental and social-cultural hydrocarbon threshold concentrations (refer to Table 2-2, Section 2.3.1.1 and see Section 6 of the EP for further information on applicable thresholds and the EMBAs). The Petroleum Activities Program worst-case credible spill MEE-01-02A and MEE-02-03B define the EMBAs 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 Response Protection Areas (RPAs) 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 the operational monitoring overview.

Key objectives of the Woodside oil spill SMP are:

- Assess the extent, severity and persistence of the environmental impacts from the spill event; and
- 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 Environment Protection and Biodiversity Conservation Act (EPBC Act 1999) 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 the NOPSEMA Bulletin #1 Oil Spill Modelling (2019), as shown in Figure 5-1:

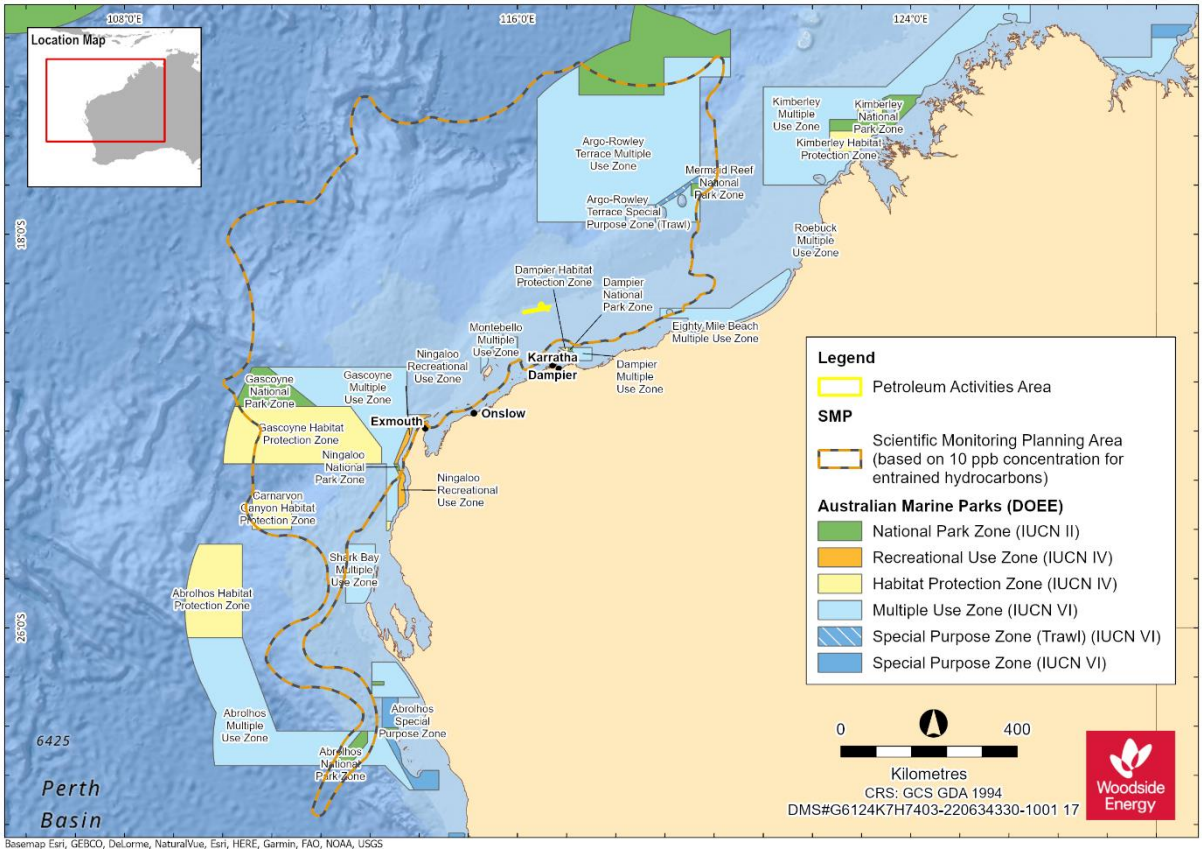

Figure 5-1: The planning area for scientific monitoring based on the area potentially contacted by the low (below ecological impact) entrained hydrocarbon threshold of 10 ppb in the event of the worst-case credible spill scenario (MEE-01-02A and MEE-02-03B)

NOTE: 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 for the worst case credible scenarios and therefore represents the largest spatial boundaries of the hydrocarbon spill combinations, not the spatial extent of a single hydrocarbon 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	Pre-emptive Baseline Areas (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 time to predicted hydrocarbon contact in the event of an unplanned hydrocarbon release from the facility operational activities. SMP activation (as per the 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 Pre-emptive Baseline Areas (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.
Met-ocean conditions	The following met-ocean 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 met-ocean conditions on a day to day basis by SMP operations.

5.8.2 Response planning assumptions

Response Planning Assumptions	
Pre-emptive Baseline Areas (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 ((≤ 10 days minimum time to contact) for which baseline data are planned for and data collection may commence pre-PAP, where identified as a gap.

	• 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 Angel Facility Operations. PBAs for Angel Facility Operations 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 with potential to be contacted by floating or entrained hydrocarbons at environmental thresholds within ≤10 days has identified the following: • Rankin Bank [11] • Glomar Shoal For example, adequate baseline data are available for Rankin Bank and Glomar Shoal as last surveyed (benthic communities and fish assemblages) in November 2018 (Currey-Randall et al., 2019). Australian Marine Parks (AMPs) potentially affected includes: • Montebello AMP • Argo-Rowley Terrace AMP All the Australian Marine Parks (AMPs) are located in offshore waters where hydrocarbon exposure is possible on surface waters and in the upper layers of the water column.
In the Event of a Spill	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 Corporate Incident Management Team (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 worst case credible spills MEE-01-02A and MEE-02-03B (Table 2-1). To address the initial focus in a response phase SMP planning situation, receptor locations predicted to be contacted between >10 days and 20 days have been identified as follows: • Ningaloo Coast [12] • Muiron Islands [13] • Barrow/Montebello/Lowendal Island Groups • South Pilbara Islands • Ningaloo AMP • Gascoyne AMP 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

[11] Floating oil will not accumulate on submerged features and at open ocean locations, therefore, no surface contact will occur and only entrained hydrocarbon contact is predicted at Rankin Bank and Glomar Shoal ≤10 days.
[12] Ningaloo Coast includes the WHA and State Marine Park
[13] Muiron islands includes the WHA and Marine Management Area

	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 Angel Facility Operations, priority would be focused on Ningaloo Coast and Muiron Islands. ii. Highly sensitive and/or valued habitats and communities in coastal waters will be prioritised for pre-emptive baseline surveys over open water areas of AMPs e.g. Ningaloo coast. 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 EMBAs for the PAP worst case credible spills MEE-01-02A and MEE-02-03B (Table 2-1), is presented in the Angel Facility Operations EP (refer to Section 6 in the EP). The key receptors at risk by location and corresponding SMPs based on the EMBAs for the PAP are presented in Annex D, as per the PAP credible spill scenarios one and two. This matrix maps the receptors at risk with their location and the applicable SMPs that may be triggered in the event of a Level two or three 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 locations identified as PBAs. 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 Environmental 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)[14] (refer to ANNEX C: Oil Spill Scientific Monitoring Program).

5.8.3 Summary – scientific monitoring

The resulting scientific monitoring capability has been assessed against the PAP worst case credible spill scenarios. The range of strategies 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 Standby SMP 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 Plan.

Scope of SMP Operations in the event of a hydrocarbon spill:

Receptor locations of interest for the SMP during the response phase are:

- Ningaloo Coast, North

[14] https://biocollect.ala.org.au/imsa#max%3D20%26sort%3DdateCreatedSort

- Muiron Islands
- Ningaloo AMP
- Gascoyne AMP
- Argo-Rowley Terrace AMP

Documented baseline studies are available for certain sensitive receptor locations including: Adequate baseline data are available for Rankin Bank and Glomar Shoal as last surveyed (benthic communities and fish assemblages) in November 2018 (Currey-Randall et al., 2019) and the Ningaloo Coast and Muiron Islands (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 baseline data at sensitive receptor locations, i.e., the sections of the Ningaloo Coast not immediately contacted to hydrocarbons. As the exact locations where hydrocarbon contact occurs may be unpredictable, SM01 would be mobilised as a priority to be able to detect hydrocarbons and track the leading edge of the spill to verify where hydrocarbon contact occurs which will assist with where SMP resources are a priority need to obtain pre-emptive baseline data.

The option analysis in Section 6.8 considers ways to reduce the gap by considering alternate, additional, and/or improved control measures on each selected response strategy.

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**
23	• Woodside has an established and dedicated SMP team comprising the Environmental Science Team and additional Environment Advisers within the HSEQ Function.	23.1	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
24	• Woodside have 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 standby contractor Implementation Plan, to implement the oil spill scientific monitoring programs. The availability of relevant personnel is reported to Woodside on a monthly basis 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.	24.1	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. • Scientific Monitoring Program 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	• HSP Internal Control Environment 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
25	• 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 SMP 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 AIIMS framework utilised in Australia. • Woodside utilises an online Incident Management Information System (IMIS) to coordinate and track key CIMT 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 First Strike Plan. • Step by step process to activation of individual SMPs provided in the SMP Operational Plan. • All decisions made regarding SMP logged in the online IMIS (SMP team members trained in using Woodside's online Incident Management System) • 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 IMIS • Woodside Environmental Science Team provide awareness training on the activation and stand-up of the Scientific Monitoring Programme (SMP) for the Environment Advisers in Woodside who are listed on the SMP team on an annual basis. • Woodside Environmental Science Team provide awareness training on the activation and stand-up of the Scientific Monitoring Programme (SMP) for the SMP standby contractor. • Woodside Environmental Science Team co-ordinates an annual SMP arrangement testing exercise which the SMP standby contractor. SMP team participates in since 2016 (report on 2016 SMP simulation) and SMP standby contractor the SMP arrangements (people and equipment availability) tested annually since 2016.	25.1	• Woodside have established an SMP organisational structure and processes to stand up and deliver the SMP.	• SMP Oil Spill Scientific Monitoring Operational Plan • SMP Implementation Plan • SMP annual arrangement testing and reporting

26	• 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 could 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.	26.1	Woodside maintains standby SMP capability to mobilise equipment required to conduct scientific monitoring programs SM01 – SM10 (except desktop based SM08): • Equipment are 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
27	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 annual reviews of the Woodside Baseline Environmental Studies Database, and specific activity baseline gap analyses. • Accessing external databases such as the Department of Water and Environmental Regulation (WA) Index of Marine Surveys for Assessment (IMSA) (refer to ANNEX C: Oil Spill Scientific Monitoring Program).	27.1	• 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**
28	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.	28.1	**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 Incident Action Plan.
		28.2	**Post Spill contact** For the receptors contacted by the spill in where baseline data are available, SMPs programs to assess and monitor receptor condition will be implemented post spill (i.e. after the response phase):	• SMP planning document • SMP Decision Log • Incident Action Plans (IAPs)

Environmental Performance Outcome		Implementation of the SMP (response and post-response phases)		
Control measure		**Performance Standard**		**Measurement Criteria**
29	• 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. • 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 detailing 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 (SMP resourcing report register. All SMP documents and their status are tracked via SMP document register.	29.1	**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
		29.2	**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
		29.3	**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 criteria. As a control measure, the IMS function is to prompt, facilitate and record the completion of three key response planning processes detailed below. As a measurement criteria the IMS records the evidence of the timeliness of all response actions included in the environmental performance standards and the plans used of 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 incident action plan (IAP) and assist the IMT with the execution of that plan. The site-based 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 either 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 ensure techniques to control the incident are appropriate to 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 engagement process

Woodside will engage 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)**
30	Operational SIMA	30.1	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
		30.2	Record the evidence and justification for any deviation from the planned response activities.	
		30.3	Record the information and data from operational and scientific monitoring activities used to inform the SIMA.	
31	Stakeholder engagement	31.1	Prompt and record all notifications (including government notifications) for relevant persons/ organisations in the region are made	
		31.2	In the event of a response, identification of relevant persons/ organisations will be re-assessed throughout the response period.	
		31.3	Undertake communications in accordance with: • Functional Support Team Guideline – Reputation • External Communication and Continuous Disclosure Procedure • External Stakeholder Engagement Procedure	
32	Personnel required to support any response	32.1	Action planning is an ongoing process that involves continual review to confirm techniques to control the incident are appropriate to the situation at the time.	1, 3B
		32.2	A duty roster of trained and competent people will be maintained to ensure that minimum manning requirements are met all year round.	3C
		32.3	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
		32.4	Collect and interpret information from the scene of the incident to determine support requirements to the site-based IMT, develop an Incident Action Plan (IAP) and assist with the execution of that plan.	
		32.5	Security & Emergency Management (S&EM) advisors will be integrated into CIMT to monitor performance of all functional roles.	

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)**
		32.6	Continually communicate the status of the spill and support Woodside to determine the most appropriate response by delivering on the responsibilities of their role.	
		32.7	Follow the OPEA, Operational Plans, FSPs, support plans and the IAPs developed.	1, 2, 3A, 4
		32.8	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 facilitates compliance with environmental performance outcomes and standards through four primary mechanisms. The aforementioned performance tables 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 communicated 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, development and the execution of the IAP.

2. The S&EM Competency Dashboard

The S&EM competency dashboard records the number of trained and competent responders that are available across Woodside, and some external providers, 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 5-2 shows the minimum manning numbers for the different hydrocarbon spill response roles and the number of qualified persons against those roles.

Woodside's pool of trained responders is composed of but not limited to personnel from the following organisations:

- Woodside internal
- Australian Marine Oil Spill Centre (AMOSC) core group
- AMOSC
- Oil Spill Response Limited (OSRL)
- Marine Spill Response Corporation (MSRC)
- AMSA
- Woodside contracted workforce

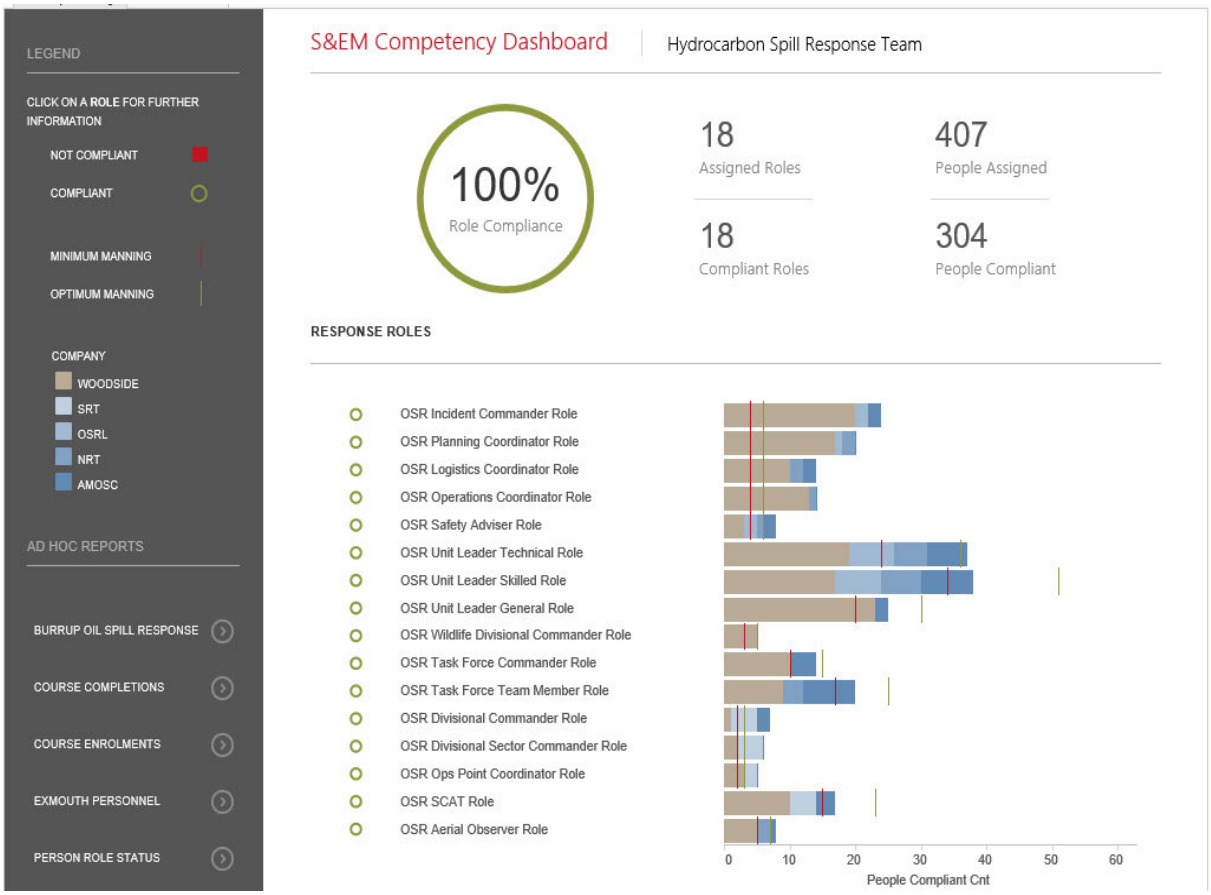

Figure 5-2: Example screen shot of the HSP competency dashboard

The Dashboard is one of Woodside's key means of monitoring its readiness to respond. It also and shows that Woodside can meet the requirements of the environmental performance standard that relate to filling certain response roles.

Figure 5-3 shows deeper dive into the Ops Point Coordinator role and the training modules required to show competence.

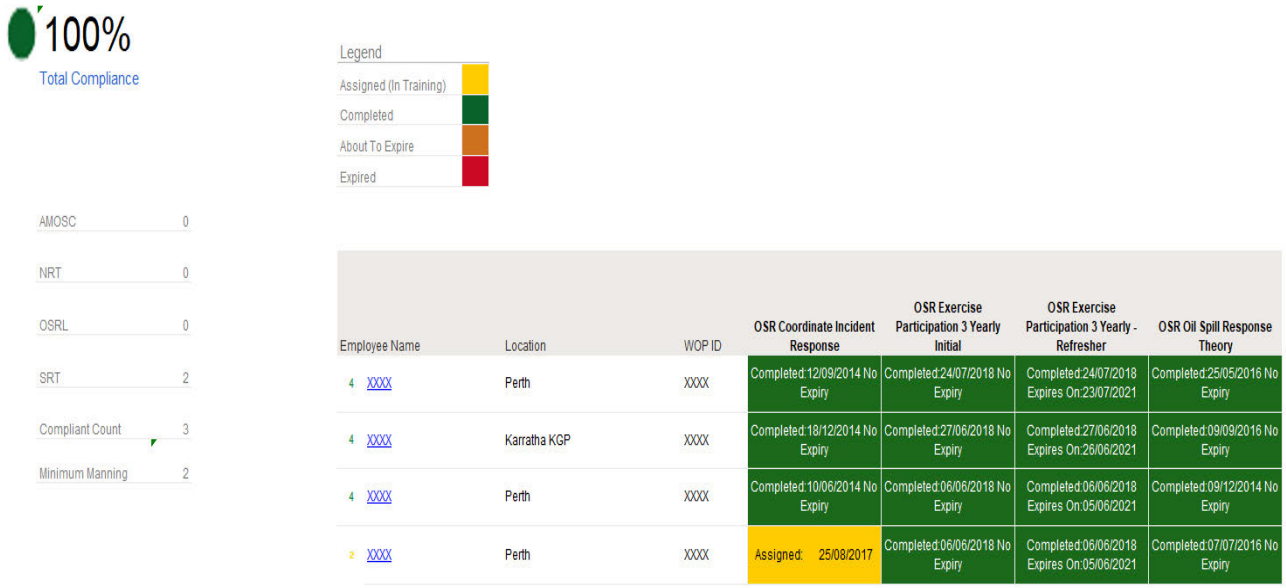

Figure 5-3: Example screen shot for the Ops Point Coordinator role

3. The Hydrocarbon Spill Preparedness ICE Assurance Process

The Hydrocarbon Spill Response Team has developed a Hydrocarbon Spill Preparedness and Response 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** – Ensures 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** – Ensures the competency dashboard is up to date and there are the minimum competency numbers 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 ensure compliance.

C. **Capability** – Tracks and monitors capability that could be required in a hydrocarbon incident, including but not limited to: integrated fleet[15] vessel schedule, dispersant availability, rig/vessels monitoring, equipment stockpiles, tracking buoy locations and the CIMT duty roster.

D. **Compliance and Assurance** – Ensures 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 to ensure ongoing compliance monitoring. The level of compliance can be reviewed in real time and is reported on a monthly basis through the S&EM Function.

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. (Note, this procedure does not apply to scenarios relating to gas releases in 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
- Accountabilities for hydrocarbon spill response preparedness
- Spill training requirements

[15] 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

- 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 options have been identified and assessed against the base capability described in Section 5 with 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 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.

6.1.1 Operational Monitoring – Control Measure Options Analysis

6.1.1.1 Alternative Control Measures

Alternative Control Measures considered *Alternative, 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 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**
Use of Autonomous Underwater Vehicles (AUVs) for hydrocarbon presence and detection.	Use of AUVs may be feasible and may provide an environmental benefit in assessing inaccessible areas for presence of hydrocarbons in the water however cost of purchase is disproportionate to the environmental benefit when compared to the monitoring types in place.	AUVs may be considered as an additional method of monitoring, should remote systems be required for health and safety reasons.	Cost A$10,000 for mobilisation and A$15,000 a day when deployed.	This option is not adopted as the current capability meets the need.	**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 monitoring data used to inform all other response techniques. No improvement required.	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 approx. $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, 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 $200 per day or $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 ensure timely and sustainable response. Additional observers are available through current contracts with AMOSC and OSRL.	Current capability meets need. Woodside has a pool of trained, competent observers at strategic locations to ensure timely and sustainable response. Additional observers are available through current contracts with AMOSC and OSRL Aviation standards & guidelines ensure all aircraft crews are competent for their roles. Woodside maintains a pool of trained and competent aerial observers with various home	Cost for additional trained aerial observers would be $2000 per person per day.	This option is not adopted as the current capability meets the need, but additional observers are available via	**No**

		base locations to be called upon at the time of an incident. Regular audits of oil spill response organisations ensure training and competency is maintained.		response contractors if required.	

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 $50,000 for 24hr access plus an initial $5000 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**
Night time 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 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. The cost and organisational complexity of employing two dedicated response vessels (approximately A$15 M/ year per vessel) is considered disproportionate to the potential environmental benefit to be realised by adopting this delivery options.	Operations are not feasible on day 1 as the hydrocarbon will take time to surface, and volatility has potential to cause health concerns within the first 24 hours of the response.	Cost for purchase of equipment approx. 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 approx. A$1 M per annum, which is disproportionate to the incremental benefit this would provide, assets are already available on day 1. Two integrated fleet vessels are available from day 1, 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 credible scenarios (as described in Section 2.2). This includes the following selection of primary source control and well intervention techniques which would be conducted concurrently:

- Inspection and possible intervention using ROVs
- Capping stack deployment (not feasible for MEE-01-02A but may be feasible for CS-01)
- 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. The ROV available on the MODU can be deployed for this purpose within 48 hours. Work class ROVs for well intervention are also available through the existing frame agreements and are available for deployment within seven days (Table 6-1). It is not expected that any additional regulatory approvals would be required as inspection, maintenance and repair is within the scope of activities for the *Woodside Energy Ltd Well Construction Campaign (2023-2024) Safety Case* as well as the scope of activities for contracted Frame Agreement vessels.

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.

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 (days)
Source and mobilise vessel with work class ROV	2 days
Liaise with Regulator regarding risks and impacts*	4 days
Undertake ROV Inspection	1 day
TOTAL	**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 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 and 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 ensure 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 and 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 Activity SCERP details the mobilisation and resource requirements for implementing this strategy. 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, 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 Activity SCERP. This plan has pre-identified vessel specifications for the capping stack deployment and Woodside monitors the availability and location of these vessels on a monthly basis. Woodside maintain 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 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.

A capping stack will be mobilised to site within 16 days. Woodside will monitor the conditions around the wellsite and deployment for 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 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:

- existing frame agreement vessel, located outside the region with approved Australian Safety Case
- a safety case revision and scope of validation is required
- vessel meets the technical requirements for deploying capping stack as per the Source Control Emergency Response Planning Guideline
- 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 6-3 would be implemented concurrently with the actions required for the Safety Case revision development scenarios detailed in Figure 6-5 and Table 6-3. Woodside will execute the capping stack response in the fastest possible timeframe, provided the required safety and metocean conditions allow. 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 ensure necessary regulatory approvals are in place to meet timelines for relief well drilling. The screening for relief well drilling MODUs is based on the following and the process used for Angel Operations 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 APPEA 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.

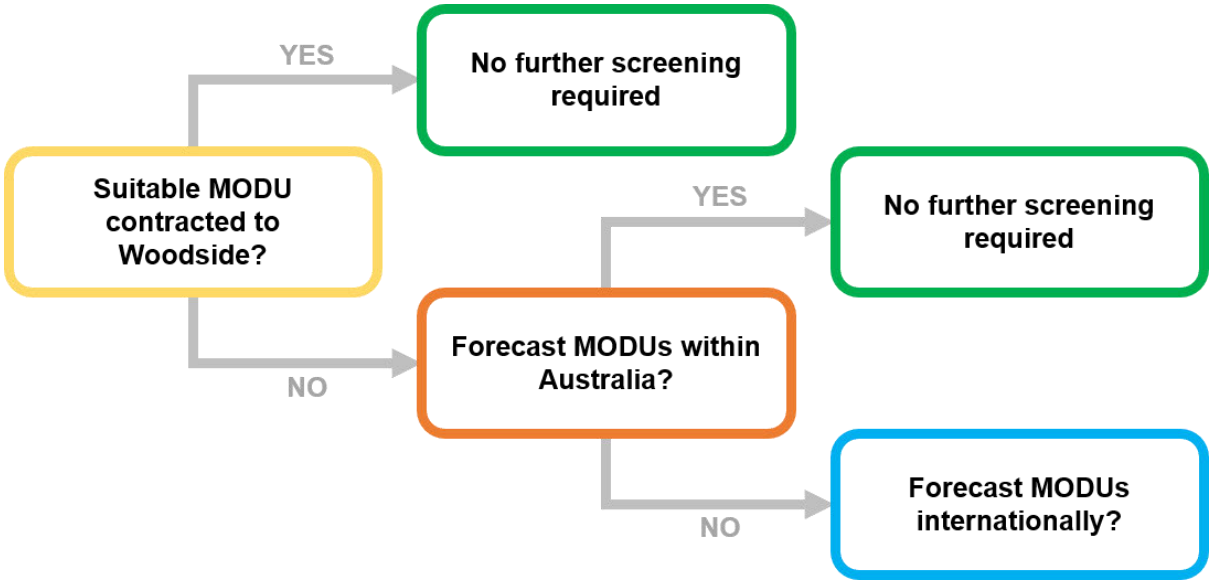

Figure 6-1: Angel Operations process for sourcing relief well MODU

Woodside has not assessed the timeframe for obtaining a relief well MODU through international supply for this project as the certainty of local supply has been confirmed. 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 screening of relief well MODUs is undertaken and presented at a well design stage peer assessment. 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. The suitability and location of pre-identified relief well MODUs is tested again prior to the operation. Though the APPEA MoU will serve as the instrument to facilitate the transfer of drilling units and well site services between operators in the event of an emergency, Woodside will engage each of the identified titleholders in advance to maintain confidence in MODU suitability and availability.

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 moored MODUs, plus MODU activities of registered operators and MODUs with approved safety cases, are tracked by Woodside on a monthly basis to ensure that the best available option can be sourced and utilised in the event of the worst-case credible 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 APPEA Drilling Industry Safety Committee. 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 timeframe would allow two years' warning of any potential gap. Woodside will execute relief well drilling in the fastest possible timeframe.

The detail of these arrangements demonstrates that the risks have been reduced to ALARP and Acceptable levels 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 68 days for AP3 well and 77 days for LDA02 well. Relief wells for other wells within the Angel and Lambert Deep fields are expected to be similar duration.

AP3 was selected as representative of Angel operations due to it being the most recently flowing and most crestal Angel well. It is the worst case spill scenario, including those for Lambert Deep and LDA02.

Details on the steps and time required to drill a relief well is shown in Table 6-2 below. Moored MODUs are suitable for the PAPs and have been used as the basis for the analysis within this document.

To validate the effectiveness of the relief MODU supply arrangements through the APPEA MoU, the 21-day mobilisation period was tested in April 2019 in an exercise facilitated by an external party. This exercise included suspension of the assisting operator's activities, contracting the MODU, vessel safety case revision and transit to location. The testing of mobilisation arrangements has been incorporated into Woodside's Hydrocarbon Spill Arrangements Testing Schedule.

Table 6-2: Relief well drilling timings

Estimated Relief Well Duration	Moored Days – production wells	Moored Days – tie-back wells	
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	33	42	
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	**68**	**77**	

The above timings assume a dynamically positioned MODU is not available.

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. During the Montara incident, it took five attempts to achieve a successful intersect.

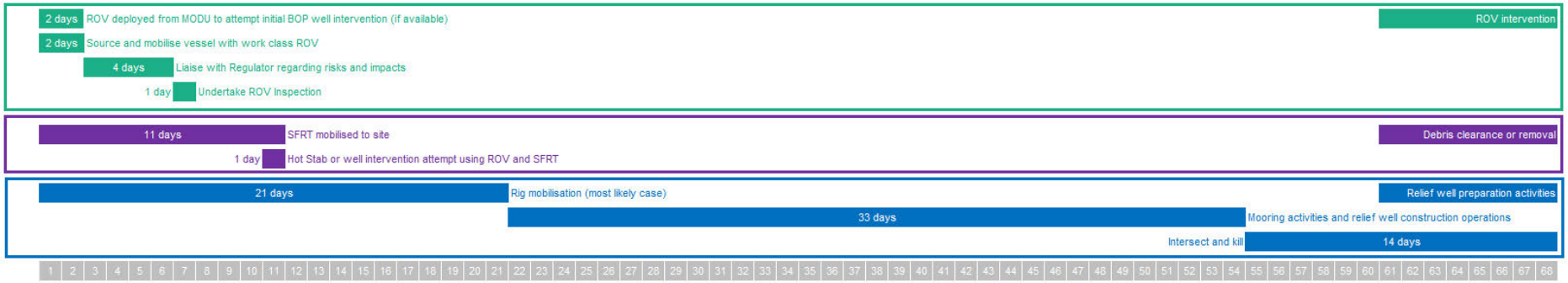

Figure 6-2: Source control and well intervention response strategy deployment timeframes for Angel operations (based on AP3 well)[16]

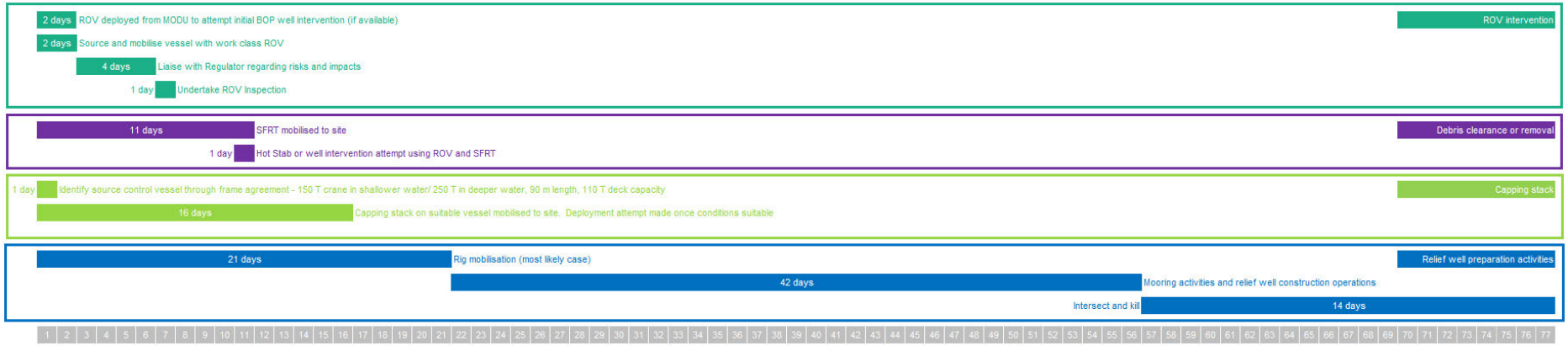

Figure 6-3: Source control and well intervention response strategy deployment timeframes for Lambert West drilling activities (LDA02 well)

[16] Note: Capping stack is not applicable for AP3 well, however, it may be feasible for other wells in the field and will be assessed on a case-by-case basis.

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. In the event that a revision to the Operator's Safety Case is required for relief well drilling, Woodside has identified measures to ensure 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 on a monthly basis, with a two-year lookahead.
- Prioritisation of MODUs/vessels with current or historical contracting arrangements. Woodside maintains records of previous contracting arrangements and companies. All current contracts for vessels and MODUs are required to support Woodside in the event of an emergency.
- Leverage mutual aid arrangements such as the APPEA MOU for vessel and MODU support.
- Woodside Planning and Logistics, and Safety Officers (on-Roster/Call 24/7) which can articulate need for, and deliver Woodside support, in key delivery tasks including 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.

The MODUs screened for contingency relief well drilling all operate under an Accepted base Safety Case. A relief well Safety Case Revision would leverage the previously accepted Safety Case Revision for the PAPs, including the associated site-specific well hazards. As such, there is less new detail for the regulator to review and should present a short review timeframe with no impact expected to the commencement of relief well drilling activities.

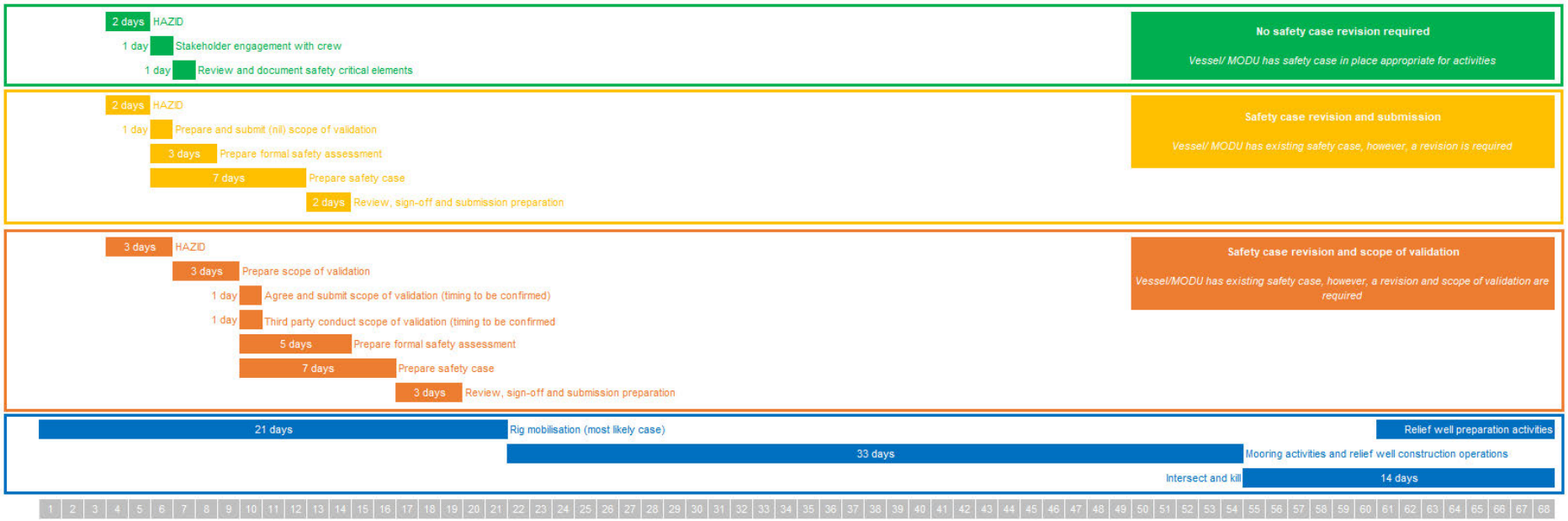

Figure 6-4: Timeline showing safety case revision timings alongside other relief well preparation activity timings for Angel operations (based on AP3 well)

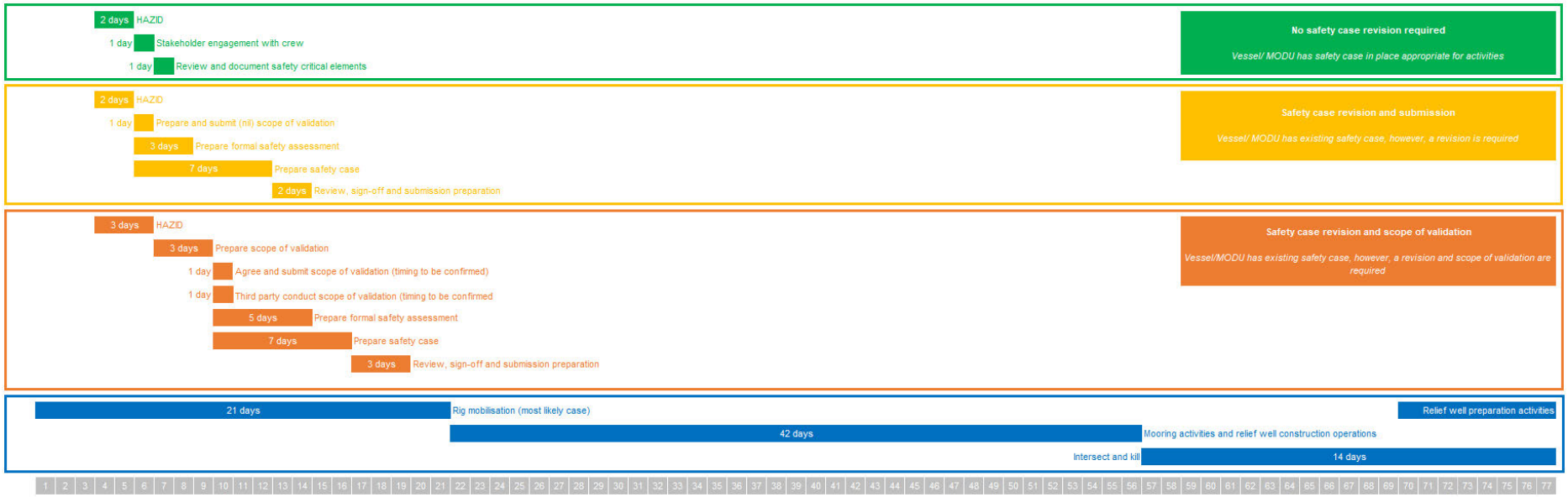

Figure 6-5: Timeline showing safety case revision timings alongside other relief well preparation activity timings for Lambert West drilling activities (LDA02 well)

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 and available for workshops and safety case studies.	Safety case timing assumes vessel/ MODU selected and crew and 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 , 6.2.2, 6.2.3 and 6.2.4 outline the primary and alternate approach 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 options have been identified and assessed against the base capability described in Section 5 with 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 clearly disproportionate to the environmental benefit, and/or the option is not reasonably practical.

- Alternative options, including potentially more effective and/or novel control measures 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 ensure the selected level of performance in Section **Error! Reference source not found.** reduces t he 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 clearly grossly disproportionate compared to the environmental benefit.

6.2.6.1 Alternative Control Measures

Alternative Control Measures considered *Alternative, 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 B 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 Petroleum Activities Program are disproportionate to the environmental benefit gained above finding a MODU through the MOU agreement for all spill scenarios.	**No**
Standby MODU shared across APPEA MOU Titleholders	A standby MODU shared across all titleholders who are signatories to the APPEA 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 a number of 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 Petroleum Activities Program 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 Petroleum Activities Program, 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 APPEA MOU on rig sharing in the unlikely event this is required. Commercial and operational provisions do not allow Woodside 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, 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, the feasibility issues surrounding an offset capping deployment in the water depths at the PAP wells, together with mobilisation lead times for both a cap and required vessels/ support equipment, would minimise any environmental benefit gained.	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 these depths 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	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 PAP 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**

		to conduct the lift of the carrier. Vessels with such capability and a current Australian vessel safety case are not locally or readily available.			
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, the feasibility issues surrounding a dual vessel capping deployment in the water depths at AP3 well, together with 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 75 m are not, however, very common and will present a logistical challenge to identify and relocate to the region. Further, 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 68 days (AP3) and 77 days (LDA02) 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 >90 days which is longer than the expected 68 days (AP3) and 77 days (LDA02) relief well drilling operations 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 Petroleum Activities Program 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 Petroleum Activities Program. Estimated cost over the program's life is approx. A$1.6 M per day over the PAP based on 2-4 days of top-hole drilling (plus standby time) for each top-hole drilled.	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	Woodside has an agreement in place with Wild Well Control Inc and Oceaneering to provide trained personnel in the event of an incident.	Having contracts in place to access trained, competent personnel in the event of an	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	**Yes**

Control and Oceaneering	This will ensure that competent personnel are available in the shortest possible timeframe.	incident would reduce mobilization times. This option is considered reasonably practicable.		disproportionate to any environmental benefit that might be realised.	

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$600K 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 options have been assessed against the base capability described in Section 5 with 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 Alternative control measures

Alternative Control Measures considered
Alternative, including potentially more effective and/or novel control measures are evaluated as replacements for an adopted control

Option considered	Environmental consideration	Feasibility	Approx. Cost	Implemented
No reasonably practical alternative control measures identified				N/A

6.3.2 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	Approx. Cost	Implemented
No reasonably practical additional control measures identified				N/A

6.3.3 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	Approx. Cost	Implemented
No reasonably practical improved control measures identified				N/A

6.3.4 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 options have been identified and assessed against the base capability described in Section 5 with 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 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 exiting 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: Angel loss of well containment (MEE-01-02A) – Shoreline Protection and Deflection

Planning for shoreline protection is based upon identification of Response Protection Areas (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 were 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 by Day 1-2 (if required). Deterministic modelling scenarios indicate that first shoreline impact at Southern Pilbara Islands – Peak Island within 23.4 days (3 m^3) for MEE-01-02A. There is no shoreline impact predicted at threshold for MEE-02-03B or MEE-04. The existing capability is, therefore, considered sufficient to mobilise and deploy protection at RPAs prior to hydrocarbon contact, guided by predictive modelling, direct observation/surveillance and remote sensing methods (OM01, OM02 and OM03) employed from the outset of a spill to track the oil and assess receptors at risk. This will then trigger the undertaking of pre-emptive assessments of sensitive receptors at risk (OM04) if required. OM04 would only be undertaken in liaison with WA DoT. Tactical response plans exist for many of the RPAs identified.

Table 6-5 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 exceeds the response planning need identified for shoreline protection and deflection operations.

Table 6-4: Response Planning – Shoreline Protection and Deflection

Angel Operations – MEE-01-2A		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	0	0	0	0	0	0	0	0	0	3	0	72
A	Capability Required												
A1	Number of RPAs contacted (> 100 g/m^2) – Angel Operations LOWC	0	0	0	0	0	0	0	0	0	1	0	3
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	84	336	336
C	Capability Gap (operations per day)												
C1	SPD operations gap – per day (lower)	0	0	0	0	0	0	0	0	0	0	0	0
C2	SPD operations gap – per day (upper)	0	0	0	0	0	0	0	0	0	0	0	0

A1, A2 and A3 – 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 5.3),
C1 and C2 – the gap between the upper and lower number of shoreline protection and deflection operations required in A1, A2 and A3 compared to the operations available in B1 and B2

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 and additional TRPs drafted only when operational monitoring (OM02 and OM03) and modelling (OM01) indicate that contact could occur at RPA(s) within 14 days. The outputs from the monitoring will inform the need for and/or direct any additional response techniques and, additionally, if/when the spill enters State Waters and control of the incident passes to WA DoT.

Table 6-5: Indicative Tactical response plan, aims and methods for identified RPAs

Tactical Response Plan	Response aims and methods
Muiron Islands	**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. **Second Response Objective**: Pre-clean of potential impact areas (if time allows) using rakes and shovels to move any debris above the high tide line and then segregate appropriately. **Third Response Objective**: Clean-up of the shoreline. Manual clean up techniques, use of mechanical recovery methods and techniques where appropriate. **Fourth Response Objective**: Collection and specialist cleaning/rehabilitation of oiled wildlife.
Pilbara Islands – Southern Island Group	**First Response objective:** Undertake Monitor and Evaluate strategy – Shoreline assessment techniques to be undertaken. **Second Response objective:** Pre-clean of the beach area using rakes and shovels, move any debris on the beach to above the high tide area, above the reach of any floating oil. **Third Response objective:** Shoreline Protection - prevent oil from moving into key sensitive areas within the gulf area by deployment of booms. Deflection & containment methods would be undertaken. **Fourth Response objective:** Recovery of collected oil where possible through the use of skimming systems. Although boom formations will deflect most of the spilt hydrocarbon away from sensitive areas, it may be necessary to collect and remove floating oil from additional boom formations to prevent the spread of oil down the coastline into the Gulf. **Fifth Response objective:** Clean-up of oiled shoreline using manual clean up techniques, predominantly rakes and shovels, with flushing and vacuum skimming if appropriate and required.

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 monitoring and modelling indicated that contact could occur within 3-5 days and operational monitoring operations identify spill heading towards RPA(s).

6.4.3 Shoreline Protection and Deflection – Control Measure Options Analysis

6.4.3.1 Alternative Control Measures

Alternative Control Measures considered *Alternative, 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. Equipment is currently available to protect RPAs and additional shorelines, within estimated minimum times until shoreline contact at RPAs, enabling mobilisation of the selected delivery options.	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 in Exmouth.	Total cost to preposition protection/ deflection packages at each site of potential impact would be approx. A$6,100 per package per day.	This option is not adopted as the existing capability meets the need.	**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 in Exmouth 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 (serious long-term impacts) 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 in Exmouth.	Total cost for purchase supplemental protection and deflection equipment would be approx. A$455,000 per package.	This option is not adopted as the existing capability meets the need.	**No**

Additional trained personnel	The level of training and competency of the response personnel ensures the shoreline protection and deflection operation is 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 OSRO's (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 brief prior to commencing operations.	Additional Specialist Personnel would cost A$2,000 per person per day.	This option is not adopted as the existing capability meets the need.	**No**

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	Given modelling does not predict floating or shoreline impacts at threshold until day 23.4 (MEE-01-02A), or no shoreline impact predicted at threshold for MEE-02-03B or MEE-04, Woodside considers that there is sufficient time for deployment of protection and deflection operations prior to impact.	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. Hydrocarbons are not predicted to strand at threshold until day 23.4 at Southern Pilbara Islands – Peak Island (MEE-01-02A) or no shoreline impact predicted at threshold for MEE-02-03B or MEE-04,therefore allowing enough time to re-locate existing equipment, personnel and other resources to the most appropriate areas.	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 the existing capability meets the need.	**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 options have been identified and assessed against the base capability described in Section 5 with 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 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.

6.5.1 Existing Capability – Shoreline Clean-up

Woodside's exiting 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: Angel loss of well containment (MEE-01-02A) – 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.

Deterministic modelling indicates that first shoreline impact is at Southern Pilbara – Islands and Peak Island within 62.9 days for MEE-01-02A (23 m^3). There is no shoreline impact predicted at threshold for MEE-02-03B and MEE-04. These volumes assume no treatment of floating surface oil by containment and recovery or surface dispersant application prior to contact so are considered very conservative.

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 deterministic modelling are longer time frames and lesser volumes, demonstration of capability against this need will ensure Woodside can meet requirements for any other outcome. Woodside is satisfied that the current capability is managing risks and impacts to ALARP.

In the event of a real spill, predictive modelling, direct observation/surveillance and remote sensing methods (OM01, OM02 and OM03) will be employed from the outset of a spill to track the oil real-time and assess receptors at risk of impact. This will then trigger the undertaking of pre-emptive assessments of sensitive receptors at risk (OM04) and shoreline assessments (OM05) to establish the extent and distribution of oiling and thus direct any shoreline clean-up operations. OM04 and OM05 would only be undertaken in liaison with WA DoT.

Due to the timeframe of predicted contact for shoreline clean-up, and deterministic modelling predicting ongoing stranding after this peak, this response may not be as time critical compared to other response techniques and the scale will depend on the success of other techniques preventing oiling occurring. Further, 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 the Dampier region to undertake clean-up operations and to manage wastes generated during the response effort. From previous assessment of facilities in the Dampier region, 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 6.4.3.

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	0	0	0	0	0	0	0	0	0	3	0	72	0
	Oil remaining following response operations - m^3	0	0	0	0	0	0	0	0	0	0	0	0	29
A	Capability Required (number of operations)													
A1	SCU operations required (lower)	0	0	0	0	0	0	0	0	0	0	0	7	3
A2	SCU operations required (upper)	0	0	0	0	0	0	0	0	0	0	0	14	6
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)	0	0	0	0	0	0	0	0	0	0	0	0	0
C2	SHC operations gap (upper)	0	0	0	0	0	0	0	0	0	0	0	0	0

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, 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 ensures the shoreline clean-up operation is 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 brief prior to commencing operations.	Additional Specialist Personnel would cost A$2,000 per person per day.	This option is not adopted as the existing capability meets the need.	**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 ensure there is no 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 x 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 ensure an efficient shoreline clean-up. 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$2,000 per person per day.	This option is not adopted as the existing capability meets the need.	**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	Given modelling does not predict floating or shoreline impacts at threshold until day 23.4 (MEE-01-02A), or no shoreline impact predicted at threshold for MEE-02-03B or	Response teams, trained personnel, contracted oil spill response service providers, government agencies and the associated	The cost of establishing a local stockpile of new shoreline clean-up equipment closer to	This option is not adopted as the existing capability meets the need.	**No**

	MEE-04, Woodside considers that there is sufficient time for deployment of protection and deflection operations prior to impact.	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. Hydrocarbons are not predicted to strand at threshold until day 23.4 at Southern Pilbara Islands – Peak Island (MEE-01-02A) or no shoreline impact predicted at threshold for MEE-02-03B or MEE-04,therefore allowing enough time to re-locate existing equipment, personnel and other resources to the most appropriate areas.	the expected hydrocarbon stranding areas is not commensurate with the need.		

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 options have been identified and assessed against the base capability described in Section 5 with 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 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.

6.6.1 Existing Capability – 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, 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 ensure that these resources can 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 by Day 3. 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 and there is no additional environmental benefit in adopting the improvements.	Hydrocarbon contact above shoreline threshold concentrations is expected on day 23.4 (MEE-01-02A), no shoreline impact predicted at threshold for MEE-02-03B or MEE-04. Given the low likelihood of such an event occurring and that the current capability meets the need, the cost of implementing measures to reduce the mobilisation time is considered disproportionate to the benefit. Additionally, the remote offshore location of the release site, with an earliest impact on day 23.4, provides sufficient opportunity for the ongoing monitoring and surveillance operations to inform the scale of the response. 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. Oiled wildlife response capacity would be addressed for open Commonwealth waters through the AMOSC arrangements, as informed by operational monitoring. The cost and organisational complexity of this approach is moderate, and the overall delivery effectiveness is high.	Additional wildlife response resources could total A$1,700 per operational site per day.	This option is not adopted as the existing capability meets the need.	**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 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 maybe sourced via existing contracts with OSROs. Materials for holding facilities, portable pools, enclosures and rehabilitation areas would be sourced as required.	Additional wildlife response personnel cost A$2,000 per person per day	This option is not adopted as the existing capability meets the need.	No

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	Response time is limited by specialist personnel mobilisation time. Current timing is sufficient for expected first shoreline contact. This control measure provides increased effectiveness through faster mobilisation of specialists. However, no significant net environmental benefit is expected due to shoreline stranding times.	Pre-positioning vessels or equipment would reduce mobilisation time for oiled wildlife response activities. However, given the effectiveness of an oiled wildlife response is expected to be low, an earlier response would provide a marginal increase in environmental benefit.	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.	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 options have been identified and assessed against the base capability described in Section 5 with 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 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.

6.7.1 Existing Capability – Waste Management

Woodside's exiting 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, 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 Veolia'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 OSRL. Existing arrangements meet identified need for the PAP.	Cost for increased waste disposal capability would be approx. A$1,300 per m^3. Cost for increased onshore temporary waste storage capability would be approx. 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.	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 as the existing capability meets the need.	**No**

	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 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 options have been identified and assessed against the base capability described in Section 5 with 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 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.

6.8.1 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, 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	SM01 water quality monitoring requires water samples to be transported to National Association of Testing Authorities (NATA) rated laboratories in Perth or interstate. 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). The environmental consideration of having access to suitable laboratory facilities in Exmouth or 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 effectiveness of this alternative control (weather dependency, availability and survivability) is rated as very low	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 well control 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 rely 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. • Ensure there is appropriate baseline for key receptors for all geographic locations that are potentially impacted <10 days of spill event. • Address resourcing needs to collect pre-emptive baseline as spill expands in the event of a spill from the PAP activities. • For SM01 pre-emptive baseline is not required as marine water quality is assumed to be pristine.	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**

6.8.2.3 Improved Control Measures considered

Improved Control Measures considered *Improved, 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 IMT.
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 to establish mobilisation plan, secure logistics resources and establish ongoing logistical support operations, including:

Responsibility	Action
	• 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 • 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 Jacob'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 Ecologically Sustainable Development (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 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 to ensure these impacts and risks have been considered and specific measures are put in place to continually review and manage these further impacts and risks to ALARP and Acceptable levels. 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. Refer to the EP for details regarding how these risks are being managed. They are not discussed further in this document.

- 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
- vegetation cutting
- additional stress or injury caused to wildlife
- waste generation.

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 response					✓	✓	
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).

A number of 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 Total Suspended Solids (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) (ie 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 in close proximity 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 Environment Plan. 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 WBM and NWBMs, 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 LOC event a relief well drilling activity would be responding too).

Vessel operations and anchoring

Typical booms used in containment and recovery operations are designed to float, meaning that fauna capable of diving, such as cetaceans, marine turtles and seasnakes 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 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); and
- Excessive removal of substrate causing erosion and instability of localised areas of the shoreline.

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), recovered from shoreline clean-up operations and OWR
- semi-solids/solids (oily solids), collected during shoreline clean-up operations and OWR
- debris (e.g. seaweed, sand, woods, plastics), collected during shoreline clean-up operations and OWR.

If not managed and disposed of correctly, wastes generated during the response have the potential for secondary contamination similar to that described above, 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 ensure that further injury and the removal of water proofing feathers are managed and mitigated. Finally, during the release phase it's 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 (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

- Vehicular access will be restricted on dunes, turtle nesting beaches and in mangroves (PS 17.3).
- 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, 17.4).
- Removal of vegetation will be limited to moderately or heavily oiled vegetation (PS28.5).
- Oversight by trained personnel who are aware of the risks (PS 17.6).
- Trained unit leaders brief personnel prior to operations of the environmental risks of presence of personnel on the shoreline (PS 17.7).

Waste generation

- All shorelines 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 15.5).
- Limiting vegetation removal to only that vegetation that has been moderately or heavily oiled (PS 17.5).

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 WAOWRP and the relevant regional plan (PS 20.1).

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 clearly 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 all of 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/ organisation 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 acceptable levels. 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 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

APASA 2013. Xena Vessel Collision – Spill Modelling Results. Memorandum to Woodside Energy Ltd.

Australian Maritime Safety Authority. The National Plan Oil Spill Control Agents List. Available from: https://www.amsa.gov.au/environment/maritime-environmental-emergencies/national-plan/General-Information/control-agents/list/index.asp [Accessed 23 June 2014]

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 08/10/2015).

Australasian Fire and Emergency Service Authorities Council, 2011, Fundamentals of Doctrine: A best practice guide, East Melbourne, VIC, AFAC Limited.

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

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

BSEE. 2016. https://www.bsee.gov/what-we-do/oil-spill-preparedness/response-system-planning-calculators

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.dpaw.wa.gov.au/images/images/WA%20Oiled%20Wildlife%20Response%20Plan.pdf

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.dpaw.wa.gov.au/images/WA%20Oiled%20Wildlife%20Response%20Manual.pdf

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]

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.pdf [https://www.doi.gov/deepwaterhorizon/adminrecord]

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 Energy Resources Australia (NERA), 2018. Environment Plan Reference Case: Anchoring of Vessels and Floating Facilities. Available at: https://referencecases.nera.org.au/Article?Action=View&Article_id=129

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 HighFrequency 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. Available at http://www.crrc.unh.edu/

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.pdf [https://www.doi.gov/deepwaterhorizon/adminrecord]

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.

11 GLOSSARY AND ABBREVIATIONS

11.1 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 is capable of performing 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 their 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 in order 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 to ensure they reduce risk to ALARP. A statement of the key requirements (indicators) that the control measure has to achieve in order to perform as intended in relation to its functionality, availability, reliability, survivability and dependencies.
Preparedness	Measures taken before an incident in order 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])

Term	Description / Definition
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.
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 – ≥100 ppb and entrained hydrocarbon concentrations – ≥500 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.

11.2 Abbreviations

Abbreviation	Meaning
ADIOS	Automated Data Inquiry for Oil Spills
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
CIMT	Corporate Incident Management Team
COP	Common Operating Picture
cSt	Centistokes
DM	Duty Manager
DoT	Western Australia Department of Transport
DBCA	Western Australia Department of Biodiversity, Conservation and Attractions (former Western Australian Department of Parks and Wildlife)
EMBA	Environment that May Be Affected
EMSA	European Maritime Safety Agency
EP	Environment Plan
Environment Regulations	Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009
ESI	Environmental Sensitivity Index
ESD	Ecologically Sustainable Development
ESP	Environmental Services Panel
FSP	First Strike Plan
GIS	Geographic Information System
GPS	Global Positioning System
HSP	Hydrocarbon Spill Preparedness
IAP	Incident Action Plan
IC	Incident Commander
ICE	Internal Control Environment
IMSA	Index of Marine Surveys for Assessment
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
KIMC	Karratha Incident Management Centre

Abbreviation	Meaning
KSAT	Kongsberg Satellite
MODU	Mobile Offshore Drilling Unit
MoU	Memorandum of Understanding
MP	Marine Park
NEBA	Net Environmental Benefit Analysis
NOAA	National Oceanic and Atmospheric Administration
NRT	National Response Team
OILMAP	Oil Spill Model and Response System
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
PEARLS	People, Environment, Asset, Reputation, Livelihood and Services
PBA	Pre-emptive Baseline Areas
PPA	Priority Protection Area
PPB	Parts per billion
PPM	Parts per million
ROV	Remotely Operated Vehicle(s)
RPA	Response Protection Area
SCAT	Shoreline Contamination Assessment Techniques
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
WHA	World Heritage Area
Woodside	Woodside Energy Limited
WCC	Woodside Communication Centre
WWCI	Wild Well Control Inc.
WCCS	Worst Case Credible Scenario

Abbreviation	Meaning
ZoA	Zone of Application

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 MEE-01-2A (AP3) and MEE-02-3B (Lambert Deep Rich Fluid). 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

The detailed NEBA assessment outcomes are shown below. The Angel Operations preoperational NEBAs contains the full assessments.

Table A-1: NEBA assessment technique recommendations for Angel Condensate release caused by well loss of containment (MEE-01-02A)

Receptor	Operational monitoring	Source control and well intervention	Source control (vessel)	Dispersant application: sub-sea	Dispersant application: > 20 m water depth and > 10 km from shore/reefs	Mechanical dispersion	In situ burning	Containment and recovery	Shoreline protection	Shoreline clean-up (manual)	Shoreline clean-up (mechanical)	Shoreline clean-up (chemical)	Oiled wildlife response
Muiron Islands & Marine Management Area	Yes	Yes	N/A	No	No	No	No	No	Yes	Yes	No	No	Yes
Southern Pilbara Islands – Peak Island	Yes	Yes	N/A	No	No	No	No	No	Yes	Yes	No	No	Yes
Sunday Island	Yes	Yes	N/A	No	No	No	No	No	Yes	Yes	No	No	Yes
Open water	Yes	Yes	N/A	No	No	No	No	No	Yes	No	No	No	Yes

Overall assessment

Sensitive receptor (sites identified in EP)	Operational monitoring	Source control and well intervention	Source control (vessel)	Dispersant application: sub-sea	Dispersant application: > 20 m water depth and > 10 km from shore/reefs	Mechanical dispersion	In situ burning	Containment and recovery	Shoreline protection	Shoreline clean-up (manual)	Shoreline clean-up (mechanical)	Shoreline clean-up (chemical)	Oiled wildlife response
Is this response Practicable?	Yes	Yes	N/A	No	No	No	No	No	Yes	Yes	No	No	Yes
NEBA identifies response potentially of net environmental benefit?	Yes	Yes	N/A	No	No	No	No	No	Yes	Yes	No	No	Yes

Table A-2: NEBA assessment technique recommendations for Lambert Deep Rich Fluid release caused by loss of subsea flowlines and infrastructure and/or export pipeline containment (MEE-02-03B)

Receptor	Operational monitoring	Source control and well intervention	Source control (vessel)	Dispersant application: sub-sea	Dispersant application: > 20 m water depth and > 10 km from shore/reefs	Mechanical dispersion	In situ burning	Containment and recovery	Shoreline protection	Shoreline clean-up (manual)	Shoreline clean-up (mechanical)	Shoreline clean-up (chemical)	Oiled wildlife response
Open water	Yes	N/A	N/A	N/A	No	No	No	No	No	No	No	No	Yes

Overall assessment

Sensitive receptor (sites identified in EP)	Operational monitoring	Source control and well intervention	Source control (vessel)	Dispersant application: sub-sea	Dispersant application: > 20 m water depth and > 10 km from shore/reefs	Mechanical dispersion	In situ burning	Containment and recovery	Shoreline protection	Shoreline clean-up (manual)	Shoreline clean-up (mechanical)	Shoreline clean-up (chemical)	Oiled wildlife response
Is this response Practicable?	Yes	N/A	N/A	N/A	No	No	No	No	No	No	No	No	Yes
NEBA identifies response potentially of net environmental benefit?	Yes	N/A	N/A	N/A	No	No	No	No	No	No	No	No	Yes

Table A-3: NEBA assessment technique recommendations for MDO (MEE-04)

Receptor	Operational monitoring	Source control and well intervention	Source control (vessel)	Dispersant application: sub-sea	Dispersant application: > 20 m water depth and > 10 km from shore/reefs	Mechanical dispersion	In situ burning	Containment and recovery	Shoreline protection	Shoreline clean-up (manual)	Shoreline clean-up (mechanical)	Shoreline clean-up (chemical)	Oiled wildlife response
Open water	Yes	N/A	Yes	N/A	No	No	No	No	No	No	No	No	Yes

Overall assessment

Sensitive receptor (sites identified in EP)	Operational monitoring	Source control and well intervention	Source control (vessel)	Dispersant application: sub-sea	Dispersant application: > 20 m water depth and > 10 km from shore/reefs	Mechanical dispersion	In situ burning	Containment and recovery	Shoreline protection	Shoreline clean-up (manual)	Shoreline clean-up (mechanical)	Shoreline clean-up (chemical)	Oiled wildlife response
Is this response Practicable?	Yes	N/A	Yes	N/A	No	No	No	No	No	No	No	No	Yes
NEBA identifies response potentially of net environmental benefit?	Yes	N/A	Yes	N/A	No	No	No	No	No	No	No	No	Yes

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[17]	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))

.

[17] 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 in order 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 in order 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	Objectives	Activation triggers	Termination criteria
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 – 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	Objectives	Activation triggers	Termination criteria
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). In the event that 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 activated the SMPs 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).

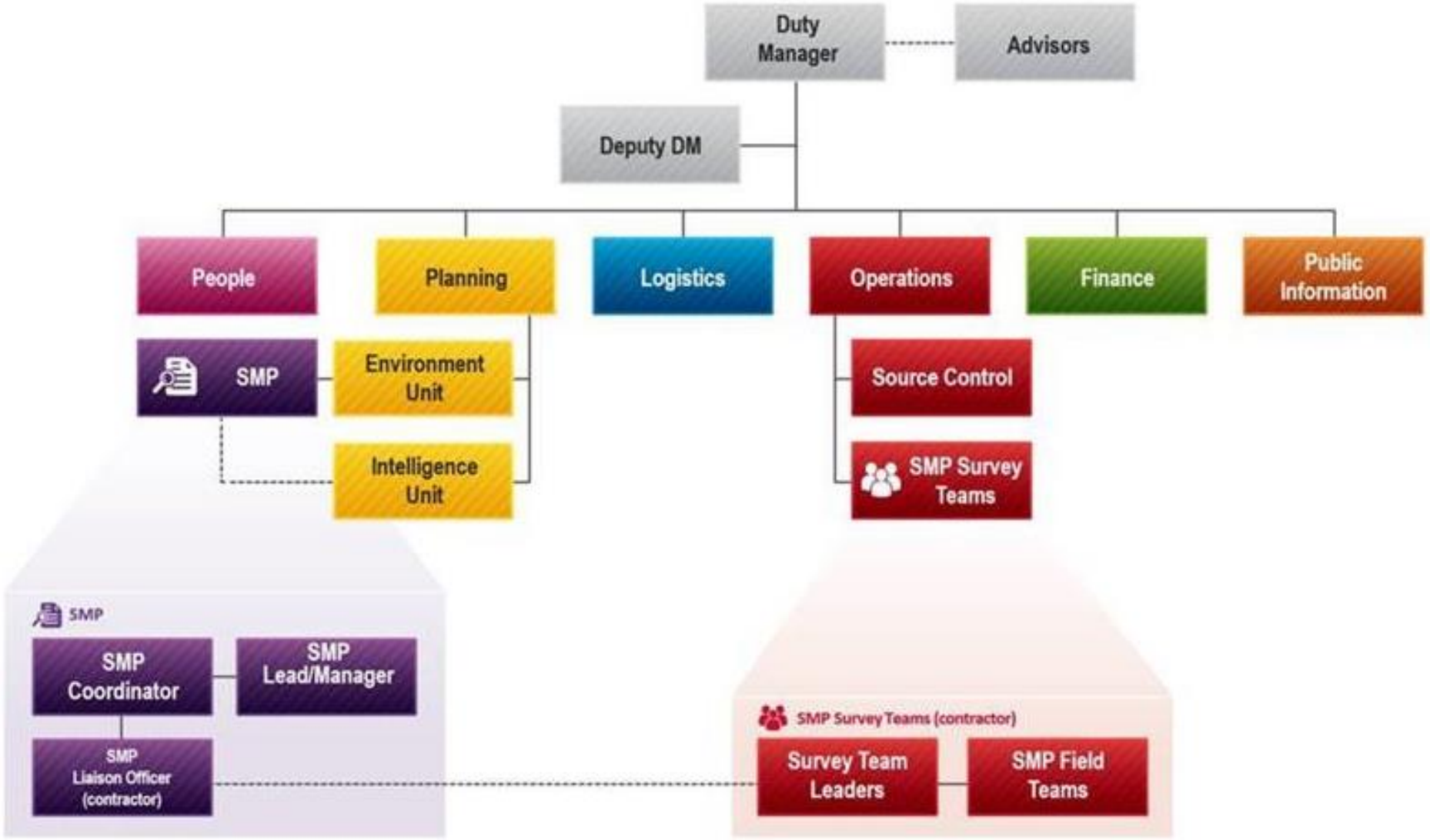

Figure C-1: Woodside Oil Spill Scientific Monitoring Program Delivery Team and Linkage to Corporate Incident Management Team (CIMT) organisational structure

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 (2019[18]) 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 (2013[19]) 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.

[18] NOPSEMA (2019) Bulletin #1 – Oil spill modelling – April 2019, https://www.nopsema.gov.au/assets/Bulletins/A652993.pdf
[19] 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
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 • 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.	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 • 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.	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. • 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.	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:	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:

Scientific monitoring Program (SMP)	Objectives	Activation Triggers	Termination Criteria
	• 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.	• 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.	• 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; • 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.	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. • 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 SMO3.	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) **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.	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.

Scientific monitoring Program (SMP)	Objectives	Activation Triggers	Termination Criteria
	Results will be used to make inferences on the health of commercial fisheries and the potential magnitude of impacts to fishing industries.		• 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 ensure the full range of eventualities relating to the environmental, socio-economic and health consequences of the spill are considered 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), Australian Marine Parks (AMPs), 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 on a daily basis 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 a number of 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 11A). Identification of relevant persons/ organisations, planning and engagement will be managed by Woodside's Public Information Functional Support Team (FST) and follow the Stakeholder Management 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/ organisations' 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 WHA, AMPs, 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).

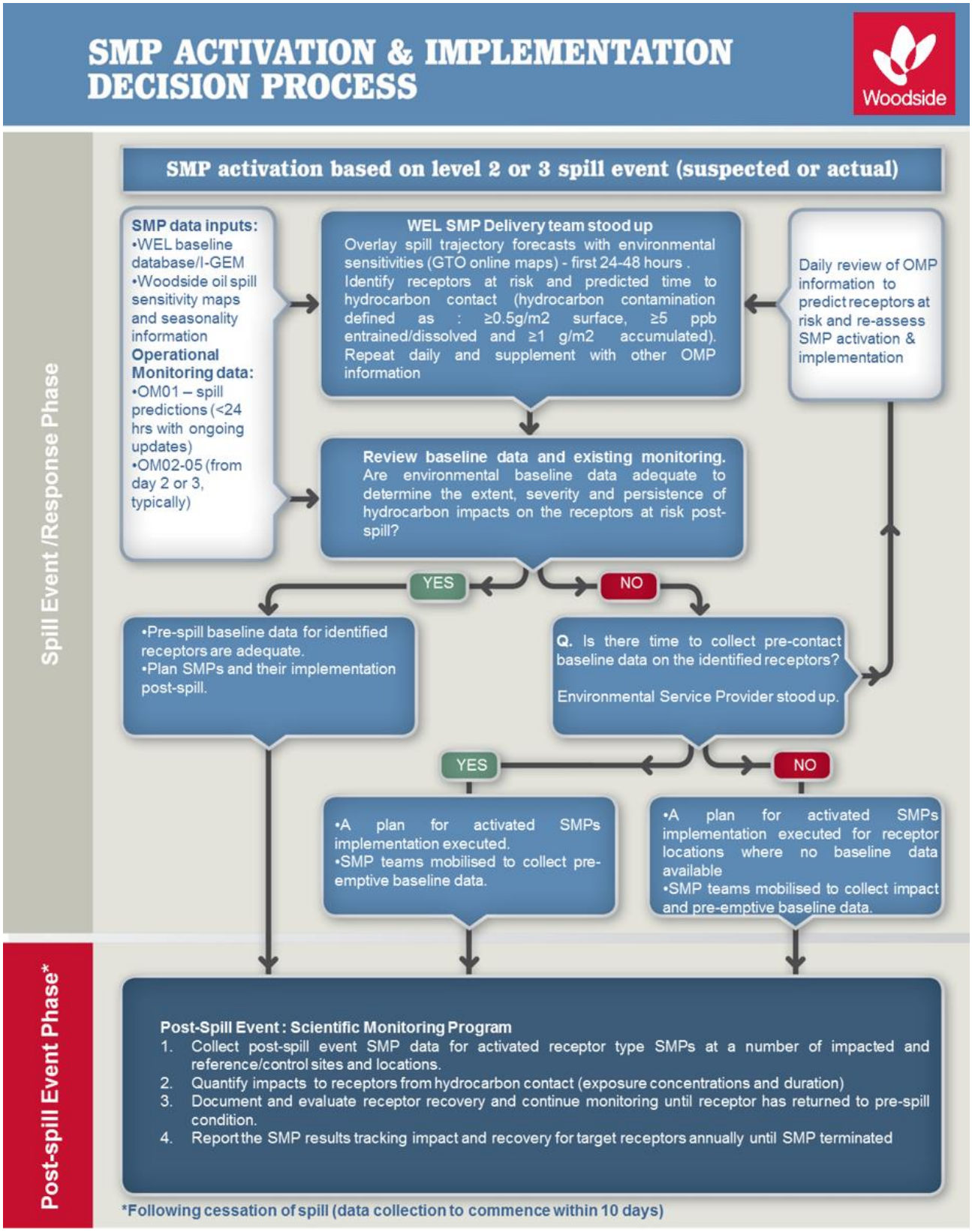

Figure C-2: Activation and Implementation Decision-tree for Oil Spill Environmental Monitoring

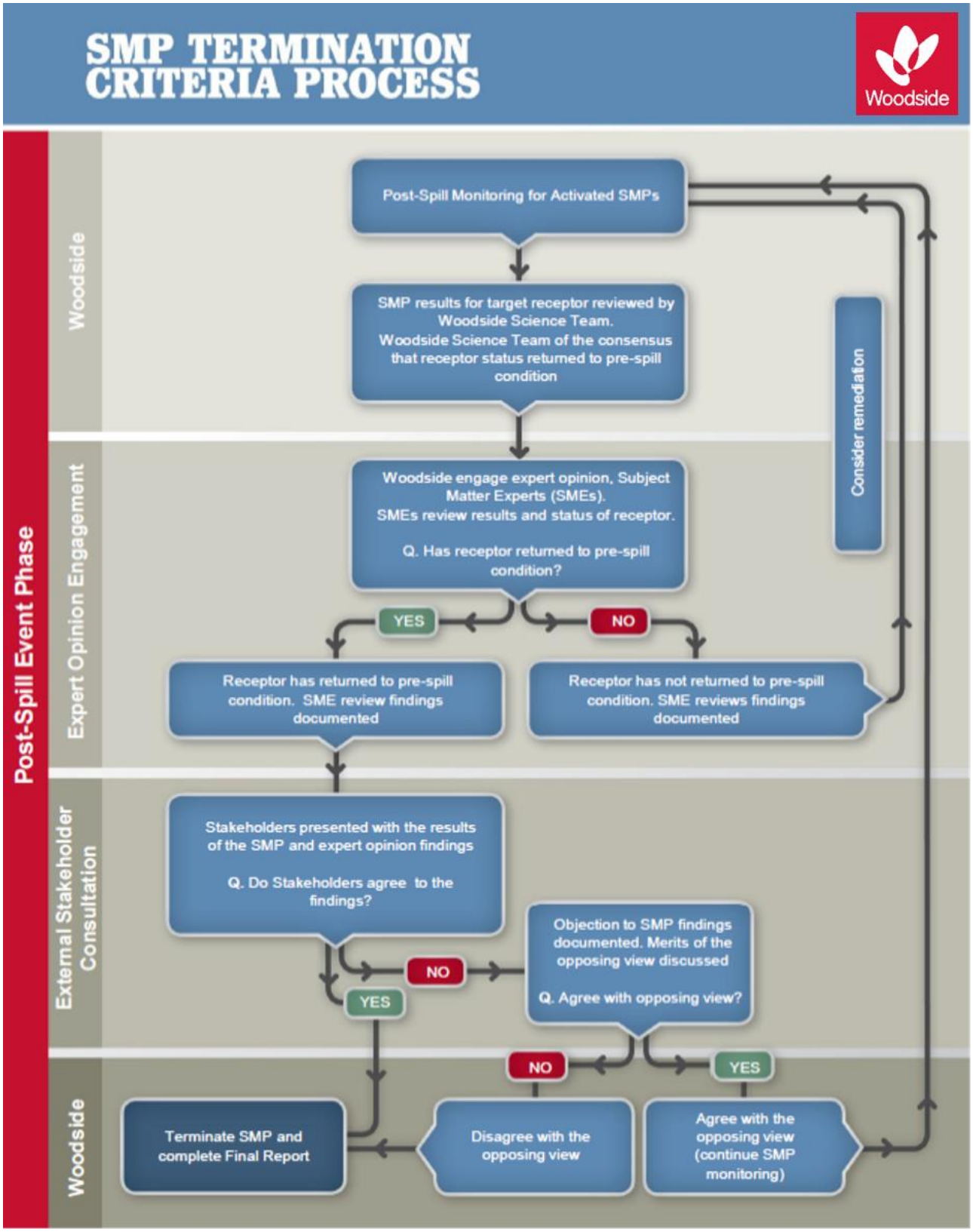

Figure C-3: Termination Criteria Decision-tree for Oil Spill Environmental Monitoring

Receptors at Risk and Baseline Knowledge

In order 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 a number of 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 Pre-emptive Baseline Areas (PBAs) where hydrocarbon contact is predicted to occur <10 days.

In addition to Woodside's Environmental Knowledge Management System, it is acknowledged that 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). In order to understand the present status of environmental baseline studies a spatial environmental metadata database for Western Australia (Industry-Government Environmental Metadata, I-GEM) 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 Department of Water and Environmental Regulation (WA) Index of Marine Surveys for Assessment (IMSA)[20] in 2020. The Index of Marine Surveys for Assessments (IMSA) is an online portal for information about marine-based environmental surveys in Western Australia. IMSA is a project of the Department of Water and Environmental Regulation 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.

[20] 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 Petroleum Activities Program 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 - Southern Island Group (Serrurier, Thevenard and Bessieres Islands - State Nature	Pilbara Islands - Northern Island Group (Sandy Island Passage Islands - State nature reserves)	Abrolhos Islands	Kimberley Coast	Dampier Peninsula	Northern Pilbara Shoreline	Ningaloo Coast (North/North West 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
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				
Mangroves and Saltmarsh	SM04																												X					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	
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	
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
Fisheries – Traditional	SM10															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	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 Petroleum Activities Program

Major Baseline	Proposed Scientific monitoring operational plan and Methodology	Rankin Bank & Glomar Shoal	Montebello Islands	Barrow Island	Lowendal Islands	Pilbara Islands – Southern Island Group (Serrurier, Thevenard and Bessieres Islands – State Nature Reserve)	Montebello AMP	Ningaloo and the Muiron Islands
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.	1. Broad benthic habitat classifications and habitat maps for the Montebello islands by DBCA. 2. Coral monitoring at sites across Barrow Island, Lowendal and the Montebello islands. Most recent survey 2012 3. Benthic community monitoring as part of DBCA Western Australian Marine Monitoring Program (2015-ongoing). 4. Pilbara Marine Conservation Partnership Seabed biodiversity survey (2013).	1. Chevron LTM of corals for the Gorgon Gas Development. Marine Baseline Program (2008), Marine Monitoring Program (2010) Post Development Surveys (2011 – 2013). 2.Coral monitoring at sites around Barrow Island, Lowendal and the Montebello islands. Most recent survey 2012. 3.Benthic community (coral, seagrass and macroalgae) monitoring as part of DBCA's Western Australian Marine Monitoring Program (2015-ongoing). 4.Pilbara Marine Conservation Partnership Seabed biodiversity survey (2013).	1. Benthic habitats surrounding the Lowendal Islands for the Gorgon Gas Development. Coral assemblages on the eastern side of Double Island, and coral bommies on the south-western edge of the Lowendal Shelf. 2. Coral monitoring at sites across Barrow Island, Lowendal and the Montebello islands. Most recent survey 2012. 3. Pilbara Marine Conservation Partnership Seabed biodiversity survey (2013).	1. Benthic habitat mapping of the subtidal and intertidal habitats of the islands and shoals. Coral communities in shallow subtidal habitat, intertidal pavement. 2. Coral monitoring at Varanus and Airlie Islands (2000 to present) to identify corals, growth from and percentage cover 3. Pilbara Marine Conservation Partnership Seabed biodiversity survey (2013; 2016)	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. DBCA LTM Ningaloo Reef program: 1991-ongoing 2. AIMS/DBCA 2014 Baseline Ningaloo and Muiron Islands Survey – repeat and expansion on the LTM (Co-funded survey: Woodside and AIMS). 3. Pilbara Marine Conservation Partnership. 4. WAMSI LTM Study: Ningaloo Research node: 2009 -10 over the length of Ningaloo reef system (with a focus on coral and fish recruitment). 5. Ningaloo Outlook (CSIRO) - Shallow and Deep Reefs Program (2015-ongoing). 6. Ningaloo Collaboration Cluster: Habitats of the Ningaloo Reef and adjacent coastal areas determined through hyperspectral imagery.
		Methods:						

Major Baseline	Proposed Scientific monitoring operational plan and Methodology	Rankin Bank & Glomar Shoal	Montebello Islands	Barrow Island	Lowendal Islands	Pilbara Islands – Southern Island Group (Serrurier, Thevenard and Bessieres Islands – State Nature Reserve)	Montebello AMP	Ningaloo and the Muiron Islands
		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.	1. Habitat mapping. 2. Quantitative assessment details not available. 3. Drop camera. 4. Fixed long-term monitoring sites. Diver video transect. 5. Towed video, benthic trawl and sled.	1. Belt transect, size class frequency, video transects, photo quadrat, tagged colonies and terracotta tiles for coral recruitment. 2. Quantitative assessment 3. Fixed long-term monitoring sites. Diver video transects. 4. Towed camera, benthic trawl and sled.	Benthic habitat mapping, diver swum transects, tagged colonies. Quantitative assessment Towed video, benthic trawl and sled.	1. ROV transects. 2. ROV transects and driver surveys 3. Towed video, benthic trawl and sled	1.ROV Transects 2. Benthic habitat mapping, multibeam acoustic swathing. 3. ROV video.	1. LTM transects, diver based (video) photo quadrats, specimen collection. 2. LTM sites, transects, diver-based video quadrat. 3. Diver video transects, still photography, video and in situ visual estimates from transects, quadrats, manta-tows, towed video and ROV. 4. Video point intercept transects recorded by towed video or diver hand-held video camera. 5. Video transects. 6. LTM transects, diver based (video) photo quadrat.
		References and Data:						

Major Baseline	Proposed Scientific monitoring operational plan and Methodology	Rankin Bank & Glomar Shoal	Montebello Islands	Barrow Island	Lowendal Islands	Pilbara Islands – Southern Island Group (Serrurier, Thevenard and Bessieres Islands – State Nature Reserve)	Montebello AMP	Ningaloo and the Muiron Islands
		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	1. DBCA 2007. DATAHOLDER: DBCA. 2. RPS, 2012. DATAHOLDER: Santos. 3. DATAHOLDER: DBCA. 4. Pitcher et al. (2016). DATAHOLDER: CSIRO.	1. Baseline: Chevron Australia 2010. Marine Monitoring Program: Chevron Australia 2011 Post Dredge: Chevron Australia 2013 DATAHOLDER: Chevron Australia. 2. RPS, 2012. DATAHOLDER: Santos. 3. Bancroft 2009. DATAHOLDER: DBCA. 4. Pitcher et al. (2016). DATAHOLDER: CSIRO.	1. RPS-Bowman Bishaw Gorham 2005. DATAHOLDER: Chevron. 2. RPS, 2012. DATAHOLDER: Santos. 3. Pitcher et al. (2016). DATAHOLDER: CSIRO.	1. Chevron 2010. DATAHOLDER: Chevron. 2. Quadrant Energy/Santos 2016 DATAHOLDER: Santos 3. CSIRO (2013; 2016). Roland Pitcher. DATAHOLDER	1. Advisian 2019 2. Keesing 2019 3. McLean et al. 2019	1. DBCA unpublished data. DATAHOLDER: DBCA 2. AIMS 2015. DATAHOLDER: AIMS. 3. Pilbara Marine Conservation Partnership DATAHOLDER: CSIRO 4. Depczynski et al. 2011 DATAHOLDER: AIMS, DBCA and WAMSI. 5. CSIRO 2019 – Ningaloo Outlook Program 6. Murdoch University - Kobryn et al 2011 and Keulen & Langdon 2011.
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:**						
		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.	1. Santos, macroalgae monitoring at sites across Lowendal and the Montebello islands in 2012. 2. Pilbara Marine Conservation Partnership Seabed biodiversity survey (2013).	1. Chevron LTM of Seagrass and Macro algae habitats for the Gorgon Gas Development project. Marine baseline Program (2008, 2009), Marine Monitoring Program (2010), Post Dredge Survey one (2011) 2. Chevron study by RPS in 2004 on Barrow Island intertidal zone. 3. Pilbara Marine Conservation Partnership Seabed biodiversity survey (2013).	1. Benthic habitats including seagrass and macroalgae for the (Lowendal Islands, Chevron Janz Feed Gas Pipeline Project.) Gorgon Gas Development Project. 2. Santos macroalgae monitoring at sites across Lowendal and the Montebello islands in 2012. 3. Pilbara Marine Conservation Partnership Seabed biodiversity survey (2013).	1. Benthic habitat mapping of the subtidal and intertidal habitats of the islands and shoals. Algae communities in shallow subtidal habitat, intertidal pavement. 3. Pilbara Marine Conservation Partnership Seabed biodiversity survey (2013; 2016)	N/A – see Table D-1	1. Quantitative descriptions of Ningaloo sanctuary zones habitats types including lagoon and offshore areas – Cassata and Collins (2008). 2. CSIRO/BHP Ningaloo Outlook Program. 3. Ningaloo Collaboration Cluster: Habitats of the Ningaloo Reef and adjacent coastal areas determined through hyperspectral imagery. 4. Australian Institute of Marine Science – CReefs: Ningaloo Reef Biodiversity Expeditions (2008-2010).
		Methods:						

Major Baseline	Proposed Scientific monitoring operational plan and Methodology	Rankin Bank & Glomar Shoal	Montebello Islands	Barrow Island	Lowendal Islands	Pilbara Islands – Southern Island Group (Serrurier, Thevenard and Bessieres Islands – State Nature Reserve)	Montebello AMP	Ningaloo and the Muiron Islands
		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	1. Quantitative assessment details not available. 2. Towed video, benthic trawl and sled.	1. Diver transects, photo quadrats, biomass. 2. Physical observational survey of intertidal habitats on Barrow Island. 3. Towed video, benthic trawl and sled.	1. Diver Transects, Photo Quadrats. 2. Quantitative assessment details not available. 3. Towed video, benthic trawl and sled.	1. ROV transects. 2. Towed video, benthic trawl and sled	N/A – see Table D-1	1. Video transects to ground truth aerial photographs and satellite imagery. 2. Diver video transects. 3. LTM transects, diver based (video) photo quadrat. 4. LTM transects, diver based (video) photo quadrats, specimen collection.
		References and 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	1. RPS 2012. DATAHOLDER: Santos. 2. Pitcher et al. (2016). DATAHOLDER: CSIRO.	1. Baseline: Chevron Australia 2010. Marine Monitoring Program: Chevron Australia 2011 Post Dredge: Chevron Australia 2013 DATAHOLDER: Chevron Australia. 2. RPS-Bowman Bishaw Gorham 2005. DATAHOLDER: Chevron Australia. 3. Pitcher et al. (2016). DATAHOLDER: CSIRO.	1. RPS-Bowman Bishaw Gorham 2005. DATAHOLDER: Chevron. 2. RPS 2012. DATAHOLDER: Santos. 3. Pitcher et al. (2016). DATAHOLDER: CSIRO.	1. Chevron 2010. DATAHOLDER: Chevron 2. CSIRO (2013, 2016). Roland Pitcher. DATAHOLDER	N/A – see Table D-1	1. Cassata and Collins 2008. DATAHOLDER: Curtin University – Applied Geology. 2. CSIRO – Ningaloo Outlook Program 3. Murdoch University - Kobryn et al 2011 and Keulen and Langdon 2011. 4. AIMS (2010) - http://www.aims.gov.au/creefs
	SM03	**Studies:**						

Major Baseline	Proposed Scientific monitoring operational plan and Methodology	Rankin Bank & Glomar Shoal	Montebello Islands	Barrow Island	Lowendal Islands	Pilbara Islands – Southern Island Group (Serrurier, Thevenard and Bessieres Islands – State Nature Reserve)	Montebello AMP	Ningaloo and the Muiron Islands
Benthic Habitat (Deeper Water Filter Feeders)	Quantitative assessment using image capture using towed video. Post analysis into broad groups based on taxonomy and morphology.	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.	N/A – See Table D-1	N/A – See Table D-1	N/A – See Table D-1	N/A – See Table D-1	N/A – see Table D-1	1.WAMSI 2007 deep-water Ningaloo benthic communities' study, Colquhoun and Heyward (2008). 2.CSIRO/BHP Ningaloo Outlook Program - Deep reef themes 2020
		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.	N/A – See Table D-1	N/A – See Table D-1	N/A – See Table D-1	N/A – See Table D-1	N/A – see Table D-1	1.Towed video and benthic sled (specimen sampling). 2.Side-scan sonar and AUV transects.
		References and 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	N/A – See Table D-1	N/A – See Table D-1	N/A – See Table D-1	N/A – See Table D-1	N/A – see Table D-1	1.Colquhoun and Heyward (eds) 2008. DATAHOLDER: WAMSI, AIMS. 2.CSIRO – Ningaloo Outlook 2020

Major Baseline	Proposed Scientific monitoring operational plan and Methodology	Rankin Bank & Glomar Shoal	Montebello Islands	Barrow Island	Lowendal Islands	Pilbara Islands – Southern Island Group (Serrurier, Thevenard and Bessieres Islands – State Nature Reserve)	Montebello AMP	Ningaloo and the Muiron Islands
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	1. Atmospheric correct and land cover classification, NW Cape. 2. Advanced Land Observing Satellite (ALOS) images taken in 2006, 2008, and 2010 by DBCA. Digital Aerial Photos were taken in 2009, and the area ground-truthed in 2006. 3. Ground truthing aerial photography to map the spatial extent of mangroves on the Montebello Islands. 4. Mangrove monitoring as part of DBCA Western Australian Marine Monitoring Program (ongoing).	1. Chevron LTM of Mangroves for the Gorgon Gas Development project. Marine Baseline Program (2009), Post Dredge Survey 1 (2011), Post Dredge Survey 2 (2013). 2. Baseline state of the mangroves 2008.	1. Atmospheric correct and land cover classification, NW Cape. 2. Santos Mangrove baseline (2010). 3. Santos - Long-term mangrove monitoring (1999-2011).	1. Study conducted by URS (November 2008 to May 2009) to ground truth aerial photography taken between 2001 and 2009 and to identify mangrove species present in the area.	N/A – see Table D-1	1.Atmospheric correct and land cover classification, NW Cape. 2.Woodside hold Rapid Eye imagery of the Ningaloo Reef and coastal area. 3.Hyperspectral survey (2006) of Ningaloo Reef and coastal area (not yet analysed for Mangroves). 4.North West Cape sensitivity mapping 2012 included Mangrove Bay. 5.Global mangrove distribution as mapped by the USGS and located on UNEP's Ocean Data viewer.
		Methods:	Methods:					
		N/A – See Table D-1	1. Modular Inversion Program. May 2017 2. ALOS and Digital aerial photos, ground truthing, for Mangrove extent and mangrove relative canopy density. 3. Species Composition, LUX, canopy density. 4. Methods unknown.	1.Health scoring system, percentage cover, mean canopy density, qualitative health assessment. 2. Annual Mangrove composition, canopy density, pneumatophore density, leaf pathology, qualitative health.	1. Modular Inversion Program. May 2017 2.Aerial imagery (resolution of 0.2 m2 captured in 2010). 3. Qualitative data includes the presence of new growth, reproductive state, extent of defoliation and pneumatophore condition. Quantitative data, collected at the tree level, includes seedling density, stem diameter, number of defoliated branches and a number of canopy condition parameters.	1.Aerial Photography and Satellite imagery Species identification and community composition.	N/A – see Table D-1	1.Modular Inversion Program. May 2017 2.Rapid Eye imagery – High resolution satellite imagery from October/November/December 2011 and 2017. 3.Remote sensing – acquisition of HyMap airborne hyperspectral imagery and ground truthing data collection. 4. Reconnaissance surveys of the shorelines of the North West Cape and Muiron Islands. 5.Remote sensing study of global mangrove coverage.
		References and Data:						

Major Baseline	Proposed Scientific monitoring operational plan and Methodology	Rankin Bank & Glomar Shoal	Montebello Islands	Barrow Island	Lowendal Islands	Pilbara Islands – Southern Island Group (Serrurier, Thevenard and Bessieres Islands – State Nature Reserve)	Montebello AMP	Ningaloo and the Muiron Islands
		N/A – See Table D-1	1. EOMAP, 2017 DATAHOLDER: Woodside. 2.DBCA unpublished data. DATAHOLDER: DBCA. 3. Voga unpublish data DATAHOLDER: Voga Contact: [redacted] 4. DBCA. DATAHOLDER DBCA.	Baseline: Chevron Australia 2010. Marine Monitoring Program: Chevron Australia 2011 Post Dredge: Chevron Australia 2013 DATAHOLDER: Chevron Australia. Chevron 2014. DATAHOLDER: Chevron.	1. EOMAP, 2017 DATAHOLDER: Woodside. 2.Santos 2014. DATAHOLDER: Santos. 3. Santos 2011. DATAHOLDER: Santos.	1. URS (2010) DATAHOLDER: Chevron Australia	N/A – see Table D-1	1.EOMAP 2017 DATAHOLDER: Woodside. 2.AAM 2014. Dataholder: Woodside 3.Kobryn et al. 2013. DATAHOLDER: Murdoch University, AIMS; Woodside. 4.Joint Carnarvon Basin Operators, 2012. DATAHOLDER: Woodside and Apache Energy Ltd. 5.http://data.unep-wcmc.org/
Seabirds	**SM05** Visual counts of breeding seabirds, nest counts, intertidal bird counts at high tide.	**Studies:**						
		N/A – See Table D-1	1.No recent studies. A DBCA/WAM study of terrestrial fauna of the islands was published in 2000 (Burbidge et al 2000). The most recent bird survey referenced in this review was 1998 by DBCA (DPaW, CALM).	1. Barrow Island migratory behaviour, nesting and foraging behaviour. 2. Migratory waders at Barrow Island. 3. LTM on Barrow island (island wide) Study September 2003 – 2006. 4. Chevron - Gorgon Gas Development. Terrestrial and subterranean environment monitoring program (2008-2015). Monitoring of Wedge-tailed Shearwaters, Bridled Terns, Silver Gulls.	1. Ongoing study of Bridled Terns from 2009. 2. Quadrant Energy seabird nesting on Lowendal Island, study 2013. 3. Lowendal Islands, common breeding bird species, structure, feeding and disturbances to the population. 4. Quadrant Energy/Santos – Integrated Shearwater Monitoring Program (1994-2016).	1. Migratory waterbirds relevant to the Wheatstone Project on behalf of URS in 2008 - 2009. 2. Quadrant Energy/Santos – Integrated Shearwater Monitoring Program (1994-2016). 3. Exmouth Sub-basin Avifauna Monitoring Program (2013-2014)	Present, in open water, no breeding habitat.	1. LTM Study of marine and shoreline birds: 1970-2011. 2. LTM of shorebirds within the Ningaloo coastline (Shorebirds 2020). 3. Exmouth Sub-basin Marine Avifauna Monitoring Program (Quadrant Energy/Santos). 4. Seabird and Shorebird baseline studies, Ningaloo Region – Report on January 2018 bird surveys. 5.Wedge-tailed shearwater foraging behaviour in the Exmouth Region – Final Report
		Methods:						

Major Baseline	Proposed Scientific monitoring operational plan and Methodology	Rankin Bank & Glomar Shoal	Montebello Islands	Barrow Island	Lowendal Islands	Pilbara Islands – Southern Island Group (Serrurier, Thevenard and Bessieres Islands – State Nature Reserve)	Montebello AMP	Ningaloo and the Muiron Islands
		N/A – See Table D-1	1. Bird observations and counts.	1. Species, total numbers, Distribution, Roosting locations and foraging numbers. Migratory behaviour. 2. High tide roost counts, abundance counts. 3. Nest burrow density (number of burrows per m2); presence/absence of eggs or chicks in burrows; collapsed burrows and predation and mortality records. 4. Barrow Island: Variation in abundance and spatial/temporal distribution on beaches. Middle Island: Abundance; nest density; Presence and absence of eggs/chicks in nest.	1. Nest Density, presence and absence of chicks, predation and mortality counts. 2. Nest burrow density (number of burrows per m2); presence/absence of eggs or chicks in burrows. 3. Burrow scopes, Ultrasonic monitors to monitor burrows. 4. The distribution and abundance of other nesting seabirds within the Lowendal Island group, including up to 45 islands and islets, also occurred from 2004 onwards.	1. Ground counts, aerial surveys of wetlands by helicopter. 2. Burrow count and observation data, burrow density, colony stability, breeding participation, incubation effort and reproductive success has been determined. Tagging data 3. Aerial surveys and onshore island surveys.	N/A	1. Counts of nesting areas, counts of intertidal zone during high tide. 2. The Shorebirds 2020 database comprises the most complete shorebird count data available in Australia. The data have been collected by volunteer counters and BirdLife Australia staff for approximately 150 roosting and feeding sites, mainly in coastal Australia. The data go back as far as 1981 for key areas. 3. The Exmouth Sub-basin Marine Avifauna Monitoring Program undertook a detailed assessment of seabird and shorebird use in the Exmouth Sub-basin. Four aerial surveys and four island surveys were conducted between February 2013 and January 2015 for this Program, inclusive of the mainland coasts, of shore islands and a 2,500 km^2 area of ocean adjacent to the Exmouth Sub-basin. 4.Shorebird counts, Shearwater Burrow Density. 5. Telemetry (GPS & Satellite).
		References and Data:						

Major Baseline	Proposed Scientific monitoring operational plan and Methodology	Rankin Bank & Glomar Shoal	Montebello Islands	Barrow Island	Lowendal Islands	Pilbara Islands – Southern Island Group (Serrurier, Thevenard and Bessieres Islands – State Nature Reserve)	Montebello AMP	Ningaloo and the Muiron Islands
		N/A – See Table D-1	DBCA/WAM – Burbidge et al 2000.	1. Bamford M.J. & A.R 2004. DATAHOLDER: Chevron. 2. Bamford M.J & A.R 2011. DATAHOLDER: Chevron. 3. Chevron, 2013. DATAHOLDER: Chevron. 4. Chevron 2013. DATAHOLDER: Chevron.	1. Bamford M.J. & A.R 2004. DATAHOLDER: Chevron. 2. Surman 2012. DATAHOLDER: Santos. 3. Bamford M.J & A.R 2011. DATAHOLDER: Chevron. 4. DATAHOLDER: Santos.	1. Bamford, MJ & AR. 2011. DATAHOLDER: Chevron. 2. Quadrant Energy/Santos. Dataholders. Santos 3. Quadrant Energy/Santos. Dataholders. Santos	N/A	1. Johnstone et al. 2013. DATAHOLDER: WA MUSEUM. AMOSC/DBCA (DPaW) 2014. 2. BirdLife Australia DATAHOLDER: Woodside and BirdlLife Australia 3. Surman & Nicholson 2015. 4. BirdLife Australia: DATAHOLDER: Woodside 5. Cannel et al. 2019 DATAHOLDER: UWA and BirdLife Australia
Turtles	**SM06** Beach surveys (recording species, nests, and false crawls).	**Studies:**						
		N/A – See Table D-1	1. LTM Study of Green, Flatback, Hawksbill turtles on beaches within the Barrow, Lowendal and Montebello Island Complex for Chevron. 2. Marine turtle monitoring as part of DBCA long-term turtle monitoring program (ongoing).	Chevron - Gorgon Gas Development. Long-term Turtle Monitoring Program - Flatback tagging program and marine turtle track census program (2005 – ongoing).	1. LTM Study of Green, Flatback, Hawksbill turtles on beaches within the Barrow, Lowendal and Montebello Island Complex. 2. Santos 2013 turtle nesting survey on the Lowendal islands. 3. Varanus Island Turtle monitoring program (2005 – present).	1. Baseline marine turtle surveys 2009 (included the islands of Serrurier, Bessieres and Thevenard), Pendoley (2009). 2. Exmouth Islands Turtle Monitoring Program (2013 and 2014) 3. North West Shelf Flatback Turtle Conservation Program's 4. Inter-nesting distribution of flatback turtles and industrial development in Western Australia (Thevenard Island)	Present, in open water, no nesting habitats.	1. Exmouth Islands Turtle Monitoring Program. 2. Ningaloo Turtle Program 3. Turtle activity and nesting on the Muiron Islands and Ningaloo Coast (2018). 4. Spatial and temporal use of inter-nesting habitat by sea turtles along the Murion Islands and Ningaloo Coast – 2018-2019
		Methods:						

Major Baseline	Proposed Scientific monitoring operational plan and Methodology	Rankin Bank & Glomar Shoal	Montebello Islands	Barrow Island	Lowendal Islands	Pilbara Islands – Southern Island Group (Serrurier, Thevenard and Bessieres Islands – State Nature Reserve)	Montebello AMP	Ningaloo and the Muiron Islands
		N/A – See Table D-1	Nesting demographics (composition, spatial variability, seasonal distribution, post-nesting dispersion).	Island wide (though primary nesting occurs on east coast). Mundabullangana on mainland is the reference location for the Flatback tagging program.	1. Nesting demographics (composition, spatial variability, seasonal distribution, post-nesting dispersion). 2. Tagging and nest counts. 3. Tagging and nest counts. Varanus, Beacon, Bridled, Abutilon and Parakeelya islands.	1. Beach/Nesting surveys (counts by species). 2. Beach/Nesting surveys (counts by species). 3. Nesting and tagging studies 4. Satellite tracking methods	N/A	1. Astron (on behalf of Santos) to address a gap in the knowledge of turtle numbers at key locations (offshore islands within the region) that are not currently part of an existing monitoring programs (e.g. the NTP). Field surveys were conducted in October 2013 and January 2014. Surveys were conducted on 12 islands, with each island surveyed once (with the exception of Beach 8 at North Muiron Island) and all tracks counted. 2. Long term trends in marine turtle populations, beach surveys, track counts, best location, mortality counts. 3. On-beach monitoring and aerial surveys. 4. Tagging (satellite transmitter), analysis of internesting, migration and foraging grounds movements and behaviour.
		References/Data:						
		N/A – See Table D-1	1. AMOSC/DPaW 2014. DATAHOLDER: Chevron. 2.DBCA.	Pendoley Environmental (2005-ongoing). DATAHOLDER: Chevron.	1. Pendoley 2005. AMOSC/DBCA (DPaW) 2014. DATAHOLDER: Chevron/ Santos. 2. Santos, 2014. DATAHOLDER: Santos. 3. Santos (2005 – present)	1. Pendoley 2009. DATAHOLDER: Chevron. 2. Quadrant Energy/Santos. Dataholders. Santos 3. DBCA. Dataholder 4. Pendoley Environment - Whittock, Pendoley and Hamann (2010-2011)	N/A	1.Santos – Report. 2. NTP Annual Reports DATAHOLDERS: DBCA. Reports available at http://www.ningalooturtles.org.au/media_reports.html 3.Rob et al. 2019 DATAHOLDER: DBCA 4.Tucker et al. 2019 DATAHOLDER: DBCA

References

AAM (2014), RapidEye satellite images were captured along the coastline of Central/ Northern, Western Australia in between September 2011 to April 2014.

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

AIMS (2010) Reefs: Ningaloo Reef Biodiversity Expeditions (2008-2010). http://www.aims.gov.au/creefs

AIMS (2015). Ningaloo and Outer Shark Bay Baseline Survey 2014. AIMS Field Report for Woodside. 21 pp. Co-funded Baseline Surveys (November-December 2014).

AIMS (2017) Juvenile fish recruitment surveys, Ningaloo Reef, Western Australia (WAMSI Node 3 Project 3.1.2). https://data.gov.au/dataset/juvenile-fish-recruitment-surveys-ningaloo-reef-western-australia-wamsi-node-3-project-3-1-2

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.).

Advisian (2019) Montebello Marine Park Benthic Habitat Survey ROV Analysis of the Scarborough Pipeline Route. Report Prepared for Woodside Energy Ltd. 183 pp.

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

Astron Environmental Service (2014). Exmouth Islands Turtle Monitoring Program January 2014 Field Survey. Report prepared on behalf of Apache Energy/Quadrant Energy (now Santos).

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.

Bamford M.J. (2004). Gorgon Development on Barrow Island. Technical Report: Avifauna

Bamford and Moro (2011). Barrow Island as an important bird area for migratory waders in the East Asian – Australasian Flyway. Stilt 60: 46–55.

BirdLife Australia (2018) Seabird and Shorebird Baseline Studies, Ningaloo Region – Report on January 2018 bird surveys. Interim Report for Woodside Energy Ltd.

BirdLife Australia (2017) Shorebirds 2020 programme – Data Extraction (1993-2017). http://www.birdlife.org.au/projects/shorebirds-2020

Cannell B, Hamilton S and Driessen (2019). Wedge-tailed Shearwater foraging behaviour in the Exmouth Region. Final Report. Report prepared for Woodside Energy Limited. The University of Western Australia and BirdLife, pp.36.

Cassata, L. and L.B. Collins (2008). Coral reef communities, habitats and substrates in and near Sanctuary Zones of Ningaloo Marine Park. Journal of Coastal Research Vol. 24 (1): 139-51.

Chevron Australia (2010). Gorgon Gas Development and Jansz Feed Gas Pipeline: Coastal and Marine Baseline State and Environmental Impact Report: Domestic Gas Pipeline. Document Number: G1-NT-REPX0002750

http://www.chevronaustralia.com/Libraries/Chevron_Documents/Gorgon_Project_Coastal_and_Marine_Baseline_State_and_Environmental_Impact_Report_Domestic_Gas_Pipeline.pdf.sflb.ashx

Chevron Australia (2011). Gorgon Gas Development and Jansz Feed Gas Pipeline: Dredging and spoil disposal Management and Monitoring Plan, Document number: G1-NT-PLNX0000373. Pp. 255. https://www.chevronaustralia.com/docs/default-source/default-documentlibrary/gorgon-emp-dredging-and-spoil-disposal-plan.pdf?sfvrsn=2

Chevron Australia (2013). Wheatstone Project, Oil Spill Operational Scientific Monitoring Program-OPS 5 Shorebird and Seabird Rapid Assessment. Document Number: WS0-0000-HESRPT-CVX-000-00144-000. https://www.chevronaustralia.com/docs/default source/defaultdocument-library/wheatstone-ops5-shorebird-and-seabird-rapid-assessment.pdf?sfvrsn=2

Chevron Australia (2014). Gorgon Gas Development and Jansz Feed Gas Pipeline: Post-Development Coastal and Marine State and Environment Impact Survey Report, Year 2:2012-2013. Document number G1-NT-REPX0005152. Pp. 362 https://www.chevronaustralia.com/docs/default-source/default-document-library/gorgon-emp-post-development-coastal-and-marine-state-and-environmental-impact-survey.pdf?sfvrsn=4

Colquhoun J and Heyward A. (eds) (2008). WAMSI Node 3 Project 1 Subproject 3.1.1 Deepwater Communities at Ningaloo Marine Park: Ningaloo Reef Marine Park Deepwater Benthic Biodiversity Survey Annual Report 2007. 209 pp. http://www.wamsi.org.au/sites/default/files/Node%203.1.1%20Ningaloo%20Reef%20Marine%20Park.pdf

CSIRO (2020). Highlights Report – Ningaloo Outlook Program. https://research.csiro.au/ningaloo/outlook/shallow-reefs/shallow-reefs-research-2015-2020/

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.

Department of Environment and Conservation (DEC), 2007, Management Plan for the Montebello/Barrow Islands Marine Conservation Reserves 2007-2017, Marine Management Plan No. 55, DEC, Perth, WA.

Depczynski M, Heyward A, Wilson S, Holmes T, Case M, Colquhoun J, O'Leary RA, Radford B (2011). Methods of monitoring the health of benthic communities at Ningaloo – Coral & Fish recruitment. WAMSI Node 3 Project 3.1.2. Final Report to the Western Australian Marine Science Institution, Perth. 101 pp. http://www.wamsi.org.au/research-ningaloo/node-3-reports

EOMAP. (2017). Atmospheric correction and land cover classification, NW Cape. Report prepared for Woodside Energy Ltd.

Fitzpatrick B.M., Harvey E.S., Heyward A.J., Twiggs E.J. and Colquhoun J. (2012). Habitat Specialization in Tropical Continental Shelf Demersal Fish Assemblages. PLoS ONE 7(6): e39634. doi:10.1371/journal.pone.0039634 http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0039634

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

Joint Carnarvon Basin Operators (2012). Draft Joint Carnarvon Basin Operators North West Cape Sensitivity Mapping. Part A. (Apache Energy Ltd, Woodside Energy Ltd, BHP Billiton and the Australian Marine Oil Spill Centre Pty Ltd (AMOSC).

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

Keulen, M. Vand Langdon, M.W. (2011) Ningaloo Collaboration Cluster: Biodiversity and ecology of the Ningaloo Reef lagoon. Final Report No. 1c. http://www.ningaloo.org.au/www/en/NingalooResearchProgram/Publications/Cluster-finalreports.html

Kobryn, H.T., Wouters, K., Beckley, L.E. and T. Heege (2013). Ningaloo Reef: Shallow marine habitats mapped using a Hyperspectral sensor. PLoS ONE 8(7): e70105. doi:10.1371/journal.pone.0070105. http://dx.plos.org/10.1371/journal.pone.0070105

Le Noahic, M., Cornwall, M. E., Comeau, S., McCulloch, M. T. and Schoepf, V. (2017). Marine heatwave causes unprecedented regional mass bleaching of thermally resistant corals in northwestern Australia. *Scientific Reports,* vol. 7, doi: 10.1038/s41598-017-14794-y

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.

Pendoley Environment (2005). Proposed Gorgon Development: Sea turtle Monitoring program results November 2004 to February 2005. Report for Chevron Australia.

Pendoley, K. (2009). Marine Turtle Beach Survey. Onslow Mainland Area and Nearby Islands. Report to URS for the Chevron Wheatstone Project Team, 91 pp. https://www.chevronaustralia.com/Files/PDF/Wheatstone%20Draft%20EIS_ERMP%20Technical%20Appendices%20O8%20to%20O12%20and.pdf

Pitcher, C.R., Miller, M., Morello, E., Fry, G., Strzelecki, J., McLeod, I., Slawinski, D., Ellis, N., Thomson, D., Bearham, D., Keesing, J., Donovan, A., Mortimer, N. Babcock, R., Fromont, J, Gomez, O., Hosie, A., Hara, A., Moore, G., Morrison, S., Kirkendale, L., Whisson, C., Richards, Z., Bryce, M., Marsh, L., Naughton, K., O'Loughlin, M., O'Hara, T., Boddington, D., Huisman, J. (2016) Environmental Pressures: Regional Biodiversity — Pilbara Seabed Biodiversity Mapping & Characterisation. Final report, CSIRO Oceans & Atmosphere, Published Brisbane, March 2016, 62 pages

Quadrant Energy - Seabird Monitoring - Lowendal, Airlie, Serrurier islands - 1994 to present. Industry-Government Environmental Meta-database (IGEM). UUID: bdd428fe-cf24-4596-a822-cd578695ee16. Accessed June 2017

RPS-Bowman Bishaw Gorham (2005). Gorgon Development on Barrow Island, Technical Report, Marine Benthic Habitats. Prepared for Chevron Australia. https://www.chevronaustralia.com/docs/default-source/default-document-library/c8_marine_benthic_habitats.pdf?sfvrsn=0

RPS (2012). Pipeline Corridor Biological Seabed Survey: Apache Julimar Development Project – Field Report. Prepared for Apache Energy Limited, October 2011.

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, pp.51.

Stevens, J.D., Last, P.R., White, W.T., McAuley, R.B., Meekan, M.G. (2009) Diversity, abundance and habitat utilisation of sharks and rays. CSIRO Marine and Atmospheric Research. Final report to Western Australian Marine Science Institute

Tucker T, Fossette S, Whiting S, Rob, D and Barnes P (2019) Spatial and temporal use of inter-nesting habitat by sea turtles along the Muiron Islands and Ningaloo Coast. Final Report. Report prepared for Woodside Energy Limited. Department of Biodiversity, Conservation and Attractions, Kensington, pp.77.

Surman CA and Nicholson LW (2012) Monitoring of annual variation in seabird breeding colonies throughout the Lowendal Group of islands: 2012 Annual Report. Unpublished report prepared for Apache Energy Ltd. by Halfmoon Biosciences.

Surman CA and Nicholson LW (2015). Exmouth Sub basin Marine Avifauna Monitoring Program: Final Report. Unpublished report prepared for Apache Energy Ltd. by Halfmoon Biosciences. 188 pp.

URS Australia Pty Ltd (2010). Biota of Subtidal Habitats in Pilbara Mangroves with Particular Reference to the Ashburton Delta and Hooley Creek, Technical Appendix N13. In: Technical Appendices N11 to N15 and O1 to O7. Draft Environmental Impact Statement/Environmental Review and Management Programme for the Proposed Wheatstone Project. July 2010, pp 124-245 https://www.chevronaustralia.com/Files/PDF/Wheatstone%20Draft%20EIS_ERMP%20Technical%20Appendices%20N11%20to%20N15%20an.pdf Unpublished Report for ChevronAustralia Pty Ltd.

Watson, D.L., Harvey, E.S., Fitzpatrick, B.M. et al. Mar Biology (2010) Assessing reef fish assemblage structure: how do different stereo-video techniques compare? Vol 157 (6): pp 1237-1250. https://doi.org/10.1007/s00227-010-1404-x

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 E: NATIONAL OFFSHORE PETROLEUM SAFETY AND ENVIRONMENTAL MANAGEMENT AUTHORITY REPORT FORM

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

Angel Operations Environment Plan

- **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: May 2024

Revision: 3

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APPENDIX F

RELEVANCY ASSESSMENT

Assessment of Relevant Persons for the Proposed Activity

The result of Woodside's assessment of relevant persons in accordance with regulation 25 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** or self-identified and Woodside assessed as not relevant are summarised below at **Table 1** and **Table 3**.

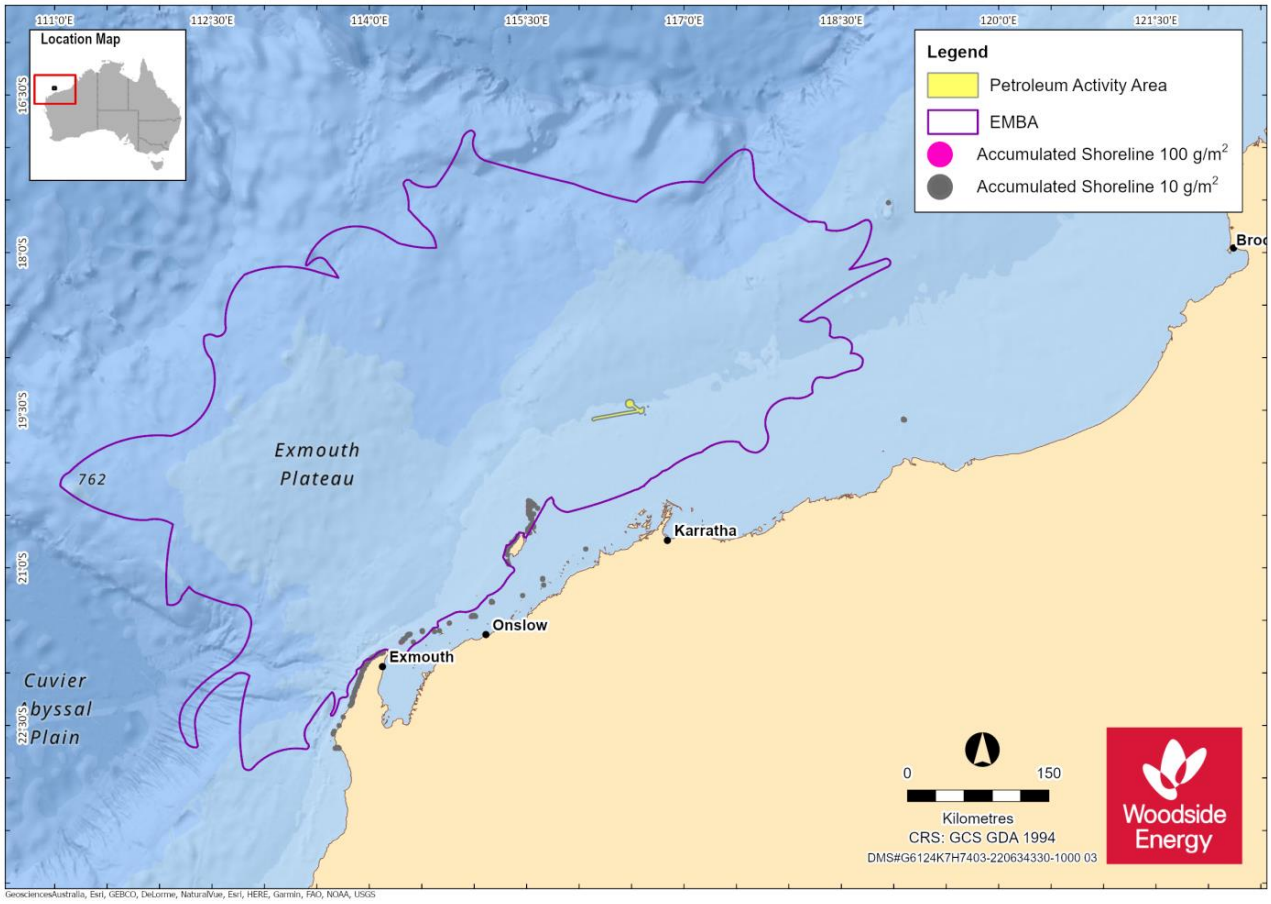

Figure 1: Operational Area and EMBA for this EP.

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 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. No Commonwealth fisheries are active in the Operational Area. The North West Slope Trawl Fishery and 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 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
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. No Commonwealth fisheries are active in the Operational Area. The North West Slope Trawl Fishery and 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 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 Pilbara Trawl Fishery, Pilbara Trap Fishery and Pilbara Line Fishery, have been active in the Operational Area within the last 5 years and Mackerel Managed Fishery (Area 2) has been active in close proximity to the Operational Area. The Mackerel Managed Fishery (Area 2), Marine Aquarium Managed Fishery, Pilbara Crab Managed Fishery, West Coast Deep Sea Crustacean Managed Fishery, Specimen Shell Managed Fishery, Onslow Prawn Managed Fishery, Western Australian Sea Cucumber Fishery, Exmouth Gulf Prawn Managed Fishery, Nickol Bay Prawn Managed Fishery, Pilbara Trawl Fishery, Pilbara Trap Fishery, Pilbara Line 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 cultural heritage and built heritage matters.	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
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 does not have the potential to impact Pilbara Ports Authority's responsibilities as the EMBA does not overlap the Pilbara Ports Authority's area of responsibility.	No
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.	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

	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 Department requests to be consulted where an activity 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). 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 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).	Yes
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
Commonwealth and State Government Departments or Agencies – Industry			
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) (formerly DMIRS)	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 and 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
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.	Yes

		The fishery does not overlap the Operational Area. The fishery overlaps EMBA and has been active in the EMBA within the last 5 years.	
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 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.	No
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. No Commonwealth fisheries are 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 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. 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 Billfish 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 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.	No
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. 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.	Yes
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 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
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.	Yes

		Although the fishery overlaps the Operational Area, it has not been active within the last 5 years. However, Woodside notes that there has been activity in close proximity to the Operational Area. The fishery overlaps the EMBA and has been active in the EMBA within the last 5 years.	
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. Although the fishery overlaps the Operational Area, the fishery 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.	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, the fishery 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.	Yes
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. Although the fishery overlaps the Operational Area, the fishery 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.	Yes
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
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 does not overlap the Operational Area. Although the fishery overlaps the EMBA, it has not been active in the EMBA within the last 5 years.	No

		Woodside does not consider that the activity will present a risk to licence holders given target species is the land hermit crab and the fishery is a land-based commercial fishery in Western Australia.	
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. Although the fishery overlaps the Operational Area and EMBA, the fishery has not been active in the Operational Area within the last 5 years. The fishery has been active in the EMBA within the last 5 years.	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. Although the fishery overlaps the Operational Area, the fishery 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.	Yes
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.	Yes
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, it has not been active in the EMBA within the last 5 years.	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.	Yes
Peal 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. The fishery overlaps the Operational Area and EMBA but has not been active in the Operational Area or EMBA within the last 5 years.	No

WA North Coast Shark 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 but has not been active in the Operational Area or EMBA within the last 5 years.	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.	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.	Yes
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. The fishery overlaps the Operational Area and EMBA and has been active in the Operational Area and EMBA within the last 5 years.	Yes
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 Pilbara Trawl Fishery, Pilbara Trap Fishery and Pilbara Line Fishery, have been active in the Operational Area within the last 5 years and Mackerel Managed Fishery (Area 2) has been active in close proximity to the Operational Area. The Mackerel Managed Fishery (Area 2), Marine Aquarium Managed Fishery, Pilbara Crab Managed Fishery, West Coast Deep Sea Crustacean Managed Fishery, Specimen Shell Managed Fishery, Onslow Prawn Managed Fishery, Western Australian Sea Cucumber Fishery, Exmouth Gulf Prawn Managed Fishery, Nickol Bay Prawn Managed Fishery, Pilbara Trawl Fishery, Pilbara Trap Fishery, Pilbara Line 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.	Yes

		State fisheries assessed as having a potential for interaction in the Operational Area and/or the EMBA were directly consulted by Woodside.	
Recreational marine users and representative bodies			
Exmouth Recreational Marine Users	Exmouth-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, Exmouth Fly Fishing, Exmouth Game Fishing Club, Indian Chief Charters, Innkeeper Sport Fishing Charter, Kings Ningaloo Reef Tours, Live Ningaloo, 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, On Strike Charters, Peak Sportfishing Charters, Pelican Charters, Sail Ningaloo, Sea Force Charters, Set the Hook, The Mobile Observatory, Three Islands, Top Gun Charters, Ultimate WaterSports, Venture Ningaloo, View Ningaloo, Warrior Princess Charters, Yardi Creek Boat Tours. Activities have the potential to impact Exmouth-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
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. Silverado Charters Pty Ltd, Reel Force Charters Pty Ltd, D & N Nominees Pty Ltd, Lyons Family Super Pty Ltd, Seafresh Holdings Pty Ltd, Eco-Abrolhos Pty Ltd, C Emery Fishing Pty Ltd, On Strike Charters (WA) Pty Ltd, Melkit Pty Ltd, Maritime Engineering Services Pty Ltd, G. C. Bass Nominees Pty Ltd, Brefjen Nominees Pty Ltd, W.A Maritime Investments Pty Ltd, Blue Juice Tours Pty Ltd, Surefire Marine Services Pty Ltd, Makalee Pty Ltd, L & S Family Holdings Pty Ltd, Bondall Pty Ltd, Kw Marine Pty Ltd, Sharkbay Charters Pty Ltd, Bluecity Enterprises Pty Ltd, Jostan Holdings Pty Ltd, Monkey Mia Yacht Charters Pty Ltd, On Strike Charters (Wa) Pty Ltd, Rainfield Pty Ltd, Monster Sportfishing Adventures Pty Ltd, Lulamanzi Investments Pty Ltd, Millennial Charters Pty Ltd, Chapel Nominees Pty Ltd,	Yes

		Regalchoice Holdings Pty Ltd, Fawesome Expeditions Pty Ltd, On Strike Charters (Wa) Pty Ltd, The Great Escape Charter Company Pty Ltd, Aoa International Pty Ltd, Fire Tiger 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 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. Willie Creek Pearl Farm Pty Ltd, Super Yachts Perth Pty Ltd, Silverado Charters Pty Ltd, Bloor Street Investments Pty Ltd, Lugger Enterprises Pty Ltd, Eco-Abrolhos Pty Ltd, C Emery Fishing Pty Ltd, Discovery Holiday Parks Pty Limited, Kimberley Marine Pty Ltd, Coral Princess Cruises (Nq) Pty Ltd, Marine Agents Australia Pty Ltd, Maritime Engineering Services Pty Ltd, G. C. Bass Nominees Pty Ltd, Coastway Investments Pty Ltd, Kcc Group Pty Ltd, Cm Ventures Pty Ltd, Lombadina Aboriginal Corporation, Australian Port And Marine Services Pty Ltd, Hartley Motorcycles Pty Ltd, Humbug Fishing Pty Ltd, Brefjen Nominees Pty Ltd, Melkit Pty Ltd, W.A Maritime Investments Pty Ltd, Blue Juice Tours Pty Ltd, Kw Marine Pty Ltd, L & S Family Holdings Pty Ltd, Bondall Pty Ltd, Lake Argyle Cruises Pty Ltd, Sealife Charters Pty Ltd, Mal Miles Adventures Pty Ltd, Mackerel Islands Pty Ltd, Diversity Charter Company Wa Pty Ltd, Split Tide Pty Ltd, Broome Tours Pty Ltd, North Star Cruises Australia Pty Ltd, Charter Express Pty Ltd, Sea 2 Pty Ltd, Hotel And Resort Investments Pty Ltd, L & S Family Holdings Pty Ltd, Down The Line Charters Pty Ltd, Kingfisher Island Resort Pty Ltd, Rstg Pty Limited, Sealife Charters Pty Ltd, Coral Princess Cruises (Nq) Pty Ltd, Kimberley Quest Adventures Pty Ltd, Monster Sportfishing Adventures Pty Ltd, Ocean Charters Pty Ltd, Lulamanzi Investments Pty Ltd, Millennial Charters Pty Ltd, Chapel Nominees Pty Ltd, Fawesome Expeditions Pty Ltd, The Great Escape Charter Company Pty Ltd, Aoa International Pty Ltd, Kimberley Getaway Cruises Pty Ltd, King Sound Resort Hotel Pty. 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
Karratha Recreational Marine Users	Karratha-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. Nickol Bay Sport Fishing Club, Archipelago Adventures, Hampton Harbour Boat & Sailing Club, King Bay Game Fishing Club, Marine Rescue Dampier, Port Walcott Volunteer Marine Rescue, Port Walcott Yacht Club, Reef Seeker Charters, West Pilbara Volunteer Sea Search and Rescue Group.	Yes

		Activities have the potential to impact Karratha-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.	
Broome Recreational Marine Users	West Coast-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. Split Tide Pty Ltd, Norbrick Pty Ltd, Eco Abrolhos Pty Ltd, KW Marine Pty Ltd, Charter Travel Company Pty Ltd, Tiffom Pty Ltd, Ocean Charters Pty Ltd, Sail Ningaloo Pty Ltd, Coral Princess Cruises (NQ) Pty Ltd, Willie Creek Pearl Farm Pty Ltd, One Tide Charters, Super Yachts Perth Pty Ltd, Bloor Street Investments Pty Ltd, Lugger Enterprises Pty Ltd, Serenity Isles Trading Company Pty Ltd, Kimberley Marine Pty Ltd, Marine Agents Australia Pty Ltd, Bardina Pty Ltd, Coastway Investments Pty Ltd, KCC Group Pty Ltd, CM Ventures Pty Ltd, Lombadina Aboriginal Corporation, Looksea Tours, Australian Port And Marine Services Pty Ltd, Hartley Motorcycles Pty Ltd, Humbug Fishing Pty Ltd, Lake Argyle Cruises Pty Ltd, Sealife Charters Pty Ltd, Mal Miles Adventures Pty Ltd, Mackerel Islands Pty Ltd, Diversity Charter Company WA Pty Ltd, Split Tide Pty Ltd, Broome Tours Pty Ltd, Charter Express Pty Ltd, Sea 2 Pty Ltd, Hotel And Resort Investments Pty Ltd, Down The Line Charters Pty Ltd, Ultimate Adventures, Discovery Holiday Parks Pty Limited, Kingfisher Island Resort Pty Ltd, RSTG Pty Limited, Wyndham Fishing Tours Pty Ltd, Kimberley Quest Adventures Pty Ltd, Ocean Charters Pty Ltd, Kimberley Getaway Cruises Pty Ltd, King Sound Resort Hotel Pty Ltd, Broome Billfish Charters. Activities have the potential to impact Broome-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 location offshore and there has been recorded charter effort in the EMBA in the past 5 years.	Yes
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.	Yes

		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.	
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. Titleholder or Operator's permit areas overlaps the EMBA.	Yes
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 (Finder No 16)	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	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
KUFPEC	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	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 / KATO NWS / KATO Amulet	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. 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
Vermillion Oil & Gas 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
OPIC 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
Dorado Petroleum	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
Beagle No 1 / Longreach Capital Investment	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) (formerly APPEA)	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. APPEA AEP 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.	Yes

		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.	
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, for which the Baiyungu, Thalanyji and Yinggarda people are party to, overlaps the EMBA. The NTGAC and YAC are the Registered Native Title Body Corporates holding native title on behalf of the Baiyungu, Thalanyji and Yinggarda people. The NTGAC is also party, with the WA State Government, to the Ningaloo Conservation Estate Indigenous Land Use Agreement (the ILUA), which overlaps 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, for which BTAC is the Registered Native Title Body Corporate, is coastally adjacent to the EMBA. 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, for which the Baiyungu, Thalanyji and Yinggarda people are party to, overlaps the EMBA. The NTGAC and YAC are the Registered Native Title Body Corporates holding native title on behalf of the Baiyungu, Thalanyji and Yinggarda people. The Yinggarda Aboriginal Corporations 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, which the Kariyarra Aboriginal Corporation is the Registered Native Title Body Corporate for. The Kariyarra Aboriginal Corporation is also party to the Kariyarra and State ILUA, which is coastally adjacent to the EMBA.	Yes
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 overlaps the EMBA, which WAC is the Registered Native Title Body Corporate for. WAC is party to the KM & YM Indigenous Land Use Agreement 2018, which overlaps the EMBA and Cape Preston Project Deed (YM Mardie ILUA) and Cape Preston West Export Facility, which are coastally adjacent to 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 KM & YM Indigenous Land Use Agreement 2018, which overlaps the EMBA, and RTIO Kuruma Marthudunera People ILUA, which is 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 does not overlap the EMBA. The claim is coastally adjacent to the EMBA, which NAC and the Yindjibarndi Aboriginal Corporation are the Registered Native Title Body Corporates for.	Yes

		NAC is also party to the RTIO Ngarluma ILUA (Body Corporate Agreement) and Anketell Port, Infrastructure Corridor and Industrial Estates Agreement, which are coastally adjacent to the EMBA.	
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 does not overlap the EMBA. The claim is coastally adjacent to the EMBA, which NAC and the Yindjibarndi Aboriginal Corporation are the Registered Native Title Body Corporates for.	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. The Ngarla and Ngarla #2 (Determination Area A) native title claim overlaps the EMBA, which the Wanparta Aboriginal Corporation is the Registered Native Title Body Corporate for. The Wanparta Aboriginal Corporation is party to the Ngarla Pastoral ILUA and Ngarla PBC KSCS ILUA, which are coastally adjacent to the EMBA.	Yes
Native Title Representative Bodies			
Yamatji Marlpa Aboriginal Corporation (YMAC)	Native Title Representative Body	Woodside has applied its methodology for 'Native Title Representative Bodies' under regulation 25(1)(d) of the Environment Regulations. YMAC is the Native Title Representative Body 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 Native Title Representative Body 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.	Yes

		The Ngarluma and Yindjibarndi People, the NWS JVs and Woodside entered into an agreement on 22 December 1998 (Agreement). NYFL was subsequently incorporated under the terms of the Agreement to act as trustee for the trust established to benefit the Ngarluma and Yindjibarndi People and the Roebourne Aboriginal Community. Subsequent to that, the Ngarluma people settled their native title claim and established their nominated representative corporation, the Ngarluma Aboriginal Corporation (PBC); and the Yindjibarndi people settled their native title claim and established their nominated representative corporation, the Yindjibarndi Aboriginal Corporation (PBC). The Ngarluma Aboriginal Corporation and the Yindjibarndi Aboriginal Corporation are the appropriate representative bodies for consultation in relation to cultural interests. NYFL's functions may be relevant to the proposed activity in relation to its functions under the Agreement.	
Historical cultural heritage groups or organisations			
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
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,	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

	Pegs Creek, Point Samson, Roebourne, Whim Creek and Wickham.		
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 overlaps the EMBA.	Yes
Shire of Broome	Local government governed by the Local Government Act 1995 representing the suburbs and localities of Mile, Bilingurr, Broome, Cable Beach, Cape Leveque, Coconut Well, Djugun, Lombadina, Minyirr, Morell Park, Skuthorpe	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 Broome's area of responsibility overlaps the EMBA.	Yes
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, Bhagwan 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	Yes

		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 **MAC was consulted directly as described above.* Under regulation 25(1)(e) of the Environment Regulations, Woodside, at its discretion, chose to assess the Karratha CLG as a relevant person.	
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 have the potential to be impacted by the proposed activities.	Yes
Broome 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 Broome 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 Broome Chamber of Commerce and Industry's interests have the potential to be impacted by the proposed activities.	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
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 to determine ACF's relevance for the proposed activity. 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 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.	No

		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.	
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 to determine CCWA's relevance for the proposed activity. 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 to determine GAP's relevance for the proposed activity. 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 Greenpeace 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 to determine 350A's relevance for the proposed activity. 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
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 and feedback demonstrates an interest with the potential risks and impacts associated with	Yes

		planned activities in accordance with the intended outcome of consultation (as set out in Section 5.2 of the EP).	
Sea Shepherd Australia (SSA)	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 SSA's relevance for the proposed activity. Woodside has assessed that SSA'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 SSA at its discretion in line with Section 5.3.7 of the EP.	No
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 to determine CCG's relevance for the proposed activity. 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 to determine CCG's relevance for the proposed activity. 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) of the Environment Regulations to determine UWA Ocean Institute's relevance for the proposed activity. There is no known research being undertaken by the 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
Western Australian Marine Science Institution (WAMSI)	Research institute	Woodside has applied its methodology for 'Research institutes and local conservation groups or organisations' under regulation 25(1)(d) of the Environment Regulations to determine WAMSI's relevance for the proposed activity. There is no known research being undertaken by WAMSI that intersects within the EMBA.	No

		Woodside chose to contact WAMSI 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) of the Environment Regulations to determine CSIRO's relevance for the proposed activity. 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) of the Environment Regulations to determine AIMS's relevance for the proposed activity. 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 individuals [name redacted] and/ or [name redacted]	Representatives of Non-Government Organisation Save Our Songlines and/ or individuals [name redacted] and/ or [name redacted]	Woodside has applied 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 Save Our Songlines (SOS) and/ or [name redacted] and/ or [name redacted] relevance for the proposed activity. Save Our Songlines and/ or [name redacted] and/ or [name redacted] 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 [name redacted] and/ or [name redacted] are relevant for this activity.	Yes

CONSULTATION ACTIVITIES

Angel Facility Operations EP Consultation Activities

Woodside has been conducting extensive consultation with relevant persons and other parties for this EP since June 2023 when consultation commenced with interested and affected stakeholders as part of a planned, integrated and consistent approach to stakeholder engagement for Woodside's proposed opportunities. A broad consultation process has been undertaken with relevant persons for the Angel Facility Operations EP. Consultation aims to be inclusive, transparent, voluntary, respectful and two-way. Consultation was undertaken by email, letter, phone call and/or meeting.

- Woodside advertised the planned activities proposed for this EP in the national, state and relevant local newspapers including The Australian, The West Australian, Pilbara News, Midwest Times, North West Telegraph and Mid West Times on 7 June 2023 (see Record of Consultation, reference 1.43). 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.
- A Consultation Information Sheet was provided to relevant persons and persons Woodside chose to contact (see Section 5.3.4 of 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).
- Since the commencement of the initial consultation period (June 2023), the Stakeholder Consultation Information Sheet has been available on the Woodside website. The Woodside Consultation Information Sheets include a toll-free 1800 phone number and Woodside's feedback email address (feedback@woodside.com.au).
- Additional targeted information was provided to relevant marine users including AHO and AMSA – Marine Safety (Record of Consultation, reference 1.46). The targeted 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 of 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 5.3.3 of the EP) or self-identified and Woodside assessed as not relevant are summarised at Appendix F, Table 3.
- Woodside has a geotargeted sponsored social media campaign (Record of Consultation, reference 2.36) to various communities that are 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.

Community information sessions

Location	Exmouth
Date	**17 June 2023**
Description of the consultation	Woodside supported the PHI Helicopters Community Open Day at the Exmouth Aerodrome. Representatives from Woodside, including project and environment personnel equipped to answer technical questions, attended the event. Copies of the Consultation Information Sheets and Summary Consultation Information Sheets were available to attendees. Community members were able to engage with Woodside representatives to understand the proposed activity and how it may affect them, ask questions and provide feedback. A number of Environment Plan Consultation Information Sheets were available to attendees including the Angel Facility Operations Environment Plan Consultation Information Sheet.
Advertising and invitations	Ahead of the event, Woodside advertised the session via the means below to assist individuals to self-identify, become aware of the community consultation, and enable individuals to provide feedback on proposed activities, through the following: • From 15−17 June 2023, Woodside commenced a geotargeted social media campaign in Exmouth and surrounding areas (Record of Consultation, reference 2.36) advertising the Community Information Session.
Estimated number of individuals consulted	• An estimated 300 community people attended the event (adults and children).

Summary of Feedback, Objection or Claim

Issues discussed from around 5 community members included:

- Whales - what Woodside is doing to protect whales, what the impact to whales might be.
- The Scarborough FPU and nature of this i.e. is it DP or moored to the seabed, was it like an FPSO
- General interest questions on Scarborough project – location, activities (i.e. trunkline installation, construction work at Pluto gas plant (within existing footprint)), trunkline size and routing – and why the location was chosen, field life and start up timing
- Turtle nesting and lighting controls
- Funding for whale shark research

Other EP consultation information sheets were available and taken by attendees. Two attendees said they were taking the information sheets so they could see pipeline routes (for fishing opportunities), specifically mentioning permit numbers they were after.

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).

Location	Roebourne
Date	**22 June 2023**
Description of the consultation	A Community Information Session was held in Roebourne. The consultation information session was hosted by members from Woodside's Corporate Affairs and Environment teams and was open for all community members to receive information regarding Woodside's Environment Plans and proposed and planned activities. A number of Environment Plan Consultation Information Sheets were available to attendees including the Angel Facility Operations EP Consultation Information Sheet.

Advertising and invitations	Ahead of the event, Woodside advertised the session via the means below to assist individuals to self-identify, become aware of the community consultation, and enable individuals to provide feedback on proposed activities, through the following:
	• From 15−17 June 2023, Woodside commenced a geotargeted social media campaign in Roeburne and surrounding areas (Record of Consultation, reference 2.37.2) advertising the Community Information Session.
	• Woodside distributed posters advertising the community information session locally, including:
	  ○ Front door and front window of Woodside Roebourne office
	  ○ Online distribution via the Roebourne Community Calendar
	  ○ Roebourne Police Station provided with printed copy
	• Woodside staff also visited the following offices to advise of the community information session:
	  ○ Ngarluma and Yindjibarndi Foundation Ltd (NYFL)
	  ○ Ngarliyarndu Bindirri Aboriginal Corporation
	  ○ Yinjaai-Barni Art
	  ○ Foundation Foods

Estimated number of individuals consulted	• N/A

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.
Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response
There were no feedback, 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).

Location	**Karratha – Shopping Centre, Woodside office**
Date	**28,29 June 2023**
Description of the consultation	Community Information Sessions were held in Karratha. Representatives from Woodside, including project and environment personnel equipped to answer technical questions, attended the event. A number of Environment Plan Consultation Information Sheets and targeted Consultation Summary Information Sheets were available to attendees including the Angel Facility Operations EP Consultation Information Sheet.
Advertising and invitations	Ahead of the event, Woodside advertised the sessions via the means below to assist individuals to self-identify, become aware of the community consultation, and enable individuals to provide feedback on proposed activities, through the following: • Ahead of the 28 June 2023 event, a story was posted on Woodside's Facebook page (Record of Consultation, reference 2.37.4), sharing details of its shopping centre stand where Consultation Information Sheets regarding planned and proposed activities were available, including the activities proposed under this EP. • Ahead of the 29 June 2023 event, the Community Information Session was advertised in the Pilbara News (Record of Consultation, reference 2.37.3), geotargeting a social media campaign in Karratha and surrounding areas and posting the event details on Woodside's Facebook page (Record of Consultation, reference 2.37.5).

	• Woodside advertised the session by distributing posters advising of the event details in the local community and visiting offices to raise awareness, including the offices of local Traditional Custodian groups.
Estimated number of individuals consulted	• Estimated number of people consulted: 10-20

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.

- Employment opportunities provided by the resources sector
- General interest in Woodside EPs

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).

Location	**Roebourne**
Date	**19 July 2023**
Description of the consultation	A Community Information Session was held in Roebourne. The consultation information session was hosted by members from Woodside's Corporate Affairs and Environment teams and was open for all community members to receive information regarding Woodside's Environment Plans and proposed and planned activities. A number of Environment Plan Consultation Information Sheets were available to attendees including the Angel Facility Operations EP Consultation Information Sheet.

Advertising and invitations	Ahead of the event, Woodside advertised the session via the means below to assist individuals to self-identify, become aware of the community consultation, and enable individuals to provide feedback on proposed activities, through the following:
	• From 15−17 June 2023, Woodside commenced a geotargeted social media campaign in Roebourne and surrounding areas (Record of Consultation, reference 2.37.**2**) advertising the Community Information Session.
	• Woodside distributed posters advertising the community information session locally, including:
	  ○ Front door and front window of Woodside Roebourne office, with the open sign and fact sheets on display inside (Record of Consultation, reference 2.37.7).
	  ○ On the noticeboard at Roebourne Community Resource Centre (inside the Ieramugadu Store (NYFL's Foundation Foods).
	  ○ Roebourne CRC
	  ○ Pilbara Community Legal Service
	  ○ NBAC
	  ○ WAPOL
	  ○ BP
	• Woodside staff also visited the following offices to advise of the community information session and provide posters:
	  ○ Ngarluma and Yindjibarndi Foundation Ltd (NYFL)
	  ○ Yinjaai-Barni Art Group

	○ Yandi for Change ○ NYFL ○ WY Program ○ Roebourne Library ○ Yindjibarndi Ranger office ○ Ashburton Aboriginal Corporation ○ A poster was also put up at Cossack.
Estimated number of individuals consulted	• N/A

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.

Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response

There were no feedback, 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).

Location	**Karratha – FeNaCING Festival**
Date	**5, 6 August 2023**
Description of the consultation	Woodside had a stand at the annual FeNaCING Festival held in Karratha. Members of Woodside's Corporate Affairs and Operations teams actively engaged with the community to discuss proposed Environment Plan activities. The stand included Consultation Information Sheets for a number of Environment Plans including Angel Facility Operations EP.
Advertising and invitations	Ahead of the event, Woodside advertised the session via the means below to assist 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 2 August 2023 (Record of Consultation, reference 2.37.8). • A social media story appeared on the Woodside Nort West Facebook page on 2 August 2023 (Record of Consultation, reference 2.37.8). • Directly inviting local Traditional Custodian groups (Record of Consultation, Table 1).
Estimated number of individuals consulted	Woodside estimates that over 2,000 people visited the Woodside stand based on the number of completed consultation forms and questionnaires.

Summary of Feedback, Objection or Claim

Community discussions centred on:

- Update of Woodside activities and employment and contracting opportunities
- All community members were encouraged to provide their views on Woodside's activities through the Woodside feedback form on the Woodside website, or to subscribe to Woodside updates. An iPad was available for stakeholders to do this on the spot.

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 of the EP).

Location	**Onslow – Passion of the Pilbara festival**
Date	**18 August 2023**
Description of the consultation	Members of Woodside's Corporate Affairs engaged with the community to discuss proposed Environment Plan activities. The stand included Consultation Information Sheets for a number of Environment Plans including the Angel Facility Operations EP.
Advertising and invitations	Ahead of the event, Woodside advertised the session via the means below to assist individuals to self-identify, become aware of the community consultation, and enable individuals to provide feedback on proposed activities, through the following: • The consultation opportunity was promoted prior to the Festival in a story on the Woodside North West Facebook page on 17 August 2023 (Record of Consultation, reference 2.37.9).
Estimated number of individuals consulted	• Woodside estimates approximately 100 people visited the Woodside stand.

Summary of Feedback, Objection or Claim

Community discussions centred on:

- Update of Woodside activities and employment opportunities
- General Scarborough project update and operations. A Scarborough operations map and Floating Production Unit images were available (see below). There was general community interest and support for the project. Discussions included:
  - Support for the project and dissatisfaction about protester activity against the project
  - Number of jobs during construction
  - Location of activities (noting activity was not off the coast of Onslow)
- General interest on the Browse project included:
  - Awareness that Carbon Capture Storage concept is feasible and has been included in the development concept.
- One individual asked in relation to the Scarborough Project what Woodside was doing in relation to the protecting environment.
- Community members were encouraged to provide their views on Woodside's activities through the Woodside feedback form on the Woodside website, or to subscribe to Woodside updates.

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 of the EP).

Location	**Karratha, Port Hedland, and Roebourne**
Date	18 – 20 September 2023
Description of the consultation	Woodside hosted community consultation sessions in Karratha, Port Hedland and Roebourne to enable community members to understand Woodside's proposed activities and how it may affect them, ask questions, and provide their feedback. Woodside Project, 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 Angel Facility Operations EP Consultation Information Sheet.
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 September 2023 (Record of Consultation, reference 2.38.1). • 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 2.38.2). • An EP consultation banner with QR code (linked to the Consultation Activities page on the Woodside website), Scarborough Project banner, and Browse Project banners were displayed stand along with current EP factsheets.
Estimated number of individuals / organisations consulted	18 September 2023 – Karratha. Estimated number of people consulted: 20 19 September 2023 – Port Hedland. Estimated number of people consulted: 20 20 September 2023 – Roebourne. Estimated number of people consulted: 0
Summary of Feedback, Objection or Claim	
Community discussions centred on: • Update of Woodside activities and employment and contracting opportunities. • General Woodside activities on the North West Shelf including the location of operations. Woodside noted the need for additional gas and the role Browse could play at the Karratha Gas Plant. • Some individuals had worked on a Woodside operations / project of knew family and friends that had. • General overview of what an EMBA was. • All community members were encouraged to provide their views on Woodside's activities through the Woodside feedback form on the Woodside website, or to subscribe to Woodside updates. An iPad was available for stakeholders to do this on the spot.	
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 Of the EP).	

Activity	**Karratha Community Liaison Group meeting**
Date	29 September 2023
Description of the consultation	Woodside hosts quarterly Community Liaison Group (CLG) meetings 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. Woodside presented a slide which listed Environment Plans on which the CLG members had recently been consulted and Environment Plans it is currently consulting on (Record of Consultation, reference 2.39***)***. The slide included a QR and URL to Consultation Activities page of the Woodside website.
Advertising and invitations	No advertising was undertaken.

Estimated number of individuals / organisations consulted	14 individuals attended the meeting representing: • City of Karratha – Council representatives and staff representatives • Karratha Central Health Care • Bechtel • Dampier Community Association • Pilbara Development Commission • Regional Development Australia • Karratha & Districts Chamber of Commerce & Industry • Ngarluma Yindjibarndi Foundation Ltd. • Pilbara Ports Authority
Summary of Feedback, Objection or Claim	
Woodside noted it dedicates significant time and effort to consult extensively on its EPs and is continuing its engagements with all relevant stakeholders on EPs. Woodside acknowledged and discussed the increased volume of consultation material the CLG members had been receiving. Woodside noted it appreciates any feedback the CLG provides, including responses to confirm there is no comment. Woodside advised that it welcomes any questions and encouraged members to reach out if they would like any further information on any of the EPs Woodside has or is currently consulting on. Woodside provided details of local engagement sessions held at the Karratha Shopping Centre, Red Earth Arts Precinct, Woodside's Roebourne Office and at the South Hedland Square. Woodside shared that sessions were for local community members to seek information about its EPs, to discuss functions, activities or interest that may be affected by its proposed projects and to provide an opportunity for feedback. Woodside noted sessions were advertised in the Pilbara News and through social media advertising. Summary of general discussion: • Employment opportunities provided by the resources sector • General interest in the location of the Scarborough Project and development activities • General interest in the Scarborough Seismic EP and Federal Court's decision. • Query as to whether the Federal Court's decision would impact the timeline of the Scarborough project. • Stakeholder commented they appreciated the consultation information received and would like to continue to receive the materials.	
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 of the EP).	

Activity	**Exmouth Consultation Roadshow**
Location	**Exmouth**
Date	23 October 2023
Description of the consultation	Woodside hosted a community consultation session in Exmouth to enable community members to understand Woodside's proposed activities and how it may affect them, ask questions, and provide their feedback. Woodside Project, Corporate Affairs, First Nations, Environment, and Biodiversity and Science representatives were available to answer questions. A number of Environment Plan Consultation Information Sheets were available to attendees including the Angel Facility Operations EP Consultation Information Sheet.
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 4 October 2023 (Record of Consultation, reference 2.40.1).

	• Geotargeted social media campaign advertising in Exmouth and surrounding areas (+80 kms) from 2 to 9 October 2023 (Record of Consultation, reference 2.40.3). • Directly inviting local Traditional Custodian groups. • 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.
Estimated number of individuals / organisations consulted	Exmouth – Four individuals attended the information session. One from Gascoyne Green Energy, two Shire Councillors and a representative from Exmouth's Chamber of Commerce and Industry.
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. • All stakeholders expressed they had seen the geotargeted ads on social media. • General interest in Woodside activities and interest in the social benefits to the local Exmouth community. This included encouragement for Woodside to promote and share the positive outcomes of Woodside's presence and an offer from the Chamber to share information amongst its members. • General interest to understand what is involved in a marine seismic survey (MSS). Woodside presented its video on MSS. • General interest to understand the interaction of whales and MSS, and what mitigation measures are put in place for our activities. • Interest to understand how Woodside undertakes community consultation	
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 of the EP).	

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 of 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
  - A 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 ensure effective information sharing via:
  - Mutually agreed agenda avoiding time pressure
  - 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
- Woodside has a geotargeted sponsored social media campaign (Record of Consultation, reference 2.36) 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 reach of this campaign is shown in Record of Consultation, reference 2.36.
  - 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, activities or interests, 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.

Table 2: Consultation Report with Relevant Persons or Organisations

Commonwealth and WA State Government Departments or Agencies – Marine		
Australian Border Force (ABF)		
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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically: • Consultation Information Sheet publicly available on the Woodside website since June 2023. • Consultation Information provided to ABF on 22 June 2023 based on their functions, interests or activities. • Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback. • Woodside has provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.* • Woodside has sent follow up emails seeking feedback on the proposed activities. • Woodside has provided the ABF with the opportunity to provide feedback over a 11-month period. **Summary of consultation provided and responses:** • On 22 June 2023, Woodside emailed ABF, advising of the proposed activity (Record of Consultation, reference 1.3), provided a Consultation Information Sheet and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.* • On 10 July 2023, Woodside emailed ABF, following up on the proposed activity (Record of Consultation, reference 2.1), provided a Consultation Information Sheet and to request any feedback.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	Woodside has addressed maritime security-related issues in Section 6 of this EP based on previous offshore activities. No additional measures or controls are required.
Australian Fisheries Management Authority (AFMA)		
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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically: • Consultation Information Sheet publicly available on the Woodside website since June 2023. • Consultation Information provided to AFMA on 22 June 2023 based on their functions, interests or activities. • Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback. • Woodside has provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*		

- Woodside has addressed and responded to AFMA over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed AFMA, advising of the proposed activity (Record of Consultation, reference 1.10), provided a Consultation Information Sheet and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- **(1)** On 11 July 2023, AFMA responded, thanking Woodside for the opportunity to comment and encouraged Woodside, if it had not already done so, to engage directly with operators in the relevant fisheries (namely the North West Slope Trawl Fishery).
- On 10 August 2023, Woodside responded, thanking AFMA for its email and confirmed that it has provided information to relevant fishery licence holders as well as representatives organisations.

Summary of Feedback, Objection or Claim	Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response	Inclusion in Environment Plan
(1) AFMA has requested Woodside consult with operators who have entitlements to fish within the proposed area including the North West Slope Trawl Fishery. Whilst feedback has been received, there were no objections or claims.	**(1)** Woodside has addressed AFMA's request to consult with North West Slope Trawl Fishery. Woodside has consulted AFMA, DAFF - Fisheries, CFA and individual relevant licence holders. 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	**(1)** Woodside has assessed the relevancy of Commonwealth fisheries issues in Section 4.9.2 of this EP. Woodside has implemented a consultation program to advise relevant persons of the activities and provide opportunity to raise objections or claims, as referenced as PS 1.8 in this EP. Woodside considers the measures and controls in the EP address AFMA's functions, interests or activities. No additional controls are required.

Australian Hydrographic Office (AHO)

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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to AHO on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside has provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has addressed and responded to the AHO over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed the AHO, advising of the proposed activity (Record of Consultation, reference 1.8), provided a Consultation Information Sheet, shipping lanes map and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- **(1)** On 23 June 2023, the AHO responded acknowledging receipt of Woodside's email.
- On 16 August 2023, Woodside emailed AHO informing it that in accordance with feedback provided by AMSA for this EP, Woodside confirms it will:
  - Notify the AHO no less than 4 weeks before operations commence in order to promulgate a Notice to Mariners.
  - Provide an update to the AHO on any material changes to planned activities.

Summary of Feedback, Objection or Claim	Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response	Inclusion in Environment Plan
(1) AHO responded and acknowledged receipt of Woodside's consultation email. Whilst feedback has been received, there were no objections or claims.	**(1)** Woodside notes that AHO has acknowledged receipt of consultation information. 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	**(1)** Not required**.** Woodside will notify the AHO no less than four working weeks before activities commence (where vessels will be in the Operational Area, but outside of the Petroleum Safety Zone >3 weeks), as referenced as a PS 1.9 in this EP. Woodside considers the measures and controls in the EP address AHO's functions, interests or activities. No additional measures or controls are required.

Australian Maritime Safety Authority (AMSA) - Marine Safety

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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to AMSA on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside has provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has addressed and responded to AMSA over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed the AMSA, advising of the proposed activity (Record of Consultation, reference 1.8), provided a Consultation Information Sheet, shipping lanes map and GIS Shape file (Record of Consultation, reference 1.44), and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 28 June 2023, AMSA emailed Woodside advising it had reviewed the Angel Facility EP and the proximity to shipping fairways and:
  - **(1)** requested that Woodside notify AMSA's JRCC for promulgation of radio navigation warnings 24-48 hours before operations commence.

- **(2)** requested that the AHO office be contacted no less than four working weeks before operations commence for the promulgation of related notices to mariners; and
- **(3)** requested that all vessels exhibit appropriate lights and shapes to reflect the nature of operations.

- On 13 July 2023, AMSA responded thanking Woodside for the information provided and:
  - **(1)** requested that AMSA's Joint Rescue Coordination Centre (JRCC) be notified at least 24–48 hours before operations commence;
  - **(2)** requested that the AHO be contacted no less than four working weeks before operations commence for the promulgation of related notices to mariners;
  - **(3)** requested that all vessels exhibit appropriate lights and shapes to reflect the nature of operations; and
  - **(4)** requested that all vessels comply with the International Rule for Preventing Collisions at Sea.
- On 31 July 2023, Woodside responded and thanked AMSA for its feedback and proposed the following notification protocols given the ongoing nature of activities during the life of the EP. Woodside will:
  - notify AMSA's JRCC where vessel activities are undertaken for more than three weeks at a time in the Operational Area (but outside the Petroleum Safety Zone), as defined in the Operations Environment Plans. Notification at least 24-48 hours before activity commencement.; and
  - notify AHO with details relevant to the operations, to enable them to generate a temporary Maritime Safety Information Notifications (MSIN) and temporary Notice to Mariners (NTM) for activities where vessel activities are to be undertaken for more than three weeks at a time in the Operational Area (but outside the Petroleum Safety Zone), as defined in the Operations Environment Plans. Woodside will provide notification no less than four weeks before operations.
  - Woodside does not propose to implement further anti-collision measures for all Angel operational activities at this time, however collision risk mitigation measures are constantly being evaluated and implemented for activities as required.
  - Woodside also confirmed that vessels will 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)** On 1 August 2023, AMSA emailed Woodside and confirmed that these protocols are acceptable to AMSA for Woodside's planned activities under the revised Operations EP.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Inclusion in Environment Plan**
AMSA has provided feedback and requested that: **(1)** AMSA's Joint Rescue Coordination Centre (JRCC) be notified at least 24–48 hours before operations commence; **(2)** the AHO be contacted no less than four working weeks	Woodside has addressed AMSA's requests and proposed updated notification protocols given ongoing nature of activities during the life of the EP. Woodside will notify: **(1)** AMSA's JRCC where vessel activities are undertaken for more than three weeks at a time in the Operational Area. Notification at least 24-48 hours before activity commencement **(2)** notify AHO with details relevant to the operations, to enable them to generate a temporary Maritime Safety Information Notifications (MSIN) and temporary Notice to Mariners (NTM) for activities to be undertaken for more than three weeks at a time in the Operational Area	**(1)** Woodside will notify AMSA's JRCC at least 24–48 hours before activities commence for each survey, as referenced as PS 1.10 in this EP. **(2)** Woodside will notify the AHO no less than four working weeks before operations commence (where vessels will be in the Operational Area, but outside of the Petroleum Safety Zone

before operations commence for the promulgation of related notices to mariners; **(3)** all vessels exhibit appropriate lights and shapes to reflect the nature of operations; and **(4)** all vessels comply with the International Rule for Preventing Collisions at Sea. **(5)** AMSA confirmed that Woodside's notification protocols are acceptable. Whilst feedback has been received, there were no objections or claims.	**(3)** Woodside confirmed vessels will exhibit appropriate lights and shapes to reflect the nature of operations. **(4)** Woodside does not propose to implement further anti-collision measures for the activity at this time but collision risk mitigation measures are constantly being evaluated and implemented. **(5)** Woodside notes the feedback received from AMSA. 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	>3 weeks), as referenced as a PS 1.9 in this EP. **(3,4)** The EP contains a number of other controls that address AMSA's feedback on lighting and compliance with the international rule for preventing collisions at sea, specifically safety zones are established (temporarily around the MODU and permanently around the facility), vessels are required to comply with marine orders and the facility's collision prevention system will be implemented. **(5)** Not required. Woodside considers the measures and controls in the EP address AMSA – Marine Safety's functions, interests or activities.

Australian Maritime Safety Authority (AMSA) – Marine Pollution

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with AMSA – Marine Pollution for the purpose of regulation 25 is complete. Sufficient information and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to AMSA – Marine Pollution on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside has provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up emails seeking feedback on the proposed activities.
- Woodside has provided AMSA – Marine Pollution with the opportunity to provide feedback over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed AMSA – Marine Pollution, (Record of Consultation, reference 1.9), provided an updated Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 31 July 2023, Woodside emailed AMSA – Marine Pollution and provided a copy of the Oil Pollution First Strike Plan (Appendix D).
- On 22 August 2023, Woodside emailed AMSA – Marine Pollution following up on the proposed activity (Record of Consultation, reference 2.31) and to request any feedback.

Summary of Feedback, Objection or Claim	Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response	Inclusion in Environment Plan
No feedback, objections or claims received despite follow up.	Woodside has provided AMSA – Marine Pollution with a copy of the Oil Pollution First Strike Plan Woodside and has addressed oil pollution planning and response at Appendix D. Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	Woodside and has addressed oil pollution planning and response at Appendix D. Woodside considers the measures and controls in the EP address AMSA – Marine Pollution's functions, interests or activities. No additional measures or controls are required.

Department of Defence (DoD)

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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to DoD on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside has provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up emails seeking feedback on the proposed activities.
- Woodside has provided DoD with the opportunity to provide feedback over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed DoD, advising of the proposed activity (Record of Consultation, reference 1.18), provided a Consultation Information Sheet, defence map, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 11 July 2023, Woodside emailed DoD, following up on the proposed activity (Record of Consultation, reference 2.18), and provided a Consultation Information Sheet and defence map.

Summary of Feedback, Objection or Claim	Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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. Woodside notes that further feedback may be received as part of ongoing consultation. Should further feedback be received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	Woodside will notify the AHO no less than four working weeks before operations commence (where vessels will be in the Operational Area, but outside of the Petroleum Safety Zone

		>3 weeks), as referenced as PS 1.9 in this EP. Notifying the AHO provides DoD with information of the PAP through maritime safety information. No additional measures or controls are required.

Department of Primary Industries and Regional Development (DPIRD)

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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to DPIRD on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside has provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has addressed and responded to DPIRD over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed DPIRD, advising of the proposed activity (Record of Consultation, reference 1.5), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- **(1)** On 26 June 2023, DPIRD emailed Woodside thanking it for the opportunity to be consulted on the Angel Facility Operations EP. DPIRD noted the fisheries that may potentially be impacted and noted the exclusionary/cautionary zones:
    - for the routine operation of the Angel Facility, the Operational area comprises the riser platform and the area within a 500m PSZ around the facility. The export pipeline from WA-14-PL up to the connection to the barred tee WA-1-PL on the NRC 1TL tie-in assembly and an area encompassing 1500m either side of the WA-14-PL pipeline infrastructure.
    - for the Angel subsea infrastructure, including Angel production wells AP-2, AP-3 and AP-4, flowlines, umbilicals and an area within 1500m around the subsea infrastructure. The Exploration wells with wellheads and an area of 500m around each wellhead.
    - for the Lambert West Drilling and Tie-Back the Operational Area includes a radius of 4500m form the Lambert Deep Manifold to allow vessels to undertake drilling activities with a temporary 500m safety exclusion zone around vessels conduction drilling and installation activities to manage vessel movements.
- On 16 August 2023, Woodside emailed DPIRD thanking it for DPIRD's feedback and confirmed Woodside had identified relevant commercial fisheries and had consulted individual licence holders and representative bodies.

Summary of Feedback, Objection or Claim	Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response	Inclusion in Environment Plan
(1) DPIRD has provided feedback and requested the fisheries that may potentially be impacted be consulted. It noted a key fisheries issue will be the impact of the exclusionary/cautionary zones. Whilst feedback has been received, there were no objections or claims.	**(1)** Woodside confirmed with DPIRD it has consulted state commercial fishery licence holders and recreational fishery licence holders that are active within the Operational Area for the proposed activity. Woodside has consulted DPIRD, WAFIC and individual relevant licence holders. 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 7.2.5 of the EP).	**(1)** Woodside has assessed the relevancy of State fisheries issues in Section 4.9.2 of this EP. Woodside has implemented a consultation program to advise relevant persons of the PAP and provide opportunity to raise objections or claims, as referenced as PS 1.8 in this EP. Woodside considers the measures and controls in the EP address DPIRD's functions, interests or activities. No additional measures or controls are required.
Department of Transport (DoT)		
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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically: • Consultation Information Sheet publicly available on the Woodside website since June 2023. • Consultation Information provided to DoT on 22 June 2023 based on their functions, interests or activities. • Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback. • Woodside has provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.* • Woodside has addressed and responded to DoT over a 11-month period. **Summary of consultation provided and responses:** • On 22 June 2023, Woodside emailed DoT, advising of the proposed activity (Record of Consultation, reference 1.3), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*. • On 10 July 2023, Woodside emailed DoT, following up on the proposed activity (Record of Consultation, reference 2.1), and provided a Consultation Information Sheet. • **(1)** On 31 July 2023, DoT responded to Woodside's email and asked to be consulted if there is a risk of a spill impacting State waters.		

- On 31 July 2023, Woodside emailed DoT and provided copies of the two Oil Pollution First Strike Plans (Appendix D) – the revised *Angel Operations Oil Pollution First Strike Plan* (Rev) and a new *Lambert West Drilling Oil Pollution First Strike Plan* (Rev0).
- On 17 August 2023, Woodside responded, thanking DoT for its email and confirmed DoT will be consulted if there is a risk of a spill impacting State waters.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Inclusion in Environment Plan**
(1) DoT responded and asked to be consulted if there is a risk of a spill impacting State waters or further, if there is an increased risk of a spill impacting State waters from the proposed activities. Whilst feedback has been received, there were no objections or claims.	**(1)** Woodside has addressed the DoT's feedback, including confirming that if there is a risk of a spill impacting State waters, DoT will be consulted. Woodside will provide DoT with a copy of the accepted Oil Pollution First Strike Plan, as referenced in the OSPRMA (Appendix D). Woodside will consult DoT if there is a spill impacting State water from the proposed activity, as referenced in the OSPRMA (Appendix D). Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	Woodside will provide DoT with a copy of the accepted Oil Pollution First Strike Plan, as referenced in the OSPRMA (Appendix D). **(1)** Woodside will consult DoT if there is a spill impacting State water from the proposed activity, as referenced in the OSPRMA (Appendix D). Woodside considers the measures and controls in the EP address DoT's functions, interests or activities. No additional measures or controls are required.

Department of Planning, Lands and Heritage (DPLH)

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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to the DPLH on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside has provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has addressed and responded to DPLH over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed DPLH advising of the proposed activity (Record of Consultation, reference 1.21), provided a Consultation Information Sheet, State Shipwrecks list, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.

- **(1)** On 29 June 2023, the DPLH emailed Woodside thanking it for the opportunity to provide feedback on the Angel Facility Operations EP. The DPLH advised that the Western Australian Museum is the delegated authority for management of historic shipwrecks and relics in WA and should be contacted for advice regarding any maritime archaeological impacts. The DPLH advised it did not have any comment or feedback to provide on the activities.
- On 17 August 2023, Woodside emailed DPLH to thank it for its feedback.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Inclusion in Environment Plan**
(1) DPLH confirmed it doesn't have any feedback on the proposed activities. It noted the WA Museum is the delegated authority for management of historic shipwrecks in WA. Whilst feedback has been received, there were no objections or claims.	**(1)** Woodside notes DPLH's confirmation that it doesn't have any feedback on the proposed activities. Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	**(1)** Not required. The EP demonstrates that there are no known underwater heritage sites or shipwrecks within the Petroleum Activities Area it identifies that there are no credible impacts to the values of any listed underwater heritage or shipwreck as a result of planned activities (Section 4.9.1.7 and Section 6.6). 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 Sections 6.7.3- 6.7.7 and Sections 6.8.1-6.8.3. Woodside considers the measures and controls in the EP address DPLH's functions, interests or activities. No additional measures or controls are required.
Commonwealth and WA State Government Departments or Agencies – Environment		
Department of Climate Change, Energy Efficiency and Water (DCCEEW)		

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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to DCCEEW on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside has provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has addressed and responded to DCCEEW over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed DCCEEW, advising of the proposed activity (Record of Consultation, reference 1.19), provided a Consultation Information Sheet, Commonwealth shipwrecks, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 10 July 2023, Woodside emailed DCCEEW, following up on the proposed activity (Record of Consultation, reference 2.3), and provided a Consultation Information Sheet.
- **(1)** On 19 July 2023, DCCEEW emailed Woodside and noted that Woodside's approach to risk mitigation and compliance with the UCH Act requirement aligns with the advice DCCEEW provide to proponents. DCCEEW asked Woodside to consult with their team as needed on these and other activities and as the EP documentation and any relevant technical reports are developed.
- On 3 August 2023, Woodside emailed DCCEEW and advised that as suggested, it will apply the methodology described including;
    - Desktop reviews by qualified and experienced maritime archaeologists for seabed disturbing activities to a depth of 130m
    - Reviewing and implementing resulting recommendations as appropriate
    - Consulting with Traditional owners in preparation and during activities subsequent to Woodside EPS
    - Confirming Woodside will keep DCCEEW's team informed of future developments related to the EPs.

Summary of Feedback, Objection or Claim	Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response	Inclusion in Environment Plan
(1) DCCEEW noted that Woodside's approach to risk mitigation and compliance aligns with the advice DCCEEW provides. It asked Woodside consult with the DCCEEW team as needed on these activities and as the EP documentation and any relevant technical reports are developed.	**(1)** Woodside has confirmed it will apply the methodology advised by DCCEEW and keep DCCEEW's team informed of future developments. Woodside has consulted AFMA, DAFF - Fisheries, CFA and individual relevant licence holders. Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	The EP demonstrates that the proposed activities are outside the boundaries of a proclaimed Commonwealth Marine Park and identifies that there are no credible impacts to the values of any Commonwealth Marine Parks as a result of planned activities (Section 4.9.1.4 and Section 6.6). While impacts to Commonwealth Marine Parks are possible in the event of an unplanned hydrocarbon spill, Woodside considers

Whilst feedback has been received, there were no objections or claims.		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 6.7.3- 6.7.7 and Sections 6.8.1-6.8.3. The EP demonstrates that there are no known underwater heritage sites or shipwrecks within the Petroleum Activities Area and identifies that there are no credible impacts to the values of any underwater heritage or shipwrecks as a result of planned activities (Section 4.9.1.7 and Section 6.6). 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 Sections 6.7.3- 6.7.7 and Sections 6.8.1-6.8.3 of the EP**.** Vessels are required to comply with the Australian Biosecurity Act 2015, specifically the 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 Sediments) to prevent introducing IMS. Vessels will be assessed and managed to prevent the introduction of invasive marine species in accordance with Woodside's Invasive Marine Species Management Plan (see Section 6.8.10 of the EP).

		Woodside has assessed the relevancy of Commonwealth fisheries issues in Section 4.9.2 of this EP. Woodside has implemented a consultation program to advise relevant persons of the PAP and provide opportunity to raise objections or claims, as referenced as PS 1.8 in this EP. Woodside considers the measures and controls in the EP address DCCEEW's functions, interests or activities. No additional measures or controls are required.
Department of Agriculture, Fisheries and Forestry (DAFF) – Fisheries and Biosecurity (marine pests, vessels, aircraft and personnel)		
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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically: • Consultation Information Sheet publicly available on the Woodside website since June 2023. • Consultation Information provided to DAFF on 22 June 2023 based on their functions, interests or activities. • Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback. • Woodside has provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.* • Woodside has sent follow up emails seeking feedback on the proposed activities. • Woodside has provided DAFF with the opportunity to provide feedback over a 11-month period. **Summary of consultation provided and responses:** • On 22 June 2023, Woodside emailed DAFF, advising of the proposed activity including biosecurity matters (Record of Consultation, reference 1.17), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*. • On 11 July 2023, Woodside emailed DAFF, following up on the proposed activity (Record of Consultation, reference 2.19), and provided a Consultation Information Sheet and requested any feedback.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Inclusion in Environment Plan**

No feedback, objections or claims received despite follow up.	Woodside has consulted AFMA, DAFF - Fisheries, CFA and individual relevant licence holders. Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	The EP demonstrates that the proposed activities are outside the boundaries of a proclaimed Commonwealth Marine Park and identifies that there are no credible impacts to the values of any Commonwealth Marine Parks as a result of planned activities (Section 4.9.1.4 and Section 6.6 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 6.7.3- 6.7.7 and Sections 6.8.1-6.8.3 of the EP**.** The EP demonstrates that there are no known underwater heritage sites or shipwrecks within the Petroleum Activities Area and identifies that there are no credible impacts to the values of any underwater heritage or shipwrecks as a result of planned activities (Section 4.9.1.7 and Section 6.6 of the 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 Sections 6.7.3- 6.7.7 and Sections 6.8.1-6.8.3 of the EP**.** Vessels are required to comply with the Australian Biosecurity Act 2015,

		specifically the 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 Sediments) to prevent introducing IMS. Vessels will be assessed and managed to prevent the introduction of invasive marine species in accordance with Woodside's Invasive Marine Species Management Plan (see Section 6.8.10 of the EP). Woodside has assessed the relevancy of Commonwealth fisheries issues in Section 4.9.2 of this EP. Woodside has implemented a consultation program to advise relevant persons of the PAP and provide opportunity to raise objections or claims, as referenced as PS 1.8 in this EP. Woodside considers the measures and controls in the EP address DAFF's functions, interests or activities. No additional measures or controls are required.
Director of National Parks (DNP)		
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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically: • Consultation Information Sheet publicly available on the Woodside website since June 2023. • Consultation Information provided to DNP on 22 June 2023 based on their functions, interests or activities. • Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback. • Woodside has provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.* • Woodside has sent follow up emails seeking feedback on the proposed activities.		

- Woodside has provided DNP with the opportunity to provide feedback over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed DNP, advising of the proposed activity (Record of Consultation, reference 1.20), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 10 July 2023, Woodside emailed DNP, following up on the proposed activity (Record of Consultation, reference 2.16), and provided a Consultation Information Sheet and requested any feedback.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see **Section 7.2.5** of the EP).	The EP demonstrates that the proposed activities are outside the boundaries of a proclaimed Commonwealth Marine Park and identifies that there are no credible impacts to the values of any Commonwealth Marine Parks as a result of planned activities (Section 4.9.1.4 and Section 6.6 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 6.7.3- 6.7.7 and Sections 6.8.1-6.8.3 of the EP**.** This 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 (Sections 6.6, 6.7 and 6.8 of 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 D). Woodside considers the measures and controls in the EP address DNP's functions, interests or activities. No additional controls are required.
Ningaloo Coast World Heritage Advisory Committee (NCWHAC)		
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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically: • Consultation Information Sheet publicly available on the Woodside website since June 2023. • Consultation Information provided to NCWHAC on 22 June 2023 based on their functions, interests or activities. • Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback. • Woodside has provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.* • Woodside has sent follow up emails seeking feedback on the proposed activities. • Woodside has provided NCWHAC with the opportunity to provide feedback over a 11-month period. **Summary of consultation provided and responses:** • On 22 June 2023, Woodside emailed NCWHAC advising of the proposed activity (Record of Consultation, reference 1.4), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*. • On 10 July 2023, Woodside emailed the NCWHAC following up on the proposed activity (Record of Consultation, reference 2.2) and to request any feedback.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	The EP demonstrates that the proposed activities are outside the boundaries of the Ningaloo Marine Park and identifies that there are no credible planned impacts to the values of the Ningaloo Marine Park (Section 4.9.1.4 and Section 6.6 of the EP). While impacts to the Ningaloo Marine

		Park 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 6.7.3- 6.7.7 and Sections 6.8.1-6.8.3 of the EP**.** Woodside considers the measures and controls in the EP address NCWHAC's functions, interests or activities. No additional measures or controls are required.

Department of Biodiversity, Conservation and Attractions (DBCA)

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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to DBCA on 22 June 2023 based on their functions, interests or activities.
- Woodside has provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside has addressed and responded to DBCA over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed DBCA, advising of the proposed activity (Record of Consultation, reference 1.3), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 10 July 2023, Woodside emailed DBCA following up on the proposed activity (Record of Consultation, reference 2.1) and to request any feedback.
- On 20 July 2023, DBCA emailed Woodside thanking it for providing DBCA with the consultation information sheet for Angel Facility Operations. The DBCA noted:

- **(1)** The Angel Facility Operations are in vicinity of reserves managed by DBCA under the CALM act and given the ecological importance of areas potentially affected by a hydrocarbon release from the proposed activities, it is considered important that the baseline values and state of the potentially affected environment are appropriately understood and documented prior to operations commencing.
- **(2)** 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.

- On 17 August 2023, Woodside replied thanking DBCA for its response. Woodside informed DBCA that Woodside maintains knowledge and an understanding of areas of ecological importance within and adjacent to operational areas and advised its oil spill scientific monitoring program will provide for a quantitative assessment of the overall environmental impacts in the event of an unplanned hydrocarbon release.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Inclusion in Environment Plan**
DBCA provided feedback relating to: **(1)** documentation of areas potentially affected by any operations commencing that have the potential to lead to hydrocarbon releases **(1)** requesting Woodside to establish appropriate baseline survey data on the current state of areas **(1)** DBCA encourages Woodside to acquire the necessary information to implement a Before-After, Control-Impact (BACI) framework **(2)** DBCA also provided an 'Incidents and Emergency Response' in case of a hydrocarbon release	Woodside has addressed the DBCA's feedback, including: **(1)** Areas of ecological importance in the proximity of the Environment Plan Operational Areas will be not impacted by planned activities. **(2)** Woodside's oil spill scientific monitoring program (SMP) will consider 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. Woodside engages in ongoing consultation throughout the life of an EP. Should further feedback be received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	**(1)** The Environment Plan demonstrates that the proposed activities are outside the boundaries of a proclaimed Commonwealth and State Marine Parks and identifies that there are no credible impacts to the values of any Marine Parks as a result of planned activities (Section 4.8 and Section 6.6 of the EP). Impacts to 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 6.7.3- 6.7.7 and Sections 6.8.1-6.8.3 of the EP**.** **(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 Section 7.8.1.2 of this EP.

Whilst feedback has been received, there were no objections or claims.		Woodside considers the measures and controls in the EP address DBCA's functions, interests or activities. No additional measures or controls are required.
Commonwealth and State Government Departments or Agencies – Industry		
Department of Industry, Science and Resources (DISR)		
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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically: • Consultation Information Sheet publicly available on the Woodside website since June 2023. • Consultation Information provided to DISR on 22 June 2023 based on their functions, interests or activities. • Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback. • Woodside has provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.* • Woodside has sent follow up emails seeking feedback on the proposed activities. • Woodside has provided DISR with the opportunity to provide feedback over a 11-month period. **Summary of consultation provided and responses:** • On 22 June 2023, Woodside emailed DISR, advising of the proposed activity (Record of Consultation, reference 1.3), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*. • On 10 July 2023, Woodside emailed DISR, following up on the proposed activity (Record of Consultation, reference 2.1), and provided a Consultation Information Sheet and requested feedback.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.
Department of Energy, Mines, Industry Regulation and Safety (DEMIRS) (formerly DMIRS)		

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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to DEMIRS on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside has provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up emails seeking feedback on the proposed activities.
- Woodside has provided DEMIRS with the opportunity to provide feedback over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed DEMIRS, advising of the proposed activity (Record of Consultation, reference 1.3), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 10 July 2023, Woodside emailed DEMIRS, following up on the proposed activity (Record of Consultation, reference 2.1), and provided a Consultation Information Sheet and requested any feedback.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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 further feedback be received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.

Commonwealth Commercial fisheries and representative bodies

North West Slope and Trawl Fishery

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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to North West Slope and Trawl Fishery on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside has provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up emails seeking feedback on the proposed activities.
- Woodside has provided North West Slope and Trawl Fishery with the opportunity to provide feedback over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed North West Slope and Trawl Fishery advising of the proposed activity (Record of Consultation, reference 1.13), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.

• On 10 July 2023, Woodside emailed the North West Slope and Trawl Fishery following up on the proposed activity (Record of Consultation, reference 2.7) and to request any feedback.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Inclusion in Environment Plan**
No feedback, objections or claims received despite follow up.	Woodside has consulted AFMA, DAFF - Fisheries, CFA and individual relevant licence holders. 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	Woodside has assessed the relevancy of Commonwealth fisheries issues in Section 4.9.2 of this EP. Woodside has implemented a consultation program to advise relevant persons of the PAP and provide opportunity to raise objections or claims, as referenced as PS 1.8 in this EP. No additional measures or controls are required.
Western Deepwater Trawl Fishery		
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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically: • Consultation Information Sheet publicly available on the Woodside website since June 2023. • Consultation Information provided to Western Deepwater Trawl Fishery on 22 June 2023 based on their functions, interests or activities. • Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback. • Woodside has provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.* • Woodside has sent follow up emails seeking feedback on the proposed activities. • Woodside has provided Western Deepwater Trawl Fishery with the opportunity to provide feedback over a 11-month period. **Summary of consultation provided and responses:** • On 22 June 2023, Woodside emailed Western Deepwater Trawl Fishery advising of the proposed activity (Record of Consultation, reference 1.13), provided a Consultation Information Sheet., and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*. • On 10 July 2023, Woodside emailed Western Deepwater Trawl Fishery following up on the proposed activity (Record of Consultation, reference 2.7) and to request any feedback.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Inclusion in Environment Plan**

No feedback, objections or claims received despite follow up.	Woodside has consulted AFMA, DAFF - Fisheries, CFA and individual relevant licence holders. 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	Woodside has assessed the relevancy of Commonwealth fisheries issues in Section 4.9.2 of this EP. Woodside has implemented a consultation program to advise relevant persons of the PAP and provide opportunity to raise objections or claims, as referenced as PS 1.8 in this EP. No additional measures or controls are required.

Commonwealth Fisheries Association (CFA)

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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to CFA on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside has provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up emails seeking feedback on the proposed activities.
- Woodside has provided CFA with the opportunity to provide feedback over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed CFA, advising of the proposed activity (Record of Consultation, reference 1.13), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 10 July 2023, Woodside emailed CFA, following up on the proposed activity (Record of Consultation, reference 2.7), and provided a Consultation Information Sheet and requested feedback.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Inclusion in Environment Plan**
No feedback, objections or claims received despite follow up.	Woodside has consulted AFMA, DAFF - Fisheries, CFA and individual relevant licence holders. 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	Woodside has assessed the relevancy of Commonwealth fisheries issues in Section 4.9.2 of this EP.

	received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	Woodside has implemented a consultation program to advise relevant persons of the PAP and provide opportunity to raise objections or claims, as referenced as PS 1.8 in this EP. No additional measures or controls are required.
State Commercial fisheries and representative bodies		
Marine Aquarium Managed Fishery		
Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with Marine Aquarium Managed Fishery for the purpose of regulation 25 is complete. Sufficient information and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically: • Consultation Information Sheet publicly available on the Woodside website since June 2023. • Consultation Information provided to Marine Aquarium Managed Fishery on 22 June 2023 based on their functions, interests or activities. • Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback. • Woodside referred to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.* • Woodside has sent follow up emails seeking feedback on the proposed activities. • Woodside has provided Marine Aquarium Managed Fishery with the opportunity to provide feedback over a 11-month period. **Summary of consultation provided and responses:** • On 22 June 2023, Woodside sent a letter to Marine Aquarium Managed Fishery advising of the proposed activity (Record of Consultation, reference 1.14), provided a Consultation Information Sheet, and referred to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*. • On 11 July 2023, Woodside sent a letter to Marine Aquarium Managed Fishery following up on the proposed activity (Record of Consultation, reference 2.8) and to request any feedback.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Inclusion in Environment Plan**
No feedback, objections or claims received despite follow up.	Woodside has consulted DPIRD, WAFIC and individual relevant licence holders.	Woodside has assessed the relevancy of State fisheries issues in Section 4.9.2 of this EP.

	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	Woodside has implemented a consultation program to advise relevant persons of the PAP and provide opportunity to raise objections or claims, as referenced as PS 1.8 in this EP. No additional measures or controls are required.

Mackerel Managed Fishery (Area 2)

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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to Mackerel Managed Fishery (Area 2) on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside referred to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up emails seeking feedback on the proposed activities.
- Woodside has provided Mackerel Managed Fishery (Area 2) with the opportunity to provide feedback over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside sent a letter to Mackerel Managed Fishery (Area 2), advising of the proposed activity (Record of Consultation, reference 1.14), provided a Consultation Information Sheet, and referred to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 11 July 2023, Woodside sent a letter to Mackerel Managed Fishery (Area 2), following up on the proposed activity (Record of Consultation, reference 2.8) and to request any feedback.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Inclusion in Environment Plan**
No feedback, objections or claims received despite follow up.	Woodside has consulted DPIRD, WAFIC and individual relevant licence holders. Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	Woodside has assessed the relevancy of State fisheries issues in Section 4.9.2 of this EP. Woodside will has implemented a consultation program to advise relevant persons of the PAP and provide opportunity to raise objections or

		claims, as referenced as PS 1.8 in this EP. No additional measures or controls are required.
Pilbara Crab Managed Fishery		
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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically: • Consultation Information Sheet publicly available on the Woodside website since June 2023. • Consultation Information provided to Pilbara Crab Managed Fishery on 22 June 2023 based on their functions, interests or activities. • Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback. • Woodside referred to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.* • Woodside has sent follow up emails seeking feedback on the proposed activities. • Woodside has provided Pilbara Crab Managed Fishery with the opportunity to provide feedback over a 11-month period. **Summary of consultation provided and responses:** • On 22 June 2023, Woodside sent a letter to Pilbara Crab Fishery, advising of the proposed activity (Record of Consultation, reference 1.14), provided a Consultation Information Sheet, and referred to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*. • On 11 July 2023, Woodside sent a letter to Pilbara Crab Fishery, following up on the proposed activity (Record of Consultation, reference 2.8) and to request any feedback.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Inclusion in Environment Plan**
No feedback, objections or claims received despite follow up.	Woodside has consulted DPIRD, WAFIC and individual relevant licence holders. Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	Woodside has assessed the relevancy of State fisheries issues in Section 4.9.2 of this EP. Woodside has implemented a consultation program to advise relevant persons of the PAP and provide opportunity to raise objections or claims, as referenced as PS 1.8 in this EP. No additional measures or controls are required.

West Coast Deep Sea Crustacean Managed Fishery		
Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with West Coast Deep Sea Crustacean Managed Fishery for the purpose of regulation 25 is complete. Sufficient information and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically: • Consultation Information Sheet publicly available on the Woodside website since June 2023. • Consultation Information provided to West Coast Deep Sea Crustacean Managed Fishery on 22 June 2023 based on their functions, interests or activities. • Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback. • Woodside referred to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.* • Woodside has sent follow up emails seeking feedback on the proposed activities. • Woodside has provided West Coast Deep Sea Crustacean Managed Fishery with the opportunity to provide feedback over a 11-month period. **Summary of consultation provided and responses:** • On 22 June 2023, Woodside sent a letter to West Coast Deep Sea Crustacean Managed Fishery, advising of the proposed activity (Record of Consultation, reference 1.14), provided a Consultation Information Sheet, and referred to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*. • On 11 July 2023, Woodside sent a letter to West Coast Deep Sea Crustacean Managed Fishery, following up on the proposed activity (Record of Consultation, reference 2.8) and to request any feedback.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Inclusion in Environment Plan**
No feedback, objections or claims received despite follow up.	Woodside has consulted DPIRD, WAFIC and individual relevant licence holders. Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	Woodside has assessed the relevancy of State fisheries issues in Section 4.9.2 of this EP. Woodside has implemented a consultation program to advise relevant persons of the PAP and provide opportunity to raise objections or claims, as referenced as PS 1.8 in this EP. No additional measures or controls are required.
Specimen Shell Managed Fishery		

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with Specimen Shell Managed Fishery for the purpose of regulation 25 is complete. Sufficient information and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to Specimen Shell Managed Fishery on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside referred to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up emails seeking feedback on the proposed activities.
- Woodside has provided Specimen Shell Managed Fishery with the opportunity to provide feedback over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside sent a letter to Specimen Shell Managed Fishery, advising of the proposed activity (Record of Consultation, reference 1.14), provided a Consultation Information Sheet, and referred to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 11 July 2023, Woodside sent a letter to Specimen Shell Managed Fishery, following up on the proposed activity (Record of Consultation, reference 2.8) and to request any feedback.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Inclusion in Environment Plan**
No feedback, objections or claims received despite follow up.	Woodside has consulted DPIRD, WAFIC and individual relevant licence holders. Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	Woodside has assessed the relevancy of State fisheries issues in Section 4.9.2 of this EP. Woodside has implemented a consultation program to advise relevant persons of the PAP and provide opportunity to raise objections or claims, as referenced as PS 1.8 in this EP. No additional measures or controls are required.

Onslow Prawn Managed Fishery (Area 1 and 2)

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with Onslow Prawn Managed Fishery (Area 1 and 2) for the purpose of regulation 25 is complete. Sufficient information and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to Onslow Prawn Managed Fishery on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.

- Woodside referred to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up emails seeking feedback on the proposed activities.
- Woodside has provided Onslow Prawn Managed Fishery with the opportunity to provide feedback over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside sent a letter to Onslow Prawn Managed Fishery, advising of the proposed activity (Record of Consultation, reference 1.14), provided a Consultation Information Sheet, and referred to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 11 July 2023, Woodside sent a letter to Onslow Prawn Managed Fishery, following up on the proposed activity (Record of Consultation, reference 2.8) and to request any feedback.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Inclusion in Environment Plan**
No feedback, objections or claims received despite follow up.	Woodside has consulted DPIRD, WAFIC and individual relevant licence holders. Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	Woodside has assessed the relevancy of State fisheries issues in Section 4.9.2 of this EP. Woodside has implemented a consultation program to advise relevant persons of the PAP and provide opportunity to raise objections or claims, as referenced as PS 1.8 in this EP. No additional measures or controls are required.

Western Australian Sea Cucumber Fishery

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with Western Australian Sea Cucumber Fishery for the purpose of regulation 25 is complete. Sufficient information and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to Western Australian Sea Cucumber Fishery on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside referred to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up emails seeking feedback on the proposed activities.
- Woodside has provided Western Australian Sea Cucumber Fishery with the opportunity to provide feedback over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside sent a letter to Western Australian Sea Cucumber Fishery, advising of the proposed activity (Record of Consultation, reference 1.14), provided a Consultation Information Sheet, and referred to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 11 July 2023, Woodside sent a letter to Western Australian Sea Cucumber Fishery, following up on the proposed activity (Record of Consultation, reference 2.8) and to request any feedback.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Inclusion in Environment Plan**
No feedback, objections or claims received despite follow up.	Woodside has consulted DPIRD, WAFIC and individual relevant licence holders. Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	Woodside has assessed the relevancy of State fisheries issues in Section 4.9.2 of this EP. Woodside has implemented a consultation program to advise relevant persons of the PAP and provide opportunity to raise objections or claims, as referenced as PS 1.8 in this EP. No additional measures or controls are required.

Exmouth Gulf Prawn Managed Fishery

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with Exmouth Gulf Prawn Managed Fishery for the purpose of regulation 25 is complete. Sufficient information and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to Exmouth Gulf Prawn Managed Fishery on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside referred to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up emails seeking feedback on the proposed activities.
- Woodside has provided Exmouth Gulf Prawn Managed Fishery with the opportunity to provide feedback over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside sent a letter to Exmouth Gulf Prawn Managed Fishery, advising of the proposed activity (Record of Consultation, reference 1.14), provided a Consultation Information Sheet, and referred to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.

- On 11 July 2023, Woodside sent a letter to Exmouth Gulf Prawn Managed Fishery, following up on the proposed activity (Record of Consultation, reference 2.8) and to request any feedback.

Summary of Feedback, Objection or Claim	Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response	Inclusion in Environment Plan
No feedback, objections or claims received despite follow up.	Woodside has consulted DPIRD, WAFIC and individual relevant licence holders. Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	Woodside has assessed the relevancy of State fisheries issues in Section 4.9.2 of this EP. Woodside has implemented a consultation program to advise relevant persons of the PAP and provide opportunity to raise objections or claims, as referenced as PS 1.8 in this EP. No additional measures or controls are required.

Nickol Bay Prawn Managed Fishery

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with Nickol Bay Prawn Managed Fishery for the purpose of regulation 25 is complete. Sufficient information and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to Nickol Bay Prawn Managed Fishery on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside referred to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up emails seeking feedback on the proposed activities.
- Woodside has provided Nickol Bay Prawn Managed Fishery with the opportunity to provide feedback over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside sent a letter to Nickol Bay Prawn Managed Fishery, advising of the proposed activity (Record of Consultation, reference 1.14), provided a Consultation Information Sheet, and referred to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 11 July 2023, Woodside sent a letter to Nickol Bay Prawn Managed Fishery, following up on the proposed activity (Record of Consultation, reference 2.8) and to request any feedback.

Summary of Feedback, Objection or Claim	Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response	Inclusion in Environment Plan
No feedback, objections or claims received despite follow up.	Woodside has consulted DPIRD, WAFIC and individual relevant licence holders. Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	Woodside has assessed the relevancy of State fisheries issues in Section 4.9.2 of this EP. Woodside has implemented a consultation program to advise relevant persons of the PAP and provide opportunity to raise objections or claims, as referenced as PS 1.8 in this EP. No additional measures or controls are required.
Pilbara Trawl Fishery		
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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically: • Consultation Information Sheet publicly available on the Woodside website since June 2023. • Consultation Information provided to Pilbara Trawl Fishery on 22 June 2023 based on their functions, interests or activities. • Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback. • Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.* • Woodside has sent follow up emails seeking feedback on the proposed activities. • Woodside has provided Pilbara Trawl Fishery with the opportunity to provide feedback over a 11-month period. **Summary of consultation provided and responses:** • On 22 June 2023, Woodside emailed Pilbara Trawl Fishery advising of the proposed activity (Record of Consultation, reference 1.11), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*. • On 10 July 2023, Woodside emailed Pilbara Trawl Fishery following up on the proposed activity (Record of Consultation, reference 2.5) and provided a Consultation Information Sheet and to request feedback.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Inclusion in Environment Plan**

No feedback, objections or claims received despite follow up.	Woodside has consulted DPIRD, WAFIC and individual relevant licence holders. Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	Woodside has assessed the relevancy of State fisheries issues in Section 4.9.2 of this EP. Woodside has implemented a consultation program to advise relevant persons of the PAP and provide opportunity to raise objections or claims, as referenced as PS 1.8 in this EP. No additional measures or controls are required.

Pilbara Trap Fishery

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with Pilbara Trap Fishery for the purpose of regulation 25 is complete. Sufficient information and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to Pilbara Trap Fishery on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up emails seeking feedback on the proposed activities.
- Woodside has provided Pilbara Trap Fishery with the opportunity to provide feedback over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed Pilbara Trap Fishery advising of the proposed activity (Record of Consultation, reference 1.11), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 10 July 2023, Woodside emailed Pilbara Trap Fishery following up on the proposed activity (Record of Consultation, reference 2.5) and provided a Consultation Information Sheet and to request feedback.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Inclusion in Environment Plan**
No feedback, objections or claims received despite follow up.	Woodside has consulted DPIRD, WAFIC and individual relevant licence holders. Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	Woodside has assessed the relevancy of State fisheries issues in Section 4.9.2 of this EP. Woodside has implemented a consultation program to advise relevant

		persons of the PAP and provide opportunity to raise objections or claims, as referenced as PS 1.8 in this EP. No additional measures or controls are required.
Pilbara Line Fishery		
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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically: • Consultation Information Sheet publicly available on the Woodside website since June 2023. • Consultation Information provided to Pilbara Line Fishery on 22 June 2023 based on their functions, interests or activities. • Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback. • Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.* • Woodside has sent follow up emails seeking feedback on the proposed activities. • Woodside has provided Pilbara Line Fishery with the opportunity to provide feedback over a 11-month period. **Summary of consultation provided and responses:** • On 22 June 2023, Woodside emailed Pilbara Line Fishery advising of the proposed activity (Record of Consultation, reference 1.11), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*. • On 10 July 2023, Woodside emailed Pilbara Line Fishery following up on the proposed activity (Record of Consultation, reference 2.5) and provided a Consultation Information Sheet and to request feedback.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Inclusion in Environment Plan**
No feedback, objections or claims received despite follow up.	Woodside has consulted DPIRD, WAFIC and individual relevant licence holders. Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	Woodside has assessed the relevancy of State fisheries issues in Section 4.9.2 of this EP. Woodside has implemented a consultation program to advise relevant persons of the PAP and provide opportunity to raise objections or

		claims, as referenced as PS 1.8 in this EP. No additional measures or controls are required.

Western Australian Fishing Industry Council (WAFIC)

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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to WAFIC on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up emails seeking feedback on the proposed activities.
- Woodside has provided WAFIC with the opportunity to provide feedback over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed WAFIC advising of the proposed activity (Record of Consultation, reference 1.12), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 27 June 2023, Woodside emailed WAFIC about an ongoing discussion that Woodside had committed to providing WAFIC with a consolidated email outlining all the EPs Woodside is currently consulting WAFIC on for ease of feedback. Woodside suggested a 1.5 hour meeting at Woodside offices to run through several EPs including this EP.
- On 10 July 2023, Woodside emailed WAFIC following up on the proposed activity (Record of Consultation, reference 2.6) and provided a Consultation Information Sheet and to request feedback. No feedback was provided in response to this information.

The summary above demonstrates that consultation for the purpose of regulation 25 of the Environment Regulations is complete, however, as per Woodside's commitment to ongoing consultation, engagement had continued as summarised below:

Ongoing consultation:

- On 25 July 2023, WAFIC sent a letter to Woodside to register frustration with regard to Woodside pursuing detailed responses to EPs or Decommissioning Proposals. WAFIC noted:
    - Since start of 2023, it has received more than 60 emails seeking feedback for activities proposed by Woodside;
    - Each email places workload pressures on WAFIC, an organisation without sufficient resources to meet the deadlines required;
    - It has a number of other oil and gas titleholders operating in WA waters seeking similar feedback for their projects;

- WAFIC requests Woodside to review its current consultation methodology for engagement with WAFIC.
- On 16 August 2023, Woodside emailed WAFIC and confirmed a meeting for 28 August 2023. Woodside also provided an outline of existing EP consultation and upcoming in the coming weeks including Angel Operations EP, NWS and Julimar Wellhead Decommissioning EP, Scarborough Offshore Facility and Trunkline Operations EP.
- On 25 August 2023, Woodside replied to the letter from WAFIC and noted:
    - Woodside's consultation is designed to ensure that relevant persons are identified and given sufficient information and a reasonable period to make an informed assessment of the possible consequences of the proposed activity.
    - Woodside is keen to meet with WAFIC and to ensure Woodside's consultation with WAFIC and the commercial fishing sector achieves this outcome.
    - Woodside thanked WAFIC for sharing concerns and appreciated opportunity to discuss these matters further and will be in touch to organise a suitable meeting date.
- On 28 August 2023, Woodside met with WAFIC to discuss consultation on Environment Plans:
    - WAFIC noted the high level of consultation currently being experienced and resourcing requirements. It noted it needs to prioritise consultation and has provided guidance to offshore proponents.
    - Woodside discussed relevant persons consultation and acknowledged the high level of consultation to meet regulatory requirements and case law.
    - WAFIC noted the importance of genuine consultation and building a relationship with the commercial fishing sector.
    - Woodside sought to understand the most appropriate way to consult the commercial fishery sector.
    - WAFIC and Woodside agreed a more strategic approach to consultation was required, noting the WAFIC fee for service model.
    - Woodside recognised the need for WAFIC to be appropriately resourced to consider consultation materials.
    - It was noted it is challenging to make assumptions about certain offshore activities, for example considering water depth or distance from shore, to reduce consultation fatigue.
    - Pipeline installation, seismic and decommissioning are activities of the most interest to the commercial fishing sector.
    - WAFIC noted consultation at the Offshore Project Proposal stage was effective in understanding projects and upcoming work scopes.
    - Woodside and WAFIC agreed to identify a more strategic and tailored model to consult the commercial fishery sector.
    - Woodside gave a presentation on Environment Plan activities, consultation requirements, and the environment that may be affected.

Summary of Feedback, Objection or Claim	Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response	Inclusion in Environment Plan
No feedback, objections or claims received despite follow up.	Woodside has consulted DPIRD, WAFIC and individual relevant licence holders. Woodside engages in ongoing consultation throughout the life of an EP. Should further feedback be received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	Woodside has assessed the relevancy of State fisheries issues in Section 4.9.2 of this EP. Woodside has implemented a consultation program to advise relevant persons of the PAP and provide opportunity to raise objections or claims, as referenced as PS 1.8 in this EP. No additional measures or controls are required.
Recreational marine users and representative bodies		
Exmouth Recreational Marine Users		

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with Exmouth Recreational Marine Users for the purpose of regulation 25 is complete. Sufficient information and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to Exmouth Recreational Marine Users on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up emails seeking feedback on the proposed activities.
- Woodside has provided Exmouth Recreational Marine Users with the opportunity to provide feedback over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed Exmouth Recreational Marine Users advising of the proposed activity (Record of Consultation, reference 1.16), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 10 July 2023, Woodside emailed Exmouth Recreational Marine Users following up on the proposed activity (Record of Consultation, reference 2.20) and provided a Consultation Information Sheet and to request feedback.

Summary of Feedback, Objection or Claim	Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response	Inclusion in Environment Plan

No feedback, objections or claims received despite follow up.	Woodside has consulted Recfishwest, Marine Tourism Association of WA, WA Game Fishing Association and individual recreational marine users. Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.
Gascoyne Recreational Marine Users		
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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically: • Consultation Information Sheet publicly available on the Woodside website since June 2023. • Consultation Information provided to Gascoyne Recreational Marine Users on 22 June 2023 based on their functions, interests or activities. • Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback. • Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.* • Woodside has sent follow up letters seeking feedback on the proposed activities. • Woodside has provided Gascoyne Recreational Marine Users with the opportunity to provide feedback over a 11-month period. **Summary of consultation provided and responses:** • On 22 June 2023, Woodside sent a letter to Gascoyne Recreational Marine Users advising of the proposed activity (Record of Consultation, reference 1.15), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*. • On 10 July 2023, Woodside sent a letter to Gascoyne Recreational Marine Users following up on the proposed activity (Record of Consultation, reference 2.9) and provided a Consultation Information Sheet and to request feedback.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Inclusion in Environment Plan**
No feedback, objections or claims received despite follow up.	Woodside has consulted Recfishwest, Marine Tourism Association of WA, WA Game Fishing Association and individual recreational marine users. Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.
Pilbara/Kimberley Recreational Marine Users		

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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to Pilbara/Kimberley Recreational Marine Users on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up letters seeking feedback on the proposed activities.
- Woodside has provided Pilbara/Kimberley Recreational Marine Users with the opportunity to provide feedback over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside sent a letter to Pilbara/Kimberley Recreational Marine Users advising of the proposed activity (Record of Consultation, reference 1.15), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 10 July 2023, Woodside sent a letter to Pilbara/Kimberley Recreational Marine Users following up on the proposed activity (Record of Consultation, reference 2.9) and provided a Consultation Information Sheet and to request feedback.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Inclusion in Environment Plan**
No feedback, objections or claims received despite follow up.	Woodside has consulted Recfishwest, Marine Tourism Association of WA, WA Game Fishing Association and individual recreational marine users. Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.

Broome Recreational Marine Users

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with Broome Recreational Marine Users for the purpose of regulation 25 is complete. Sufficient information and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to Broome Recreational Marine Users on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up letters seeking feedback on the proposed activities.
- Woodside has provided Broome Recreational Marine Users with the opportunity to provide feedback over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside sent a letter to Broome Recreational Marine Users advising of the proposed activity (Record of Consultation, reference 1.15), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 10 July 2023, Woodside sent a letter to Broome Recreational Marine Users following up on the proposed activity (Record of Consultation, reference 2.9) and provided a Consultation Information Sheet and to request feedback.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Inclusion in Environment Plan**
No feedback, objections or claims received despite follow up.	Woodside has consulted Recfishwest, Marine Tourism Association of WA, WA Game Fishing Association and individual recreational marine users. Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.

Karratha Recreational Marine Users

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with Karratha Recreational Marine Users for the purpose of regulation 25 is complete. Sufficient information and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to Karratha Recreational Marine Users on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up emails seeking feedback on the proposed activities.
- Woodside has provided Karratha Recreational Marine Users with the opportunity to provide feedback over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed Karratha Recreational Marine Users advising of the proposed activity (Record of Consultation, reference 1.16), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 10 July 2023, Woodside emailed Karratha Recreational Marine Users following up on the proposed activity (Record of Consultation, reference 2.20) and provided a Consultation Information Sheet and to request feedback.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Inclusion in Environment Plan**
No feedback, objections or claims received despite follow up.	Woodside has consulted Recfishwest, Marine Tourism Association of WA, WA Game Fishing Association and individual recreational marine users.	No additional measures or controls are required.

	Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	

Recfishwest

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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to Recfishwest on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has addressed and responded to Recfishwest over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed Recfishwest advising of the proposed activity (Record of Consultation, reference 1.16), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 10 July 2023, Woodside emailed Recfishwest following up on the proposed activity (Record of Consultation, reference 2.20) and provided a Consultation Information Sheet and to request feedback.
- On 19 July 2023, Recfishwest responded with the following comments:
    - **(1)** Recreational fishing is an integral part of the Pilbara lifestyle and the array of offshore islands, coral reefs and habitats include some of Australia's best fishing locations and opportunities.
    - **(2)** Acknowledgment of the operational areas and exclusion zones, and the importance of being informed on the proposal's progress to communicate with the recreational fishing community.
    - **(3)** With regard to decommissioning planning, some structures may be suitable as artificial reefs if they deliver equal or better environmental outcomes compared to complete removal.
    - **(4)** No objection to Woodside's proposed activities.
- On 16 August 2023, Woodside responded thanking Recfishwest for their feedback and noted Recfishwest has no objection to the proposed activities. Woodside confirmed it will keep Recfishwest informed of future developments relating to this project as and when required.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Inclusion in Environment Plan**
Response from Recfishwest noted: **(1)** Recreational fishing is an integral part of the Pilbara	**(1,2,3)** Woodside has addressed Recfishwest's feedback and confirmed it will keep Recfishwest informed of future developments relating to this project as and when required. **(4)** Woodside noted Recfishwest has no objection to the proposed activities.	**(1,2,3,4)** Not required. Woodside has assessed the relevancy of recreational fishing in Section 4.9.4 of this EP.

lifestyle with some of Australia's best fishing. **(2)** Acknowledgment of the operational areas and exclusion zones, and the importance of being informed on the proposal's progress to communicate with the recreational fishing community. **(3)** Some structures may be suitable as artificial reefs if they deliver equal or better environmental outcomes compared to complete removal. **(4)** It had no objections to the proposed activity. Whilst feedback has been received, there were no objections or claims.	Woodside has consulted Recfishwest, Marine Tourism Association of WA, WA Game Fishing Association and individual recreational marine users. 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	Woodside has implemented a consultation program to advise relevant persons of the PAP and provide opportunity to raise objections or claims, as referenced as PS 1.8 in this EP. Woodside considers the measures and controls in the EP address Recfishwest's functions, interests or activities. No additional measures or controls are required.

Marine Tourism WA

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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to Marine Tourism Association on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up emails seeking feedback on the proposed activities.
- Woodside has provided Marine Tourism Association with the opportunity to provide feedback over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed Marine Tourism WA advising of the proposed activity (Record of Consultation, reference 1.16), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 10 July 2023, Woodside emailed Marine Tourism WA following up on the proposed activity (Record of Consultation, reference 2.20) and provided a Consultation Information Sheet and to request feedback.

Summary of Feedback, Objection or Claim	Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response	Inclusion in Environment Plan
No feedback, objections or claims received despite follow up.	Woodside has consulted Recfishwest, Marine Tourism Association of WA, WA Game Fishing Association and individual recreational marine users. Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.
WA Game Fishing Association (WAGFA)		
Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with WAGFA for the purpose of regulation 25 is complete. Sufficient information and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically: • Consultation Information Sheet publicly available on the Woodside website since June 2023. • Consultation Information provided to WAGFA on 22 June 2023 based on their functions, interests or activities. • Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback. • Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.* • Woodside has sent follow up emails seeking feedback on the proposed activities. • Woodside has provided WAGFA with the opportunity to provide feedback over a 11-month period. **Summary of consultation provided and responses:** • On 22 June 2023, Woodside emailed WA Game Fishing Association advising of the proposed activity (Record of Consultation, reference 1.16), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*. • On 10 July 2023, Woodside emailed WA Game Fishing Association following up on the proposed activity (Record of Consultation, reference 2.20) and provided a Consultation Information Sheet and to request feedback.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Inclusion in Environment Plan**
No feedback, objections or claims received despite follow up.	Woodside has consulted Recfishwest, Marine Tourism Association of WA, WA Game Fishing Association and individual recreational marine users. Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.

Titleholders and Operators		
Chevron Australia/ Osaka Gas Gorgon/ Tokyo Gas Gorgon/ JERA Gorgon		
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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically: • Consultation Information Sheet publicly available on the Woodside website since June 2023. • Consultation Information provided to Chevron on 22 June 2023 based on their functions, interests or activities. • Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback. • Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.* • Woodside has sent follow up emails seeking feedback on the proposed activities. • Woodside has provided Chevron with the opportunity to provide feedback over a 11-month period. **Summary of consultation provided and responses:** • On 22 June 2023, Woodside emailed Chevron Australia advising of the proposed activity (Record of Consultation, reference 1.7), 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*. • On 10 July 2023, Woodside emailed Chevron Australia following up on the proposed activity (Record of Consultation, reference 2.4) and provided a Consultation Information Sheet and to request feedback.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Inclusion in Environment Plan**
No feedback, objections or claims received despite follow up.	Woodside has provided Chevron with GIS shape files for the EP. Woodside engages in ongoing consultation throughout the life of an EP. Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP) if required.	No additional measures or controls are required.
Western Gas		
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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically: • Consultation Information Sheet publicly available on the Woodside website since June 2023. • Consultation Information provided to Western Gas on 22 June 2023 based on their functions, interests or activities. • Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback. • Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.* • Woodside has sent follow up emails seeking feedback on the proposed activities. • Woodside has provided Western Gas with the opportunity to provide feedback over a 11-month period.		

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed Western Gas advising of the proposed activity (Record of Consultation, reference 1.6), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 10 July 2023, Woodside emailed Western Gas following up on the proposed activity (Record of Consultation, reference 2.3) and provided a Consultation Information Sheet and to request feedback.

Summary of Feedback, Objection or Claim	Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.

Exxon Mobil Australia Resources Company

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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to Exxon Mobil Australia on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up emails seeking feedback on the proposed activities.
- Woodside has provided Exxon Mobil Australia with the opportunity to provide feedback over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed Exxon Mobil Australia advising of the proposed activity (Record of Consultation, reference 1.6), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 10 July 2023, Woodside emailed Exxon Mobil Australia following up on the proposed activity (Record of Consultation, reference 2.3) and provided a Consultation Information Sheet and to request feedback.

Summary of Feedback, Objection or Claim	Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.

Shell Australia		
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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically: • Consultation Information Sheet publicly available on the Woodside website since June 2023. • Consultation Information provided to Shell Australia on 22 June 2023 based on their functions, interests or activities. • Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback. • Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.* • Woodside has sent follow up emails seeking feedback on the proposed activities. • Woodside has provided Shell Australia with the opportunity to provide feedback over a 11-month period. **Summary of consultation provided and responses:** • On 22 June 2023, Woodside emailed Shell Australia advising of the proposed activity (Record of Consultation, reference 1.9), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*. • On 10 July 2023, Woodside emailed Shell Australia following up on the proposed activity (Record of Consultation, reference 2.3) and provided a Consultation Information Sheet and to request feedback.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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 further feedback be received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.
BP Developments Australia		
Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with BP for the purpose of regulation 25 is complete. Sufficient information and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically: • Consultation Information Sheet publicly available on the Woodside website since June 2023. • Consultation Information provided to BP on 22 June 2023 based on their functions, interests or activities. • Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback. • Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.* • Woodside has sent follow up emails seeking feedback on the proposed activities. • Woodside has provided BP with the opportunity to provide feedback over a 11-month period.		

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed BP Developments Australia advising of the proposed activity (Record of Consultation, reference 1.6), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 10 July 2023, Woodside emailed BP Developments Australia following up on the proposed activity (Record of Consultation, reference 2.3) and provided a Consultation Information Sheet and to request feedback.

Summary of Feedback, Objection or Claim	Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.

Carnarvon Energy

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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to Carnarvon Energy on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has addressed and responded to Carnarvon Energy over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed Carnarvon Energy advising of the proposed activity (Record of Consultation, reference 1.6), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 10 July 2023, Woodside emailed Carnarvon Energy following up on the proposed activity (Record of Consultation, reference 2.3) and provided a Consultation Information Sheet and to request feedback.
- **(1)** On 12 July 2023, Carnarvon Energy emailed Woodside thanking it for providing information regarding the plan for Angel Facility Operations. Carnarvon Energy has reviewed and has no further requests for any information.
- On 17 August 2023, Woodside emailed Carnarvon Energy and thanked it for reviewing the information and noted they had no further comments.

Summary of Feedback, Objection or Claim	Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response	Inclusion in Environment Plan

(1) Carnarvon Energy advised it had no comments on the proposed EP. Whilst feedback has been received, there were no objections or claims.	**(1)** Carnarvon Energy has confirmed it has no feedback relating to the proposed activity. Woodside engages in ongoing consultation throughout the life of an EP. Should further feedback be received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	**(1)** Not required. Woodside considers the measures and controls in the EP address Carnarvon Energy's functions, interests or activities. No additional measures or controls are required.
PE Wheatstone		
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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically: • Consultation Information Sheet publicly available on the Woodside website since June 2023. • Consultation Information provided to PE Wheatstone on 22 June 2023 based on their functions, interests or activities. • Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback. • Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.* • Woodside has sent follow up emails seeking feedback on the proposed activities. • Woodside has provided PE Wheatstone with the opportunity to provide feedback over a 11-month period. **Summary of consultation provided and responses:** • On 22 June 2023, Woodside emailed PE Wheatstone advising of the proposed activity (Record of Consultation, reference 1.6), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*. • On 10 July 2023, Woodside emailed PE Wheatstone following up on the proposed activity (Record of Consultation, reference 2.3) and provided a Consultation Information Sheet and to request feedback.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.
Kyushu Electric Wheatstone		

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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to Kyushu Electric Wheatstone on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up emails seeking feedback on the proposed activities.
- Woodside has provided Kyushu Electric Wheatstone with the opportunity to provide feedback over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed PE Wheatstone advising of the proposed activity (Record of Consultation, reference 1.6), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 10 July 2023, Woodside emailed PE Wheatstone following up on the proposed activity (Record of Consultation, reference 2.3) and provided a Consultation Information Sheet and to request feedback.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.

Eni Australia

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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to ENI Australia on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up emails seeking feedback on the proposed activities.
- Woodside has addressed and responded to ENI Australia over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed ENI Australia advising of the proposed activity (Record of Consultation, reference 1.6), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.

- On 10 July 2023, Woodside emailed ENI Australia following up on the proposed activity (Record of Consultation, reference 2.3) and provided a Consultation Information Sheet and to request feedback.
- **(1)** On 25 July 2023, ENI Australia emailed Woodside thanking it for the information provided and advised it had no concerns with the activities associated with the EP. ENI asked Woodside to please keep ENI Australia informed as and when required.
- On 16 August 2023, Woodside emailed ENI Australia and confirmed it would keep the company informed of future developments.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Inclusion in Environment Plan**
(1) ENI Australia advised it had no comments on the proposed EP. Whilst feedback has been received, there were no objections or claims.	**(1)** ENI Australia has confirmed it has no feedback relating to the proposed activity. Woodside will keep ENI Australia informed of future developments as and when required. Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	**(1)** Not required. Woodside considers the measures and controls in the EP address Eni Australia's functions, interests or activities. No additional measures or controls are required.

Dorado Petroleum

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with Dorado Petroleum for the purpose of regulation 25 is complete. Sufficient information and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to Dorado Petroleum on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up emails seeking feedback on the proposed activities.
- Woodside has provided Dorado Petroleum with the opportunity to provide feedback over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed Dorado Petroleum advising of the proposed activity (Record of Consultation, reference 1.6), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 10 July 2023, Woodside emailed Dorado Petroleum following up on the proposed activity (Record of Consultation, reference 2.3) and provided a Consultation Information Sheet and to request feedback.

Summary of Feedback, Objection or Claim	Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.

Finder Energy No 16

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with Finder Energy No 16 for the purpose of regulation 25 is complete. Sufficient information and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to Finder Energy No 16 on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up emails seeking feedback on the proposed activities.
- Woodside has addressed and responded to Finder Energy No 16 over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed Finder Energy No 16 advising of the proposed activity (Record of Consultation, reference 1.6), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 10 July 2023, Woodside emailed Finder Energy No 16 following up on the proposed activity (Record of Consultation, reference 2.3) and provided a Consultation Information Sheet and to request feedback.
- **(1)** On 14 August 2023, Searcher Seismic, a subsidiary of Finder Energy, emailed thanking Woodside for including it in consultation for this EP and asked to be included in notification of commencement, but did not require further information on the activity at this stage. Searcher Seismic further stated should it have any need for SIMOPS for any future planned seismic activities, it would advise as appropriate.
- On 16 August 2023, Woodside emailed Searcher Seismic and advised that Woodside will keep you informed of future developments relating to the Angel Operations EP as and when required.

Summary of Feedback, Objection or Claim	Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response	Inclusion in Environment Plan
(1) Finder Energy's subsidiary, Searcher Seismic responded and asked to be included in notification of	**(1)** Woodside has addressed the request for notification of commencement.	**(1)**Woodside will send Searcher Seismic start of activity notifications, referenced as PS 1.11 of the EP.

commencement but did not require further information on the activity. Whilst 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.

KUFPEC

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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to KUFPEC on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up emails seeking feedback on the proposed activities.
- Woodside has provided KUFPEC with the opportunity to provide feedback over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed KUFPEC advising of the proposed activity (Record of Consultation, reference 1.6), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 10 July 2023, Woodside emailed KUFPEC following up on the proposed activity (Record of Consultation, reference 2.3) and provided a Consultation Information Sheet and to request feedback.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.

Santos NA Energy Holdings / Santos Ltd / Santos WA Northwest / Santos Offshore / Santos WA Southwest / Santos (BOL) / Santos WA PVG

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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.

- Consultation Information provided to Santos on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up emails seeking feedback on the proposed activities.
- Woodside has provided Santos with the opportunity to provide feedback over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed Santos advising of the proposed activity (Record of Consultation, reference 1.6), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 10 July 2023, Woodside emailed Santos following up on the proposed activity (Record of Consultation, reference 2.3) and provided a Consultation Information Sheet and to request feedback.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.

Coastal Oil and Gas

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with Coastal Oil and Gas for the purpose of regulation 25 is complete. Sufficient information and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to Coastal Oil and Gas on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up emails seeking feedback on the proposed activities.
- Woodside has provided Coastal Oil and Gas with the opportunity to provide feedback over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed Coastal Oil and Gas advising of the proposed activity (Record of Consultation, reference 1.6), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.

- On 10 July 2023, Woodside emailed Coastal Oil and Gas following up on the proposed activity (Record of Consultation, reference 2.3) and provided a Consultation Information Sheet and to request feedback.

Summary of Feedback, Objection or Claim	Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.

Bounty Oil and Gas

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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to Bounty Oil & Gas on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up emails seeking feedback on the proposed activities.
- Woodside has provided Bounty Oil & Gas with the opportunity to provide feedback over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed Bounty Oil and Gas advising of the proposed activity (Record of Consultation, reference 1.6), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 10 July 2023, Woodside emailed Bounty Oil and Gas following up on the proposed activity (Record of Consultation, reference 2.3) and provided a Consultation Information Sheet and to request feedback.

Summary of Feedback, Objection or Claim	Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.

OMV Australia

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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to OMV Australia on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up emails seeking feedback on the proposed activities.
- Woodside has provided OMV Australia with the opportunity to provide feedback over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed OMV Australia advising of the proposed activity (Record of Consultation, reference 1.6), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 10 July 2023, Woodside emailed OMV Australia following up on the proposed activity (Record of Consultation, reference 2.3) and provided a Consultation Information Sheet and to request feedback.

Summary of Feedback, Objection or Claim	Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.

KATO Energy / KATO Corowa

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with KATO Energy for the purpose of regulation 25 is complete. Sufficient information and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to Kato Energy on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up emails seeking feedback on the proposed activities.
- Woodside has provided Kato Energy with the opportunity to provide feedback over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed Kato Energy advising of the proposed activity (Record of Consultation, reference 1.6), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 10 July 2023, Woodside emailed Kato Energy following up on the proposed activity (Record of Consultation, reference 2.3) and provided a Consultation Information Sheet and to request feedback.

Summary of Feedback, Objection or Claim	Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.

INPEX Alpha

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with INPEX Alpha for the purpose of regulation 25 is complete. Sufficient information and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to INPEX Alpha on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up emails seeking feedback on the proposed activities.
- Woodside has provided INPEX Alpha with the opportunity to provide feedback over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed INPEX Alpha advising of the proposed activity (Record of Consultation, reference 1.6), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- **(1)** On 23 June 2023, INPEX Alpha emailed Woodside advising that the email had been passed on to appropriate INPEX personnel.
- On 10 July 2023, Woodside emailed INPEX Alpha following up on the proposed activity (Record of Consultation, reference 2.3) and provided a Consultation Information Sheet and to request feedback.

Summary of Feedback, Objection or Claim	Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response	Inclusion in Environment Plan
(1) INPEX confirmed receiving the email and that it	**(1)** Woodside notes the comment.	**(1)** Not required.

was passed onto appropriate personnel. Whilst 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.
JX Nippon O&G Exploration (Australia)		
Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with JX Nippon for the purpose of regulation 25 is complete. Sufficient information and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically: • Consultation Information Sheet publicly available on the Woodside website since June 2023. • Consultation Information provided to JX Nippon on 22 June 2023 based on their functions, interests or activities. • Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback. • Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.* • Woodside has sent follow up emails seeking feedback on the proposed activities. • Woodside has provided JX Nippon with the opportunity to provide feedback over a 11-month period. **Summary of consultation provided and responses:** • On 22 June 2023, Woodside emailed JX Nippon advising of the proposed activity (Record of Consultation, reference 1.6), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*. • On 10 July 2023, Woodside emailed JX Nippon following up on the proposed activity (Record of Consultation, reference 2.3) and provided a Consultation Information Sheet and to request feedback.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.
OPIC Australia		

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with OPIC Australia for the purpose of regulation 25 is complete. Sufficient information and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to OPIC Australia on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up emails seeking feedback on the proposed activities.
- Woodside has provided OPIC Australia with the opportunity to provide feedback over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed OPIC Australia advising of the proposed activity (Record of Consultation, reference 1.6), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 10 July 2023, Woodside emailed OPIC Australia following up on the proposed activity (Record of Consultation, reference 2.3) and provided a Consultation Information Sheet and to request feedback.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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 further feedback be received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.

Vermillion Oil & Gas

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with Vermillion Oil and Gas for the purpose of regulation 25 is complete. Sufficient information and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to Vermillion Oil & Gas on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up emails seeking feedback on the proposed activities.
- Woodside has provided Vermillion Oil & Gas with the opportunity to provide feedback over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed Vermillion Oil & Gas advising of the proposed activity (Record of Consultation, reference 1.6), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.

- On 10 July 2023, Woodside emailed Vermillion Oil & Gas following up on the proposed activity (Record of Consultation, reference 2.3) and provided a Consultation Information Sheet and to request feedback.

Summary of Feedback, Objection or Claim	Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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 further feedback be received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.

Jadestone

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with Jadestone for the purpose of regulation 25 is complete. Sufficient information and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to Jadestone on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up emails seeking feedback on the proposed activities.
- Woodside has provided Jadestone with the opportunity to provide feedback over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed Jadestone advising of the proposed activity (Record of Consultation, reference 1.6), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 10 July 2023, Woodside emailed Jadestone following up on the proposed activity (Record of Consultation, reference 2.3) and provided a Consultation Information Sheet and to request feedback.

Summary of Feedback, Objection or Claim	Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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 further feedback be received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.

Longreach Capital/Beagle No 1

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with Longreach Capital/Beagle for the purpose of regulation 25 is complete. Sufficient information and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to Longreach Capital/Beagle on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up emails seeking feedback on the proposed activities.
- Woodside has provided Longreach Capital/Beagle with the opportunity to provide feedback over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed Longreach Capital/Beagle advising of the proposed activity (Record of Consultation, reference 1.6), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 10 July 2023, Woodside emailed Longreach Capital/Beagle following up on the proposed activity (Record of Consultation, reference 2.3) and provided a Consultation Information Sheet and to request feedback.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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 further feedback be received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.

Peak Industry Representative bodies

Australian Energy Producers (AEP) (formerly APPEA)

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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to AEP on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up emails seeking feedback on the proposed activities.
- Woodside has provided APPEA with the opportunity to provide feedback over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed AEP advising of the proposed activity (Record of Consultation, reference 1.3), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 10 July 2023, Woodside emailed AEP following up on the proposed activity (Record of Consultation, reference 2.1) and provided a Consultation Information Sheet and to request feedback.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.

Traditional Custodians

Murujuga Aboriginal Corporation (MAC)

MAC is established under the Burrup and Maitland Industrial Estates Agreement 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 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. Specifically:

Sufficient Information:

- Woodside sought direction on MAC's preferred method of consultation. As sufficient information and a reasonable period have been provided (see below), any meetings would be considered as ongoing engagement post regulation 25 of the Environment Regulations consultation.
- Provided Consultation Information Sheets and Consultation Summary Sheets developed by Indigenous staff to MAC. These set out details of the proposed activity, the location of the activity, the timing of the activity as well as the potential risks and impacts of the activity with controls in a digestible, plain English format.
- Confirmed the purpose of consultation and set out in detail what is being sought through consultation.
- Articulated planned and unplanned environmental risks and impacts, with proposed controls.
- Asked for the consultation and information sheets to be distributed to members and individuals as required.
- Woodside has provided NOPSEMA's Brochure "Consultation on offshore petroleum environment plans" and Guideline "Guideline: Consultation in the course of preparing an environment plan".
- Advised that MAC can request that particular information provided in the consultation not be published (to align with 25(4) of the Environment Regulations).

Reasonable Period:

- Woodside published advertisements in a national, state, and relevant local newspapers including The Australian, The West Australian, North West Telegraph, Pilbara News, Midwest Times on 7 June 2023 advising of the proposed activities and requesting comments or feedback.
- Woodside commenced consultation with MAC in June 2023. Woodside has provided MAC with the opportunity to provide feedback over a 11-month period, demonstrating a "reasonable period" of consultation.
- Woodside asked MAC if it was aware of any other Traditional Custodian groups or individuals with whom Woodside should consult. None were identified.

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 7.2.5 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.

Summary of information provided and record of consultation for this EP:

- On 29 June 2023, Woodside emailed MAC advising of the proposed activity (Record of Consultation, reference 1.47) and provided a summary Consultation Information Sheet (including a link to the detailed information sheet on Woodside's website). The email requested information on the interests that MAC and its members may have within the EMBA. No response was received to this email.
- On 18 July 2023, Woodside emailed MAC NOPSEMA's Consultation Guidelines, Consultation Brochure, and Draft Policy for Managing Gender-Restricted Information. This email also reiterated Woodside's request that MAC advise Woodside of any other Traditional Custodian groups or individuals with whom Woodside should consult. No response was received to this email.
- On 26 July 2023, Woodside emailed MAC Woodside's planned Program of Ongoing Engagement with Traditional Custodians.
- On 10 August 2023, Woodside emailed MAC requesting space on the next MAC board meeting to discuss EPs.
- **(1)** On 1 September 2023, MAC sent Woodside a letter regarding the authority of the Circle of Elders for their cultural guidance on various issues involving the people and "Country" of Murujuga.
- **(1)** On 14 December 2023, Woodside met with MAC Board and Circle of Elders and CEO in Karratha to discuss accepted EPs as well as upcoming EPs being submitted in 2024. The meeting also reconfirmed MAC as the cultural authority over Murujuga and spoke to the specific authority of its senior law men and women. Woodside undertook to give a slide presentation to update on all activities, including this one, in early 2024.
- On 5 January 2024, Woodside emailed MAC following up on multiple outstanding EP consultations including this activity, asking if MAC would like to meet or have any concerns/feedback at this time.

Ongoing Relationship Building

- Woodside will continue to pursue an ongoing two-way relationship with MAC focused on future opportunities to work together.

Summary of Feedback, Objection or Claim	Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response	Inclusion in Environment Plan

MAC has provided significant valuable input into the management of known and potential cultural and heritage values across other Woodside activities. No feedback, objections or claims have been received from MAC for this activity since consultation commenced in June 2023, despite follow up. **(1)** MAC have advised that they are the appropriate cultural authority for Murujuga.	Woodside accepts that MAC has no feedback on this activity at this time. Woodside has an established and ongoing relationship with MAC and supports MAC engaging on EPs and other matters important to MAC. **(1)** Woodside accepts and respects MAC's position as the appropriate body corporate and cultural authority over Murujuga. Separate from consultation under regulation 25 of the Environment Regulations, Woodside supports ongoing engagement with MAC. As outlined in the consultation summary above, sufficient information and a reasonable period have been provided to demonstrate that consultation for the purpose of regulation 25 of the Environment Regulations is complete. Any further engagement with and support offered to MAC will be for the purpose of ongoing engagement. Woodside engages in ongoing consultation 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 7.2.5 of the EP).	Feedback on values has been included in Section 4.9.1.5. Existing controls considered sufficient as described in Section 6 of the EP. **(1)** Not required. Although consultation for the purpose of regulation 25 of the Environment Regulations is complete, as identified in Section 5.7 of this EP, 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.

Nganhurra Thanardi Garrbu Aboriginal Corporation (NTGAC)

NTGAC is established under the N*ative Title Act 199*3 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 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 and a reasonable period have been provided, as described in Section 5.5 of the EP. Specifically:

Sufficient Information:

- Woodside sought direction on NTGAC's preferred method of consultation. This resulted in a face-to-face meeting being coordinated at location of NTGAC's choosing, with NTGAC nominated representatives. These meetings included Woodside presenting information in a format and style that was readily accessible and appropriate. Any further meetings would be considered as ongoing engagement post regulation 25 of the Environment Regulations consultation.
- Provided Consultation Information Sheets and Consultation Summary Sheets developed by Indigenous staff to NTGAC. These set out details of the proposed activity, the location of the activity, the timing of the activity as well as the potential risks and impacts of the activity with controls in a digestible, plain English format.
- Articulated planned and unplanned environmental risks and impacts, with proposed controls.
- Confirmed the purpose of consultation and set out in detail what was being sought through consultation.
- Asked for the consultation and information sheets to be distributed to members and individuals.

- Woodside has provided NOPSEMA's Brochure "Consultation on offshore petroleum environment plans" and Guideline "Guideline: Consultation in the course of preparing an environment plan".
- Advised that NTGAC can request that particular information provided in the consultation not be published (to align with regulation 25(4) of the Environment Regulations).

Reasonable Period:

- Woodside published advertisements in a national, state, and relevant local newspapers including The Australian, The West Australian, North West Telegraph, Pilbara News, Midwest Times (7 June 2023) advising of the proposed activities and requesting comments or feedback.
- Woodside commenced consultation with NTGAC in June 2023. Woodside has addressed and responded to NTGAC over 11 months, demonstrating a "reasonable period" of consultation.

Woodside asked NTGAC if it was aware of any other Traditional Custodian groups or individuals with whom Woodside should consult. None were identified.

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 7.2.5 of the 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.

Woodside does not agree with NTGAC's assertion that it has not yet been adequately consulted on the activity. Woodside has assessed the claims and feedback raised by NTGAC, as detailed later in this section alongside Woodside's response to the claims.

Summary of information provided and record of consultation for this EP:

- On 19 June 2023, Woodside emailed NTGAC advising of the proposed activity (Record of Consultation, reference 1.48) and provided a summary Consultation Information Sheet (including a link to the detailed information sheet on Woodside's website). The email requested information on the interests that NTGAC and its members may have within the EMBA.
- On 19 June 2023, NTGAC/YMAC emailed Woodside with instructions from NTGAC Directors that they would like to undertake a consultation workshop with Woodside.
- On 19 June 2023, Woodside emailed NTGAC/YMAC to request a one-day meeting at a time and location suitable to the Board.
- **(3)** On 20 June 2023, Woodside emailed NTGA/YMAC to confirm that NTGAC would like Woodside to speak to them about this activity and confirmed agreement to a funding request for YMAC's in-house environmental scientist's attendance at the proposed meeting.
- On 20 June 2023, NTGAC/YMAC emailed Woodside to acknowledge they would look at the Board's availability for a one-day meeting for the activities.
- On 21 June 2023, NTGAC/YMAC emailed Woodside to acknowledge they will look at booking a full day's workshop and that they would like all EP activities to be covered including this activity.
- On 21 June 2023, Woodside emailed NTGAC/YMAC noting workshop and agreeing to assist with planning arrangements.
- On 30 June 2023, NTGAC/YMAC emailed Woodside with a date and proposed budget for a full day meeting with NTGAC Board on 15 August 2023.

- On 5 July 2023, Woodside emailed NTGAC/YMAC to confirm the meeting date and offer assistance with meeting arrangements.
- On 17 July 2023, YMAC/NTGAC emailed Woodside referring to YMAC's proposed consultation framework for PBCs to consult with oil and gas companies. They requested that they no longer be consulted on the EPs at a planned workshop in August, but that Woodside run a strategic planning workshop with NTGAC to develop the benefits that Woodside can provide under the consultation agreement, to discuss the consultation framework and determine the best way to implement it.
- 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 24 July 2023, Woodside replied to NTGAC's email of 17 July 2023 confirming they would be happy to use the workshop to discuss the consultation framework, identification of opportunities and relationship building while also consulting on activities. Woodside also suggested the workshop be jointly run and not run by Woodside as suggested in the email of 17July 2023 and requested a meeting to prepare.
- On 25 July 2023, Woodside emailed NTGAC/YMAC Woodside's planned Program of Ongoing Engagement with Traditional Custodians
- Between 28-31 July 2023, NTGAC and Woodside settled a date for a preparatory meeting through telephone calls and emails.
- On 3 August 2023, Woodside emailed NTGAC/YMAC about an unrelated activity and thanking for the pre meeting held on 2 August and confirming the meeting with NTGAC on 15 August 2023.
- Between 9-14 August 2023, NTGAC and Woodside exchanged emails settling logistics and attendances at the meeting scheduled for 15 August 2023.
- On 15 August 2023, Woodside presented to the NTGAC about several EPs including this EP. At the meeting Woodside:
    - Described the EP framework, referring to the Offshore Petroleum and Greenhouse Gas Storage Act (Environment) Regulations, NOPSEMA's role as regulator and general contents of EPs.
    - Displayed a map of activities open for feedback to be discussed in the meeting and provided a list of other upcoming activities which will be open for consultation in 2023.
    - Provided an overview of the drill rig activities.
    - Described the proposed activity, noting that this activity is a revision of the Angel Facility Operations EP.
    - Described the types of vessels involved.
    - Described planned and unplanned environmental risks and impacts in accordance with tables provided in the Information Sheets for the activities, emphasising that unplanned risks are not expected to occur and are unlikely.
    - Displayed and spoke to the EMBA for each proposed drilling activities, and the individual worst-case loss of containment scenarios identified, noting that they are all diesel fuel releases which would only be caused by vessel collisions.
    - Stated that Woodside wanted to understand how the functions, activities or interests of NTGAC and the people it represents may be impacted by any of those activities.
- Specifically asked the following:
    - How could these activities impact your cultural values, interests, and activities – does protecting the environment do enough to protect your cultural values?
    - What are your concerns about the proposed activities and what do you think we should do about them?

- Is there anything you would like included in the EPs before submission?
- Is there anyone else Woodside should consult with about the activities?

- Advised that Woodside will continue to take feedback from NTGAC for the life of the EP.
- Provided personal contact details for further feedback. Woodside provided NOPSEMA contact details, should NTGAC desire to provide feedback directly to the regulator.

  At the 15 August meeting NTGAC asked the following questions and gave the following feedback:

  - **(1)** Asked about ballast water discharges.
    - **(1)** Woodside responded by explaining Invasive Marine species requirements and controls such as hull cleaning, quarantine rules and dry docking, noting the risk is taken very seriously by Woodside.
  - **(2)** Asked about whale sightings and Woodside's response to sightings.
    - **(2)** Woodside responded that the response to whale sightings depended on the specific activity and that controls like Marine Mammal Observers were implemented for particular activities.
  - **(4)** A proposed framework for consultation was discussed, involving Woodside funding a General Project Report to be written by an independent suitably qualified and experienced consultant, to be provided to NTGAC initially and then on to Woodside.
  - Terms for ongoing engagement were discussed, including frequency, participation, and content in context of the proposed General Project Report
  - **(5)** NTGAC Strategic Plan and relation to potential Woodside social investment opportunities were explored.
  - NTGAC stated their consultation expectations (two-way dialogue preferred over one-way presentations and requested that consultation meetings cover whole projects or phases rather than single EP activities which is too time consuming).
  - NTGAC requested that a table of EPs be submitted by December with a timeline.
  - **(5)** NTGAC stated that they did not consider that they had been consulted on other EP's based on engagement to date.
- On 31 August 2023, Woodside emailed NGTAC/YMAC, confirming outcomes of the 15 August 2023 meeting, including:
  - **(4)** YMAC to provide a first draft of a consultation agreement.
  - **(4)** YMAC to prepare the first draft of a general report.
  - Woodside to provide a list of upcoming activities.
  - **(5)** Agreed to continue discussions relating to key community focus areas highlighted by NTGAC.
  - **(6)** Feedback from NTGAC on the appropriateness of the information given by Woodside (too technical) to enable NTGAC to provide feedback.
  - **(6)** Responded to NTGAC's claim that consultation has not begun by stating that in their view consultation has begun and is ongoing.
- **(1)** On 6 September 2023, Woodside emailed NTGAC/YMAC with responses to queries relevant to this and other unrelated activities, including:
  - Ballast waters release.
  - Specific chemicals released in marine environment.
  - Ballast waters testing for PFAs.

- **(3)** On 6 September 2023, NTGAC/YMAC emailed Woodside acknowledging information and noting they would pass over to their environmental scientist, as was stated as part of their proposed framework for consultation on 15 August 2023 meeting. No response or further questions have been received from NTGAC or their environmental consultant to date.
- **(4)** On 14 December 2023, Woodside emailed YMAC attaching the Program of Ongoing Consultation and advised that Woodside wanted to progress negotiations on consultation frameworks with groups represented by YMAC (including NTGAC). Woodside proposed the protocol would include (among other things):
    - The procedures Woodside will follow when a submission requires consultation.
    - Initial and ongoing consultation in relation to activities.
    - Agreement as to how Woodside will provide NTGAC with the information NTGAC requires to make free, prior and informed decisions about Woodside's EPs.
    - Agreement as to how NTGAC will provide feedback and how that can best be represented in EPs.
    - An agreed schedule of rates for NTGAC's participation in consultation.
    - How the outputs of the consultations will be managed.
- On 21 December 2023, Woodside emailed NTAGC (via YMAC) a list of all current and upcoming EPs, including this activity, as requested in the 15 August 2023 meeting.
- **(4)** On 28 February 2024, Woodside emailed YMAC with a letter setting out the draft terms of an agreement between NTGAC and Woodside, the agreement (among other things) included the following topics:
    - Sufficient Information
    - Reasonable Period.
    - Provision of Information.
    - Objection or claims.
    - Publications
    - Cost and termination.
- On 29 February 2024, YMAC emailed Woodside acknowledging receipt of the information.

Ongoing relationship building:

Woodside will continue to pursue an ongoing two-way relationship with NTGAC under the Proposed Program of Ongoing Engagement with Traditional Custodians.

Summary of Feedback, Objection or Claim	Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response	Inclusion in Environment Plan

(1) During face-to-face engagement in August, NTGAC requested further information on topics related to this proposed activity which were responded to during the meeting: • Ballast water discharge **(2)** NTGAC expressed a general interest in whales and whale sharks. No further feedback or comment was received on the topics. **(3)** NTGAC requested funding for YMAC's in-house environmental scientist. **(4)** YMAC will develop the first draft of a General Report and Framework Agreement. **(5)** NTGAC expressed interest in exploring social investment opportunities with Woodside which may support NTGAC's Strategic plan. **(6)** On 15 August 2023**,** NTGAC stated that in their view consultation had not commenced. NTGAC provided feedback that some of the information they have	**(1)** Woodside responded to NTGAC's requests for further information during face-to-face engagements, and by subsequent email when further information was requested. No further feedback or comment was request or received on these topics to date. **(2)** NTGAC/YMAC's interest in whale sharks has been noted in the Section 4.9.1.5 of the EP. **(3)** Woodside funded YMAC's environmental scientist to attend a face-to-face meeting on 15 Aug 2023 to support consultation. No feedback was received from this activity. **(4)** Separate from consultation under regulation 25 of the Environment Regulations for this activity, Woodside has sent a draft agreement to NTGAC in February 2024. The Agreement and General Report/s would be used to frame ongoing consultation to occur as part of Woodside's commitment to post regulation 25 of the Environment Regulations consultation. Sufficient information and a reasonable period have been provided to demonstrate that consultation for the purpose of regulation 25 of the Environment Regulations for this activity is complete. Any further engagement with NTGAC will be for the purpose of ongoing engagement. **(5)** Woodside is continuing to work with NTGAC regarding social investment opportunities. Woodside has assessed that the Framework for Ongoing Consultation with NTGAC is an effective mechanism for exploring opportunities for alignment with NTGAC's Strategic Plan. **(6)** Woodside does not agree with NTGAC's claim that it has not yet been consulted on the activity, or that information provided has been too technical. Woodside considers regulation 25 of the Environment Regulations consultation is complete and closed. Woodside met with NTGAC nominated representatives, at location of NTGAC's choice on 15 Aug 2023 for a multiple hour session where the activity was described face to face by Woodside project representatives, subject matter experts and First Nations relations advisers. This included specifically developed consultation material developed by First Nations personnel in collaboration with technical experts, maps and pictures. During the meeting, NTGAC and YMAC representatives were encouraged to control the pace of the engagement and seek clarification through the presentation. NTGAC and YMAC asked questions about the activity (see point 1) which indicates that material was engaged with. Woodside engages in ongoing consultation 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 7.2.5 of the EP).	**(1)** Existing controls considered sufficient, as described in Section 6. **(2)** Woodside has implemented controls for interactions with Whales, as referenced as PS 4.1 in this EP. Vessels are required to comply with the Australian Biosecurity Act 2015, specifically the 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 Sediments) to prevent introducing IMS. Vessels will be assessed and managed to prevent the introduction of invasive marine species in accordance with Woodside's Invasive Marine Species Management Plan (see Section 6.8.10 of the EP. Woodside updated Section 4.9.1 to reflect NTGAC's cultural interest in whale sharks. **(3)** Not required. **(4, 5)** Woodside is implementing a program to actively support Traditional Custodians' capacity for ongoing engagement and consultation on EPs, (Appendix I). This includes continued engagement regarding NTGAC and Woodside's proposed draft Framework Agreement and potential opportunities for alignment with NTGAC's Strategic

received is too technical.		Plan. Although consultation for the purpose of regulation 25 of the Environment Regulations is complete, as identified in Section 5.7 of this EP, 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. **(6)** Not required.

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 discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with BTAC 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 sought direction on BTAC's preferred method of consultation. As sufficient information and a reasonable period have been provided (see below), any meetings would be considered as ongoing engagement post regulation 25 of the Environment Regulations consultation.
- Provided Consultation Information Sheets and Consultation Summary Sheets developed by Indigenous staff to BTAC. These set out details of the proposed activity, the location of the activity, the timing of the activity as well as the potential risks and impacts of the activity with controls in a digestible, plain English format.
- Articulated planned and unplanned environmental risks and impacts, with proposed controls.
- Confirmed the purpose of consultation and set out in detail what is being sought through consultation.
- Asked for the consultation and information sheets to be distributed to members and individuals.
- Woodside has provided NOPSEMA's Brochure "Consultation on offshore petroleum environment plans" and Guideline "Guideline: Consultation in the course of preparing an environment plan".
- Advised that BTAC can request that particular information provided in the consultation not be published (to align with regulation 25(4) of the Environment Regulations.

Reasonable Period:

- Woodside published advertisements in a national, state, and relevant local newspapers including The Australian, The West Australian, North West Telegraph, Pilbara News, Midwest Times (7 June 2023) advising of the proposed activities and requesting comments or feedback.

- Woodside commenced consultation with BTAC in June 2023. Woodside has addressed and responded to BTAC over a 11-month period, demonstrating a "reasonable" period of consultation.

Woodside asked BTAC if it was aware of any other Traditional Custodian groups or individuals with whom Woodside should consult. None were identified.

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 7.2.5 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.

Summary of information provided and record of consultation for this EP:

Historical Engagement

- On 20 February 2023, BTAC emailed Woodside a letter in relation to another project but relevant to all Woodside activities, including the footprint of this activity:
    - **(1, 2)** BTAC confirmed that BTAC on behalf of Thalanyji people has interests and that the Thalanyji people have 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.
    - BTAC advised it was seeking the opportunity to engage with Woodside and NOPSEMA on the activities.
    - **(5)** BTAC advised it has not specifically developed values regarding Sea Country into a format that could be articulated for consultation and seeks support from Woodside to enable BTAC to define and articulate its values on Sea Country in a manner that could be more clearly understood by the offshore sector, government, and the community. This would enable BTAC and Woodside to collaborate to develop effective management plans that can provide adequate protection to sea country values.
    - **(3)** BTAC advised the information in the consultation fact sheets was very general. BTAC seeks support from Woodside to obtain technical support to review the information and provide BTAC and its members with feedback on the project risks to Sea Country and help BTAC contemplate the potential management controls that could be developed to protects its values and interests.
    - **(4)** BTAC requested that emergency response capability is developed and locally provided to be able to respond to potential activities/actions that may cause an impact in the EMBA. BTAC encouraged Woodside and industry to build capacity and capability in BTAC's ranger program so that it could participate in response planning and management activities.
    - **(6)** BTAC noted that ongoing consultation with BTAC would be imperative and likely continuous given recent changes to consultation requirements and this will continue to be a burden on the organisation. BTAC requested that Woodside enter a consultation or engagement framework to ensure BTAC can be properly resourced financially and intellectually to participate in the consultation and management planning processes for the activities.

Summary of information provided and record of consultation for this EP:

- On 19 June 2023, Woodside emailed BTAC advising of the proposed activity (Record of Consultation, reference 1.49) and provided a summary Consultation Information Sheet (including a link to the detailed information sheet on Woodside's website). The email requested information on the interests that BTAC and its members may have within the EMBA. Woodside sought confirmation of a meeting time and date.
- On 19 June 2023, BTAC emailed Woodside confirming they would like this activity included in a presentation Woodside was preparing for an upcoming meeting, although a date had not been settled. BTAC noted they were reviewing consultation rates and requested proposed principles be included in a presentation.
- On 20 June 2023, Woodside emailed BTAC to acknowledge Thalanyji's interest and requested a meeting to discuss draft principles.

- **(6)** On 10 July 2023, Woodside emailed BTAC acknowledging that Woodside commits to a program of ongoing consultation and will be governed by a framework agreement. Woodside sought confirmation as to whether BTAC had any objection to a number of activities, including this activity. No response was received.
- 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 19 July 2023, Woodside emailed BTAC seeking a time to continue discussion regarding a draft presentation to a meeting between Woodside and the BTAC Board about activities on Thalanyji country including other items not related to this proposed activity, and the collaboration principles.
- On 19 July 2023, BTAC emailed Woodside to organise a time for a discussion about proposed activities, principles and how they would be presented at a meeting.
- On 20 July 2023, Woodside emailed BTAC a draft presentation for discussion.
- On 26 July 2023, Woodside emailed BTAC Woodside's planned Program of Ongoing Engagement with Traditional Custodians.
- On 26 July 2023, Woodside emailed BTAC Woodside's template presentation further to an earlier draft for consideration.
- On 28 July 2023, Woodside emailed BTAC meeting details to join a Teams meeting of 28 July 2023.
- **(6)** On 28 July2023, BTAC emailed Woodside with outcomes of meeting, confirming Woodside has set aside funding for engagement, Woodside wish to meet with BTAC board (or sub-committee) as soon as available to discuss offshore activities/EPs. Woodside will prepare a draft framework agreement to address consultations in relation to NOPSEMA matters. BTAC enquired whether Woodside would be open to funding a special meeting with the board, outside of an ordinary board meeting.
- On 31 July 2023, Woodside emailed BTAC noting that Woodside would be open to funding a special meeting with the board or sub-committee and requesting a cost estimate for such a meeting.
- On 31 July 2023, Woodside emailed 3 letters to BTAC, 2 of those letters related to other Woodside activities. The 3rd letter outlined support for an ethnographic assessment to:
    - **(5)** identify sea country values generally sufficient to inform all Woodside EP's.
    - Support any work necessary to clarify or define the offshore areas that are relevant to the Thalanyji People.
    - Propose the delivery of interim reports if this will enable prioritising matters considered most critical by BTAC.
    - **(7)** Confirm Woodside will be responsible for all reasonable costs to complete the assessment.
    - Confirm BTAC retains intellectual property.
- On 15 August 2023, Woodside telephoned and emailed BTAC following up on correspondence from 31 July 2023, requesting to meet and discuss matters with BTAC.
- On 22 August 2023, BTAC emailed Woodside acknowledging correspondence and noting they will come back with a time to meet and progress matters.
- On 23 August 2023, Woodside emailed BTAC requesting to meet for an initial discussion to layout the various matters that have been under discussion, including BTAC's capacity and priority areas previously identified by BTAC.

- **(5)** On 14 September 2023, BTAC emailed a letter to Woodside regarding a framework agreement with BTAC. The intent of the agreement would be to formalise a co-ordinated, streamlined approach to progressing meaningful ongoing engagement and consultation. The letter included areas the agreed framework could address, and confirmed that the agreed framework would allow BTAC to meaningfully comment on a range of issues including:
    - Noted that Woodside has committed on on-going consultation throughout the life of relevant EPs, including this activity.
    - How/whether EP activities could impact cultural values, interests and customary or organisational activities and concerns and useful ways these could be addressed.
    - The content of EPs prior to submission to NOPSEMA.
    - **(2, 7)** Appropriate ways for mitigating risk and ensuring ongoing social licence. A further letter was attached outlining a proposed cost recovery mechanism for consultation activities, and BTAC stated that it did not sanction or endorse any consultation occurring without cost recovery.
    - **(6)** BTAC thanked Woodside for committing to on-going consultation throughout the life of relevant various EPs and associated activities including this EP.
    - BTAC noted that Woodside has commenced consultation, or intends to consult, with Thalanyji people through BTAC for more than 24 separate activities including this activity.
- On 14 September 2023, Woodside emailed BTAC acknowledging BTAC's email of 14 September and planning further review and discussion.
- **(7)** On 20 September 2023, BTAC emailed Woodside requesting a response from Woodside about accepting the proposed costs acceptance letter which BTAC sent on 14 September 2023 and requesting a list of current and ongoing activities Woodside were seeking ongoing consultation for.
- **(6, 7)** On 20 September 2023, BTAC emailed Woodside further to their earlier email, requesting a response to BTAC's cost proposal, a list of Woodside activities for ongoing consultation and an update on the status of the framework agreement to assist in ongoing consultation, for BTAC's review.
- **(6, 7)** On 22 September 2023, Woodside emailed BTAC accepting BTAC's proposed consultation fee structure, the list of activities that Woodside has consulted BTAC on and advising that the draft framework agreement to assist in ongoing consultation was under internal review.
- **(7)** On 26 September BTAC emailed Woodside acknowledging EP information received, signed costs and acceptance letter and that a draft agreement was currently under internal Woodside review. The email confirmed BTAC will be assisted with legal advice.
- On 27 September 2023, BTAC (via legal representative) emailed Woodside clarifying that they are instructed by BTAC on NOPSEMA matters.
- On 4 October 2023, Woodside emailed BTAC (via legal representative) thanking them and stating that they look forward to an ongoing relationship with BTAC and its legal representation.
- On 13 October 2023, BTAC (via legal representative) emailed Woodside confirming they acted for BTAC on NOPSEMA matters. Among other things, they noted, they required an indemnity clause in the proposed framework agreement against any court action that arose from a claim against BTAC in regard to the consultation they engaged on with Woodside EP's.
- On 31 October 2023, BTAC (via legal representative) emailed Woodside, requesting a response to the email about indemnifying BTAC.
- On 1 November 2023, BTAC emailed Woodside requesting attendance at a BTAC member meeting to update on Woodside activities on 27 November 2023 in Carnarvon.

- On 1 November 2023, Woodside emailed BTAC accepting the invitation from BTAC and offering to cover costs.
- On 2 November 2023, Woodside emailed BTAC (via legal representative) noting they would not agree to the request to indemnify BTAC against any court proceedings as a result of consultation they engage in with Woodside on EPs. Woodside re-iterated their wish to progress the framework agreement to build their relationship with BTAC. Woodside again noted that they wish to progress other matters, including the commitment to mapping BTAC's sea country values.
- On 2 November 2023, BTAC (via legal representative) emailed Woodside requesting more detail about Woodside not supporting the indemnity request.
- On 3 November 2023, BTAC (via legal representative) emailed Woodside confirming that BTAC would like Woodside to present to a BTAC members meeting on 27 November 2023 in Carnarvon.
- On 18 November 2023, Woodside emailed BTAC (via legal representative) with further information about why they would not indemnify BTAC as requested in the 13 October 2023 email. Woodside explained that it could harm genuine engagement, may promote behaviours in others who may become aware of the indemnity by Woodside, and it would not be good practice to provide an indemnity in relation to the act or omission of other parties that Woodside would not necessarily engage with. Woodside again noted their commitment to build an ongoing relationship with BTAC.
- **(5, 6)** On 27 November 2023, Woodside attended and presented at the BTAC Common Law Holders meeting. The one-hour timeslot did not allow for taking feedback in relation to EPs, but the Common Law Holders meeting were made aware that Woodside had been attempting to meet since January, and had agreed to pay for reasonable consultation costs as well as fund the Sea Country mapping but that these offers had not been taken up. BTAC members were very interested in an ongoing relationship and discussed sea country mapping, which Woodside had responded to in writing earlier in 2023, Woodside agreed to re-send the relevant correspondence to the new CEO. BTAC noted they would invite Woodside to attend a meeting with BTAC early in 2024, a collaborative agreement will be settled and further ongoing consultation on all relevant EPs will continue in order of priority for BTAC and Woodside.
- On 7 December 2023, Woodside emailed BTAC (via legal representative) requesting a response to the email of 18 November 2023 in relation to their request and Woodside's response on indemnification. Woodside noted that the framework agreement has not been finalised to date but would include the following:
    - **(6)** Agreement between parties to consult in a meaningful and genuine manner.
    - Procedure Woodside will follow when a submission requires consultation, which would include notification and an invitation to meet.
    - Initial and ongoing consultation about activities.
    - How Thalanyji provides feedback and how to represent that feedback in submissions.
    - **(7)** Agreed schedule of rates.
    - How to manage the outputs of consultation.
    - Woodside requested to meet to progress discussions with BTAC.
- **(1, 2, 3, 5, 7)** On 7 December 2023, Woodside emailed BTAC forwarding correspondence received from and correspondence sent to the previous CEO dated 20 February 2023 and dated 17 March 2023, confirming support for recording sea country values and confirming anthropological support. Woodside confirmed support to pay reasonable costs for ethnographic/anthropological support for mapping and recording sea country values. Woodside requested to be contacted to enable progress on the above matters. BTAC's letter of 20 February 2023 in relation to other activities noted interests in nearshore islands including the Montebello, Barrow and Mackerel Islands, they noted a cultural obligation to care for sea country and environmental values.
- **(5)** On 7 December 2023, BTAC emailed Woodside accepting the offer to take up sea country mapping and research. BTAC requested a meeting in the week of 15 January 2024 to plan for upcoming activities.

- **(7)** On 8 December 2023, BTAC (via legal representative) emailed Woodside in relation to settling finance matter, noting they would wait to schedule a meeting with BTAC once financials were sorted.
- On 8 December 2023, Woodside emailed BTAC (via legal representative) requesting further details on finances for the framework agreement, noting that Woodside's policies require itemised estimates for services.
- On 11 December 2023, BTAC (via legal representative) emailed acknowledging costs estimates would be provided shortly and requesting availability to meet with BTAC during January, February and March 2024.
- On 12 December 2023, BTAC (via legal representative) emailed Woodside asking if 17 January 2024 was a suitable date to meet.
- **(5, 6)** On 12 December 2023, Woodside emailed BTAC (via legal representative) noting that BTAC had suggested a meeting during the week of 15 January 2024 to discuss sea country mapping. Woodside suggested that they would include time to progress the framework agreement and present on the status of current EPs.
- On 12 December 2023, BTAC emailed Woodside requesting a copy of the slide presentation from the meeting of 27 November 2023.
- On 15 December 2023, BTAC emailed Woodside requesting following on their previous email, requesting a copy of the slide presentation from the meeting of 27 November 2023.
- On 18 December 2023, Woodside emailed BTAC a copy of the slide presentation given by Woodside at the 27 November 2023 meeting, as requested by BTAC.
- On 19 December 2023, Woodside emailed BTAC (via legal representative) agreeing to meet on 17 January 2024, Woodside provided an example of costings provided by other PBCs and noted they would not be able to pay legal fees if the framework agreement and EPs were not discussed. Woodside requested other meeting dates if the 17 January 2024 meeting was only to discuss sea country mapping.
- On 19 December 2023, BTAC (via legal representative) emailed Woodside noting that they had an understanding that the EP consultation and framework agreement would be discussed at the 17 January 2024 meeting. BTAC (via legal representative) queried the detail of the information being sought by Woodside on funding.
- On 20 December 2023, Woodside emailed BTAC (via legal representative) noting that they were seeking a cost estimate and required this prior to BSA being present at the BTAC meeting if they wished to be funded for attendance.
- On 9 January 2024, Woodside emailed BTAC confirming a meeting on 17 January 2024 to discuss sea country mapping, requesting logistics and cost coverage estimate.
- On 16 January 2024, BTAC emailed Woodside confirming meeting of 17 January 2024 with BTAC and requesting the names of Woodside attendees.
- On 16 January 2024, Woodside emailed BTAC with the names of Woodside attendees, as requested.
- On 17 January 2024, Woodside met with BTAC and discussed (among other things):
    - **(5)** Sea country mapping, confirming:
    - BTAC choose their own experts for ethnographic survey.
    - BTAC retain intellectual property of material and may request information not be provided.
    - Fieldwork required with a preferred commencement in April, with Woodside personnel in attendance as guided by BTAC.
    - **(8)** BTAC prefer early notice on EPs, if possible.
    - **(4)** BTAC keen on employment/training opportunities and opportunities for rangers.

  - **(8)** BTAC to form a committee for consultation on EPs.

- **(4)** On 17 January 2024, Woodside emailed BTAC information about training pathways as discussed at the meeting with BTAC on 17 January 2024.
- On 8 February 2024, Woodside emailed BTAC (via legal representative) following up on a quote for Woodside to support BTAC articulating sea country values.
- **(5)** On 8 February 2024, BTAC emailed Woodside noting that they have a consultant generating a scope of work for articulating sea country values which will allow BTAC to understand costings.
- On 8 February 2024, Woodside emailed BTAC acknowledging their response.
- **(6)** On 28 February 2024, Woodside emailed BTAC with a letter setting out the draft terms of an agreement between BTAC and Woodside, the agreement (among other things) included the following topics:
  - Sufficient Information
  - Reasonable Period.
  - Provision of Information.
  - Objection or claims.
  - Publications
  - Cost and termination.
- On 28 February 2024, BTAC (via legal representative) emailed Woodside querying funding for legal advice for BTAC.
- **(6, 7)** On 28 February 2024, Woodside emailed BTAC (via legal representative) noting that BTAC had been seeking a draft Framework Agreement from Woodside and apologising for the delay in providing the draft to BTAC, noting that the rate for engagement could be set out in the agreement. In relation to legal advice Woodside re-iterated that a cost estimate was required and noted that the legal representative's refusal to provide an estimate could be interfering with progressing matters with BTAC.
- On 5 March 2024, BTAC (via a legal representative) emailed Woodside to request a face-to-face meeting for consultation on another activity, and that BTAC would respond shortly to Woodside's email on 28 February 2024 which included a draft consultation agreement for BTAC's review.
- On 6 March 2024, Woodside emailed BTAC (via a legal representative) to indicate their willingness to meet face-to-face and to request a suitable meeting date.
- On 25 March 2024, BTAC (via a legal representative) emailed Woodside to advise they had appointed two liaison committees consisting of BTAC Board members, (a Woodside NOPSEMA Engagement Committee and Macedon ILUA Committee), and they requested to meet with Woodside on the ILUA Committee in the first instance.
- On 15 April, BTAC (via a legal representative) emailed Woodside advising of BTAC Board meeting dates for consideration to attend.
- On 15 April 2024, Woodside email BTAC (via a legal representative) to confirm Woodside would attend a meeting with BTAC Directors on 22 May 2024.
- On 22 April 2024, BTAC (via a legal representative) emailed Woodside to confirm Board meeting details for the 22 May 2024.

Ongoing Relationship Building

- Woodside is continuing to pursue an ongoing two-way relationship with BTAC including the development of a Collaboration Agreement focused on future opportunities to work together.

Summary of Feedback, Objection or Claim	Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response	Inclusion in Environment Plan
(1) BTAC stated that their interests include nearshore islands including the Montebello Islands, Barrow Island and the Mackerel Islands. **(2)** BTAC has a cultural obligation to care for the environmental values of sea country. **(3)** Requested Woodside supports BTAC in obtaining technical advice relating to proposed activities. **(4)** Expressed desire to be involved in local emergency response capability, potentially via an Indigenous Ranger Program. Interested in opportunities for employment/training. **(5)** BTAC has not specifically developed values regarding Sea Country into a format that could be articulated for consultation. BTAC sought support from Woodside to enable BTAC to define and	**(1)** Given the EMBA for this activity extends to nearshore areas coastally adjacent to BTAC native title lands, these values may be relevant in the event of an unplanned hydrocarbon spill. The nearshore islands identified by BTAC do fall within the EMBA and the potential impacts assessed in Section 6.7 and 6.8 in the EP. BTAC has not provided further detail regarding heritage value of places or cultural features of the Operational Area or the EMBA. **(2)** Woodside assessed BTAC's cultural obligation to care for environmental values of sea country to represent potential cultural values in Section 4.9.1.5 in the EP. **(3)** Woodside has offered support for technical advice and other support this has now been taken up. In February 2024, BTAC engaged a consultant who is completing a scope of work to inform BTAC of costings for articulating sea country values (see 5 below). **(4)** Woodside has offered to support BTAC to engage in management and emergency response. In January 2024 Woodside provided BTAC with information about a training/employment program. **(5)** Woodside agreed to support the articulation and recording of sea country values. This offer has been taken up (see 3 above) and has commenced progress towards the desired outcome. The draft Collaboration Agreement (see 6) includes support for recording and articulation of Sea Country values. Completion of an ethnographic assessment is not required to undertake or complete consultation under regulation 25 of the Environment Regulations and/or for a comprehensive description of the environment. Opportunity to undertake this work continues under the proposed Collaboration Agreement (see 6) as part of ongoing engagement. Woodside has been able to develop a robust understanding of Thalanyji Sea Country cultural values and features in absence of this assessment. **(6)** Separate from consultation under regulation 25 of the Environment Regulations, Woodside has drafted a Collaboration Agreement between BTAC and Woodside to assist in ongoing consultation, the agreement was sent to BTAC in February 2024. The agreement includes support for recording and articulation of Sea Country values and will help support ongoing consultation as set out by BTAC in their 14 September 2023 letter to Woodside, which requested such an agreement. Sufficient information to allow informed assessment has already been provided by other means, including Consultation Information Sheets and a Summary Information Sheet developed by Indigenous staff members.	**(1)** Existing controls considered sufficient as described in **Section 6**. **(2)** Woodside updated Section 4.9.1.5 to record BTAC's interests and potential cultural values and assessed potential impact on these, including controls, in Section 6. **(3)** Not required. **(4)** The Program for Ongoing Engagement with Traditional Custodians (Appendix I) includes commitments to social investment to support Indigenous Ranger programs, and support for Indigenous oil spill response capabilities. **(5)** Woodside has taken all reasonable steps to identify cultural features and heritage features of Thalanyji people within the EMBA. This is described in Section 4.9.1. The proposed Collaboration Agreement (Appendix I) 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

articulate its values on Sea Country in a manner that could be more clearly understood by the offshore sector, government, and the community. **(6)** BTAC proposed a Collaboration Agreement as an appropriate mechanism to provide ongoing feedback to Woodside regarding its activities. **(7)** BTAC does not endorse any consultation without appropriate cost recovery. **(8)** BTAC requested early notification on EPs and are interested in forming a committee for ongoing consultation on EPs.	**(7)** Woodside and BTAC have agreed on a Costs Acceptance Letter. Woodside assesses that the proposed Collaboration Agreement is an appropriate mechanism for addressing appropriate cost recovery for BTAC. Woodside has already offered BTAC support for technical advice (see 3), and informed BTAC that it will financially support consultation meetings. As described in the summary above, Woodside has afforded sufficient information and reasonable time for BTAC to provide feedback in the course of preparing this EP. **(8)** Woodside supports ongoing consultation being conducted in the most appropriate way for BTAC. Woodside engages in ongoing consultation 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 7.2.5 of the EP).	cultural values), it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5) **(6) 7 & 8)** As identified in Section 5.7 of this EP, 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. This includes continued engagement regarding the Collaboration Agreement that Woodside seeks with BTAC, a draft of which includes support for BTAC to define and articulate sea values, provision of ongoing feedback and cost recovery.

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 has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with YAC 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 sought direction on YAC's preferred method of consultation. As sufficient information and a reasonable period have been provided (see below), any meetings would be considered as ongoing engagement post regulation 25 of the Environment Regulations consultation.

- Provided Consultation Information Sheets and Consultation Summary Sheets developed by Indigenous staff to YAC. These set out details of the proposed activity, the location of the activity, the timing of the activity as well as the potential risks and impacts of the activity with controls in a digestible, plain English format.
- Articulated planned and unplanned environmental risks and impacts, with proposed controls.
- Confirmed the purpose of consultation and set out in detail what was being sought through consultation.
- Asked for the consultation and information sheets to be distributed to members and individuals.
- Woodside has provided NOPSEMA's Brochure "Consultation on offshore petroleum environment plans" and Guideline "Guideline: Consultation in the course of preparing an environment plan".
- Advised that YAC can request that particular information provided in the consultation not be published (to align with regulation 25(4) of the Environment Regulations.

Reasonable Period:

- Woodside published advertisements in a national, state, and relevant local newspapers including The Australian, The West Australian, North West Telegraph, Pilbara News, Midwest Times (7 June 2023) advising of the proposed activities and requesting comments or feedback.
- Woodside has addressed and responded to YAC over 11 months demonstrating a "reasonable period" of consultation.

Woodside asked YAC if it was aware of any other Traditional Custodian groups or individuals with whom Woodside should consult. None were identified.

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 8.7 of the 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.

Summary of information provided and record of consultation for this EP:

- On 19 June 2023, Woodside emailed Gumala Aboriginal Corporation advising of the proposed activity (Record of Consultation, reference 1.50) and provided a summary Consultation Information Sheet (including a link to the detailed information sheet on Woodside's website). The email requested information on the interests that YAC and its members may have within the EMBA.
- On 20 June 2023, Woodside emailed to offer a meeting with YAC about the current activity.
- On 21 June 2023, Woodside emailed Gumala Aboriginal Corporation accepting the invite to attend the YAC Board meeting on 6 July for a half day.
- **(1)** On 5 July 2023, Woodside presented to the YAC about several EPs including this EP. At the meeting Woodside:
    - Described the Environment Plan framework, referring to the Offshore Petroleum and Greenhouse Gas Storage Act (Environment) Regulations, NOPSEMA's role as regulator and general contents of Environment Plans.
    - Displayed a map of activities open for feedback to be discussed in the meeting and provided a list of other upcoming activities which will be open for consultation in 2023.
    - Provided an overview of the drill rig activities.
    - Described the proposed activity, noting that this activity is a revision of the Angel Facility Operations EP.
    - Described the types of vessels involved.

- Described planned and unplanned environmental risks and impacts in accordance with tables provided in the Information Sheets for the activities, emphasising that unplanned risks are not expected to occur and are unlikely.
- Displayed and spoke to the EMBA for each proposed drilling activities, and the individual worst-case loss of containment scenarios identified, noting that they are all diesel fuel releases which would only be caused by vessel collisions.
- Stated that Woodside wanted to understand how the functions, activities or interests of YAC and the people it represents may be impacted by any of those activities.

- Specifically asked the following:
  - How could these activities impact your cultural values, interests, and activities – does protecting the environment do enough to protect your cultural values?
  - What are your concerns about the proposed activities and what do you think we should do about them?
  - Is there anything you would like included in the EPs before submission?
  - Is there anyone else Woodside should consult with about the activities?
- Advised that Woodside will continue to take feedback from YAC for the life of the EP.
- Provided personal contact details for further feedback. Woodside provided NOPSEMA contact details, should WAC desire to provide feedback directly to the regulator.

(1) At the 5 July meeting YAC asked the following questions and provided the following feedback:

- Whether Woodside has undertaken environmental studies and whether these studies are ongoing.
- What environmental monitoring happens after the EPs are approved.
  - Woodside responded that numerous environmental studies are undertaken, and they form part of the EP's, some information about ongoing commitments and research studies are available on Woodside's website. Woodside notes that they commit to ongoing consultation with YAC and will take feedback if any new information in relation to risks comes to light.
- **(1)** YAC expressed sadness at the potential for environmental impact.
  - Response: Woodside explained that the potential impact from the unplanned activities is very low. For example, Woodside has been operating in the region for over 30 years and has not had a serious unplanned environmental event in that time. Importantly, if there is an unplanned event, the entire EMBA as shown on the maps will not be impacted. The area of the EMBA will be somewhere within the mapped area depending on factors such as wind, current and tide.
- **(1)** YAC stated plants, animals and the environment are inexorably linked to their culture and asked: whether Woodside has undertaken environmental studies and whether these studies ongoing; and what environmental monitoring happens after the EPs are approved.
  - Response: Woodside has undertaken numerous environmental studies that form part of the EPs and has an ongoing commitment to environmental studies and research, some of which are set out on Woodside's website.
  - Environmental monitoring is an ongoing activity, and the nature and timing of environmental monitoring depends on the nature, possible consequences, and likelihood of the environmental risks. Importantly, Woodside commits to ongoing consultation with YAC and will be able to take feedback if any new information in relation to risks comes to light.
- **(1)** YAC suggested that ranger programs could assist with environmental management and monitoring, and that YAC would likely write to Woodside about this suggestion and generally to discuss how YAC can be involved with / benefit from Woodside's activities.

        - Response: Woodside looks forward to discussing these opportunities with YAC further as part of our ongoing engagement. Woodside commits to ongoing consultation about the EPs and to building the relationship with YAC.
    - **(1, 2)** YAC expressed concern about potential impacts to potential impact patterns of whales, and potential collisions.
        - Woodside responded by explaining controls which would be in place to minimise impacts and risks to whales, and no further information was requested.
        - Woodside responded that potential impact from unplanned activities is very low and that they had not had a serious unplanned environmental impact in over 30 years.
- On 17 July 2023, Woodside emailed YAC a letter summarising the 5 July meeting.
- On 19 July 2023, Woodside emailed YAC 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 19 July 2023, YAC emailed Woodside acknowledging receipt of Woodside's email of 19 July.
- **(3)** On 26 July 2023, Woodside emailed YAC Woodside's planned Program of Ongoing Engagement with Traditional Custodians.
- On 2 August 2023, YAC legal representative emailed Woodside confirming they have been retained by the YAC Board to advise them on NOPSEMA matters and would receive instructions shortly.
- **(3)** On 4 August 2023, YAC legal representative emailed Woodside confirming they have been retained by the YAC Board to deal with requests for consultation with them for NOPSEMA purposes. The email noted that YAC would like Woodside to submit a consultation agreement for YAC's consideration.
- On 10 August 2023, YAC (via legal representative) emailed Woodside noting that YAC Board has not had the opportunity to form a view of what feedback it wishes to provide Woodside. The email requested appropriate resources and time, including legal advice be approved by Woodside to allow YAC to consider NOPSEMA matters.
- On 10 August 2023, Woodside phoned Gumala Aboriginal Corporation to request written confirmation of YAC's legal representative.
- On 11 August 2023, Gumala Aboriginal Corporation emailed Woodside confirming the appointment of their legal representation and attaching a copy of the formal resolution of the YAC Board.
- On 11 August 2023, Woodside emailed YAC (via legal representative) informing the process required for funding approval and confirming that woodside would send through a draft consultation agreement shortly.
- **(3)** On 14 August 2023, YAC (via legal representative) emailed Woodside stating that it looked forward to receiving the consultation agreement for consideration and agreeing arrangements for provision of resourcing.
- **(3)** On 13 September 2023, YAC (via legal representative) responded to Woodside advising that in the absence of a draft consultation agreement they were unable to respond in substance to the matters raised.
- **(3)** On 14 September 2023, Woodside emailed YAC (via legal representative) with a proposed consultation framework.
- **(3)** On 14 September 2023, YAC (via legal representative) confirmed receipt of the consultation framework and advised they would seek direction from the YAC Board.
- **(2)** On 13 October 2023, YAV (via legal representative) emailed Woodside confirming they act for YAC on NOPSEMA matters. Among other things, they noted, they required an indemnity and hold harmless clause be included in the Framework Agreement to protect against potential exposure to activist litigation.
- On 2 November 2023, Woodside emailed YAC (via legal representative) advising they would not agree to the request to indemnify YAC against any court proceedings as a result of consultation they engage in with Woodside on EPs.

- On 2 November 2023, (via legal representative) emailed Woodside requesting information on the reason for Woodside's position not to include indemnification in the consultation agreement.
- On 18 November 2023, Woodside emailed (via legal representative) with further information about why they would not indemnify YAC as requested in the 13 October 2023 email. Woodside explained that it could harm genuine engagement, may promote behaviours in others who may become aware of the indemnity by Woodside, and it would not be good practice to provide an indemnity in relation to the act or omission of other parties that Woodside would not necessarily engage with.
- On 8 March 2024, Woodside emailed YAC (via legal representative) the draft consultation agreement for consideration by YAC, and to propose a schedule of rates and add details relating to future engagements.
- On 12 March 2024, YAV (via legal representative) emailed Woodside with an attached proposed schedule of rates that BSA would recommend to the YAC Board, if Woodside was agreeable to the proposed rates.
- On 27 March 2024, Woodside emailed YAC (via legal representative) about another matter, and advised it would seek the status of legal representative's 12 March email.
- On 4 April 2024, Woodside emailed YAC (via legal representative) informing that the proposed rates had been reviewed and amended for YAC Board consideration, and a request for the date of the next YAC Board meeting.
- On 8 April 2024, YAC (via legal representative) emailed Woodside informing of the next YAC Board meeting scheduled on 9 May 2024, and confirming if Woodside would fund the cost of meeting with the Board and to advise the matters to be discussed.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Inclusion in Environment Plan**
(1) During face-to-face engagements related to this activity and others YAC requested further information on topics related to this proposed activity which was responded to during the meeting: – Whether Woodside has undertaken environmental studies and whether these studies are ongoing.	**(1)** Woodside responded to YAC's requests for further information during face-to-face engagements, and no further information was requested on these topics. **(2)** Woodside noted YAC's interest in whales. **(3)** Separate from consultation under regulation 25 of the Environment Regulations, Woodside will establish a framework agreement with YAC. A draft agreement was sent to YAC in September 2023 which would be used to frame ongoing consultation and allow for reasonable funding. No response has been received from YAC to date. Sufficient information to allow informed assessment has already been provided by other means, including summary sheets developed by Indigenous staff, a face-to-face meeting with appropriate material (pictures, maps, video) and project attendance allowing opportunity to ask questions and seek further understanding. Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received after the EP has been accepted (including any relevant new information on cultural	**(1)** Existing controls considered sufficient, as described in **Section 6**. **(2)** Woodside updated Section 4.9.1 to record YAC's interests, including whales and assessed potential impact on these, including controls in Section 6. **(3)** Although consultation for the purpose of regulation 25 of the Environment Regulations is complete, Woodside will continue to engage with YAC through ongoing engagement and continue to progress with establishing the

YAC also expressed the following: – Sadness at the potential for environmental impact – That plants, animals and the environment are inexorably linked to their culture – Seagrass is a food source for dugongs – Ranger programs could assist with environmental management and monitoring. – Expressed concern about potential impacts to patterns of whales, and potential collisions. **(2)** YAC expressed a general interest in whales. Woodside discussed controls protecting whales from an ecological perspective during meetings in which they were raised, no further feedback or comment was received on these topics.	values), it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	draft framework agreement as part of Woodside's Program of Ongoing Engagement with Traditional Custodians (Appendix I). 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.

(3) YAC are keen to enter into a framework agreement to settle timeframes for ongoing consultation and provision for funding.		

Kariyarra Aboriginal Corporation

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 discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with Kariyarra Aboriginal Corporation 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 sought direction on KAC's preferred method of consultation. As sufficient information and a reasonable period have been provided (see below), any meetings would be considered as ongoing engagement post regulation 25 of the Environment Regulations consultation.
- Provided Consultation Information Sheet and Consultation Summary Sheets developed by Traditional Owner staff to KAC. These set out details of the proposed activity, the location of the activity, the timing of the activity as well as the potential risks and impacts of the activity in a digestible, plain English format.
- Articulated planned and unplanned environmental risks and impacts, with proposed controls.
- Confirmed the purpose of consultation and set out in detail what was being sought through consultation.
- Asked for the consultation and information sheets to be distributed to members and individuals.
- Woodside has provided NOPSEMA's Brochure "Consultation on offshore petroleum environment plans" and Guideline "Guideline: Consultation in the course of preparing an environment plan".
- Advised that KAC can request that particular information provided in the consultation not be published (to align with regulation 25(4) of the Environment Regulations.

Reasonable Period:

- Woodside published advertisements in a national, state, and relevant local newspapers including The Australian, The West Australian, North West Telegraph, Pilbara News, Midwest Times (7 June 2023) advising of the proposed activities and requesting comments or feedback.
- Woodside has addressed and responded to Kariyarra over 11 months, demonstrating a "reasonable period" of consultation.

Woodside asked KAC if it was aware of any other Traditional Custodian groups or individuals with whom Woodside should consult. None were identified.

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 8.7 of the 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.
Summary of information provided and record of consultation for this EP:

- On 20 June 2023, Woodside emailed the Kariyarra Aboriginal Corporation advising of the proposed activity (Record of Consultation, reference 1.51) and provided a summary Consultation Information Sheet (including a link to the detailed information sheet on Woodside's website). The email requested information on the interests that KAC and its members may have within the EMBA.
- On 6 July 2023, Woodside followed up on the EPs, including this activity provided to KAC on 20 June 2023 and advising Woodside wished to meet or consult with KAC about the activity.
- On 18 July 2023, Woodside emailed KAC NOPSEMA's Consultation Guidelines, Consultation Brochure, and Draft Policy for Managing Gender-Restricted Information. This email also reiterated Woodside's request 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 planned Program of Ongoing Engagement with Traditional Custodians.
- On 28 August 2023, Woodside emailed KAC following up on a number of EPs previously notified, including this activity and re-iterating a request to meet with KAC to consult on activities.
- On 31 August 2023, KAC emailed Woodside (in response to an email regarding another activity unrelated to this EP) apologising for not responding sooner and noting that KAC were seeking legal advice on matters.
- On 31 August 2023, Woodside emailed KAC acknowledging their response.
- On 31 August 2023, KAC (via legal representative) emailed Woodside requesting information about another activity unrelated to this EP, indicating they required:
    - **(1)** Costs to be met for KAC to be engaged in consultations with Woodside.
    - **(2)** Costs for preparation of an engagement protocol.
- **(2)** Between 10 – 13 September 2023, Woodside and KAC (via legal representation) exchanged emails in relation to Woodside funding consultation costs for KAC to meet. KAC also advised that:
    - **(3)** Kariyarra have sea rights referenced in their native title evidence.
- The KAC lawyer affirmed that further consultation will be required now that KAC has a legal advisor. Woodside noted they were seeking positive engagement with KAC and would fund reasonable requests.
- On 28 September 2023, KAC's legal representative provided a single figure non-itemised quote. The email attached a letter dated 22 September, referring to another activity more broadly setting out:
    - **(2)** Proposed negotiations for a consultation protocol and co-management agreement.
    - **(3)** Referring to values and interests in sea country.
    - **(3)** Traditional fishing and gathering rights in the ocean.
    - **(4)** Presence of mythic snakes.

- **(1)** Between 20 -26 October 2023, several emails were exchanged in relation to costs and Woodside reiterated the need for reasonable costs request from KAC. The KAC legal representative emailed stated Woodside's proposed cost structure was inadequate and would confer with the traditional owners that have taken court action and would confer with the EDO.
- On 14 November 2023, KAC legal representative stated that they had taken their concerns to the EDO.
- On 22 November 2023, Woodside emailed KAC partly addressing an activity outside of this EP, also noting they were keen to progress the consultation protocol and to meet with KAC. Woodside also offered to fund both the consultation protocol and full day meeting, including a breakdown of reasonable costs for the work required.
- **(1, 2)** On 23 November 2023, KAC legal representative emailed Woodside agreeing to Woodside's proposal in the email of 22 November 2023, requesting a draft protocol and suggesting several dates for a meeting between KAC and Woodside.
- **(1)** On 23 November 2023, KAC legal representative emailed Woodside seeking costs already incurred by his services to KAC.
- **(1)** On 29 November 2023, Woodside telephoned KAC, confirming a meeting on 5 December 2023 in Port Hedland with KAC, noting that Woodside will not pay legal costs that had been incurred prior to the meeting date.
- **(1, 2)** On 29 November 2023, KAC (via legal representative) emailed Woodside with details of a meeting with KAC, request for proposed protocol, costs for meeting and suggested Agenda for the meeting.
- **(1)** On 29 November 2023, KAC (via legal representative) emailed Woodside requesting confirmation of costs quote, confirming logistics of meeting and providing a suggested Agenda for the meeting.
- On 29 November 2023, Woodside emailed KAC (via legal representative) attaching Woodside's Program of Ongoing Consultation, a revised Agenda and suggesting the protocol between KAC and Woodside set out:
    - How Woodside and KAC would consult, the basic procedure for initial and ongoing consultation in relation to activities
    - Agreement as to how Woodside would provide KAC information.
    - How KAC would provide feedback and how Woodside represents that into submissions.
    - Agreed schedule of rates.
    - How the outputs of the consultations are managed.
- On 29 November 2023, KAC (via legal representative) emailed Woodside with an amended proposed Agenda for the upcoming meeting.
- On 5 December 2023, Woodside and KAC met in Port Hedland. It was agreed that KAC and Woodside will hold a workshop early 2024 for further consultation on all current EP's that apply to KAC and will finalise a framework agreement for ongoing consultation and partnership. At the meeting Woodside:
    - Presented on an Engagement Protocol.
    - What Woodside plan to do to protect the environment.
    - Presented the regulatory context.
    - Spoke about the biological studies that are carried out through different times of the year.
    - Discussed why Woodside were talking to KAC.
    - Displayed the EMBA and how it was developed.
    - Showed projects open for ongoing consultation.

- Spoke to what Woodside were seeking to understand from KAC:
  - How could these activities impact your cultural values, interests, and activities - does protecting the environment do enough to protect your cultural values?
  - What are your concerns about the proposed activities and what do you think we should do about them?
  - Is there anything you would like included in the EPs before submission?
  - Is there anyone else Woodside should consult with about the activities?
- **(5)** KAC asked how Woodside maintain the validity of controls over periods of times, sighting turtles as an example in terms of whether current controls would be sufficient into the future.
  - Woodside noted that there is ongoing monitoring and Woodside would apply its Management of Change and Revision process to address controls.
  - Noted the EP's subject of ongoing consultation, including this EP.
  - Spoke to planned and unplanned risks.
- KAC gave a presentation to Woodside on their sea country rights and duties:
  - **(3)** Accessing sea country for fishing, trapping, crabbing catching turtle, hunting dugong, using stingray barbs for spears and collecting shellfish.
  - Visiting offshore islands at low tide.
  - **(3)** Passing on traditional knowledge to children.
  - **(4)** Totems.
  - **(3)** Intangible heritage including the Yinta (associated with Sea Country).
  - **(3)** Having duties to look after and protect all KACs sea country.
- KAC outlined their consultation requirements to Woodside:
  - **(2)** Co-designed and co-managed approach to protecting sea country.
  - On-going input into EPs.
  - **(2)** An agreement with Woodside.
  - **(6)** Funding for sea rangers.
  - A positive and collaborative relationship.
  - **(1)** The need for an agreement that addresses resourcing issues.

- **(2)** On 13 December 2023, KAC (via legal representative) emailed Woodside with outcomes of the 5 December meeting, confirming availability for a workshop in March 2024 and that KAC and Woodside aim to reach agreement on an engagement protocol by mid-2024.
- On 20 December 2023, Woodside phoned KAC to follow up on the 5 December 2023 meeting and ask if there was any other information, they could provide KAC. KAC asked if they could receive more information about how cultural values are recorded in an EP. KAC also asked if Woodside could resend the Program of Ongoing Engagement document. Woodside responded that they would send an email with the requested information.
- On 20 December 2023, Woodside emailed KAC following up on the 5 December 2023 meeting outcomes and phone call discussion that day. The email included details about how Woodside records and manages cultural information provided by KAC.

- On 20 December 2023, KAC emailed Woodside thanking them for their follow up email. They also asked Woodside to add that KAC also raised:
  - **(7)** A cultural interest in coastal landforms and coastal native vegetation.
  - **(8)** A cultural interest in cultural heritage sites and intangible cultural heritage associated with the coast and the ocean.
- **(1)** On 13 January 2024, KAC via legal representative emailed Woodside a letter outlining proposed costs to settle an agreement with KAC board.
- On 21 February 2024, Woodside emailed KAC (via legal representative) discussing costings and attached a letter with the terms of a draft agreement noting:
  - Level of information to satisfy KAC to make informed decisions on the proposed activities.
  - Reasonable period for consultation.
  - How information would be provided.
  - Feedback, objections, and claims ad how KAC would provide these.
  - Reasonable costs and expenses to be agreed.
  - How the agreement would be terminated.
- On 22 February 2024, KAC (via legal representative) emailed Woodside requesting a word version of the document.
- On 22 February 2024, Woodside emailed KAC via legal representative a word version of the 21 February 2024 document.
- **(2)** On March 10, 2024, KAC (vial legal representative) emailed Woodside with a draft agreement between KAC and Woodside for Woodside review.
- On 12 March 2024, Woodside emailed KAC acknowledging receipt of the draft agreement and noting they would review and return to KAC in the future.
- On 4 April 2024, Woodside emailed KAC (via legal representative) the reviewed and amended draft agreement, with requests for further information.
- On 4 April 2024, KAC (via legal representative) emailed Woodside advising the amendments were not acceptable and seeking further instructions. Woodside is reviewing this.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Inclusion in Environment Plan**
KAC has not provided any feedback objections or claims in relation to this activity since June 2023. **(1)** KAC indicated they require costs to be met for KAC to be engaged in consultations with Woodside. **(2)** KAC have noted that they want to engage on matters with Woodside and would	Woodside accepts that KAC has no feedback on this activity at this time. Woodside demonstrated reasonable effort to consult since February 2023 and engage in genuine two-way dialogue since August 2023. Kariyarra Aboriginal Corporation has had sufficient time and sufficient information to participate in consultation. Woodside has continued to consult with Kariyarra (via legal representation) since 31 August 2023. The details of these engagements are described in the consultation summary above. **(1)** Woodside have agreed to fund reasonable costs and funded the 5 December 2023 meeting. Woodside will fund future meetings on an agreed costs basis to be set out in an Engagement Protocol see (2) below. **(2)** Woodside and KAC have agreed to hold a workshop in early April 2024 to progress towards the finalisation of the draft Engagement Protocol sent to KAC in February 2024.	Existing controls are considered sufficient, as described in Section 7. **(1)** An Engagement Protocol to be settled between KAC and Woodside will address reasonable funding requests. **(2)** Although consultation for the purpose of regulation 25 of the Environment Regulations is complete, Woodside will continue to engage with KAC through ongoing engagement and continue to progress towards

like to develop an Engagement Protocol. **(3)** KAC has asserted that they have sea rights under Native Title, a duty to look after and protect sea country under those rights mentioning fishing, trapping, crabbing, catching turtle, hunting dugong, and using stingray barbs for spears and collecting shellfish, intangible heritage including Yinta, and passing on traditional knowledge to children **(4)** Having a cultural obligation to look after and protect sea country and secret habitat totems, and the presence of mythic snakes. **(5)** Asked how the validity of current controls are maintained and appropriate into the future. **(6)** KAC has expressed an interest in social investment opportunities including a Sea Country Ranger Program. **(7)** A cultural interest in coastal landforms and coastal native vegetation. **(8)** A cultural interest in cultural heritage sites and intangible cultural heritage	**(3)** Woodside has noted KAC's values and interests in sea country in Section 4.9.1.5. Woodside accepts that KAC may have sea country values within the EMBA for this EP, although since June 2023 they have not raised any claims or objections in relation to this activity. **(4)** Woodside respects KAC's position that they have cultural obligations to look after country and cultural knowledge about sea country and customary law within the EMBA for this EP, although since June 2023 they have not raised any claims or objections in relation to this activity. **(5)** Woodside applies its Management of Change and Revision process to address controls. **(6)** See (2) above which will address social investment and a sea ranger program. **(7)** Woodside implements controls to reduce potential risks and impacts on the environment to ALARP to an acceptable level, this feedback was not in relation to this EP. **(8)** Woodside understands that KAC may have cultural interests in tangible and intangible heritage sites within the EMBA for this EP, although since June 2023 they have not raised any claims or objections in relation to this activity. Woodside engages in ongoing consultation 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 7.2.5 of the EP).	agreement on the draft protocol as requested by Kariyarra (Appendix I). **(3, 4, 5)** Existing controls considered sufficient as described in Section 6 of the EP. Woodside recognises that KAC holds Sea Country rights and interests that need to be protected (Section 4.9.1.5). **(6)** An Engagement Protocol will address social investment opportunities including a Sea Country Ranger Program. **(7, 8)** Existing controls considered sufficient as described in Section 6 of the EP. Woodside recognises that KAC holds Sea Country rights and interests that need to be protected (Section 4.9.1.5). 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.

associated with the coast and the ocean.		

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 discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with WAC 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 sought direction on WAC's preferred method of consultation. This resulted in a face-to-face meeting being coordinated at a location of WAC's choosing. This meeting included information that was readily accessible and appropriate.
- Consultation Information Sheet was publicly available on the Woodside website since June 2023.
- Provided Consultation Information Sheets and Consultation Summary Sheets to WAC. These set out details of the proposed activity, the location of the activity, the timing of the activity as well as the potential risks and impacts of the activity in a digestible, plain English format.
- Articulated planned and unplanned environmental risks and impacts, with proposed controls.
- Confirmed the purpose of consultation and set out in detail what was being sought through consultation.
- Asked for the consultation and information sheets to be distributed to members and individuals.
- Provided NOPSEMA's Brochure "Consultation on offshore petroleum environment plans" and Guideline "Guideline: Consultation in the course of preparing an environment plan".
- Provided response to questions asked about the activity through consultation. Through these questions, WAC have displayed an understanding of the activities under this Environment Plan.
- Advised that WAC could request the particular information provided in the consultation not be published (to align with regulation 25(2)(4) of the Environment Regulations).

Reasonable Period:

- Woodside published advertisements in a national, state, and relevant local newspapers including The Australian, The West Australian, North West Telegraph, Pilbara News, Midwest Times (7 June 2023) advising of the proposed activities and requesting comments or feedback.
- Consultation information provided to WAC on 20 June 2023 based on their function, interest, and activities.
- Woodside has addressed and responded to WAC over 11 months, demonstrating a "reasonable period" of consultation.

- Woodside asked WAC if it was aware of any other Traditional Custodian groups or individuals with whom Woodside should consult. None were identified.
- Woodside has provided a reasonable opportunity for input since June 2023 and a genuine two-way dialogue has occurred via meetings and written exchanges to further understand the environment in which the activity will take place. WAC has engaged with the detail of the activity asking related questions. The details of these engagements are described in the consultation summary below.

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 7.2.5 of the 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.

Summary of information provided and record of consultation for this EP:

- On 20 June 2023, Woodside emailed WAC advising of the proposed activity (Record of Consultation, reference 1.52) and provided a summary Consultation Information Sheet (including a link to the detailed information sheet on Woodside's website). The email requested information on the interests that WAC and its members may have within the EMBA.
- 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 19 July 2023, Woodside presented to the WAC about several EPs, including this EP. At the meeting Woodside:
    - Described the Environment Plan framework, referring to the Offshore Petroleum and Greenhouse Gas Storage Act (Environment) Regulations, NOPSEMA's role as regulator and general contents of Environment Plans.
    - Displayed a map of activities open for feedback to be discussed in the meeting and provided a list of other upcoming activities which will be open for consultation in 2023.
    - Provided an overview of the drill rig activities.
    - Described the proposed activity, noting that this activity is a revision of the Angel Facility Operations EP.
    - Described the types of vessels involved.
    - Described planned and unplanned environmental risks and impacts in accordance with tables provided in the Information Sheets for the activities, emphasising that unplanned risks are not expected to occur and are unlikely.
    - Displayed and spoke to the EMBA for each proposed drilling activities, and the individual worst-case loss of containment scenarios identified, noting that they are all diesel fuel releases which would only be caused by vessel collisions.
    - Stated that Woodside wanted to understand how the functions, activities or interests of WAC and the people it represents may be impacted by any of the activities.

  Specifically asked the following:
    - How could these activities impact your cultural values, interests, and activities – does protecting the environment do enough to protect your cultural values?
    - What are your concerns about the proposed activities and what do you think we should do about them?
    - Is there anything you would like included in the EPs before submission?

        - Is there anyone else Woodside should consult with about the activities?
    - Advised that Woodside will continue to take feedback from WAC for the life of the EP.
    - Provided personal contact details for further feedback. Woodside provided NOPSEMA contact details, should WAC desire to provide feedback directly to the regulator.
- **(1)** On 20 July 2023, Woodside emailed WAC thanking them for the meeting and attached the presentation slides. Woodside also confirmed that they are supportive of a ranger program and are interested in further discussions regarding social investment opportunities. The email also acknowledged WAC's request for time to reflect on the meeting before responding to Woodside.
- On 20 July 2023, WAC emailed Woodside thanking them for the email and requesting a list of all upcoming EPs where WAC is a relevant group.
- On 26 July 2023, Woodside emailed WAC Woodside's planned Program of Ongoing Engagement with Traditional Custodians.

  On 3 August 2023, WAC emailed Woodside requesting a map of relevant Commonwealth and State EMBAS.
- On 10 August 2023, Woodside emailed WAC providing requested list of current and intended EP's which Woodside would be looking to consult with WAC on, which was requested by WAC on 20 July 2023.
- On 10 August 2023, WAC emailed Woodside acknowledging provision of information and noting they would provide formal response in the near future. WAC's email also requested some information in relation to EMBA development.
- On 15 August 2023, Woodside emailed WAC with a response to their query about EMBA's.
- On 15 August 2023, WAC emailed Woodside noting they would provide a formal response shortly.
- On 31 August 2023, WAC emailed a letter to Woodside proposing a framework agreement to provide a streamlined, formalised approach to consultation between WAC and Woodside. This included a list of activities that WAC is to be consulted on including this one.
- **(2)** On 11 September 2023, WAC emailed Woodside with a copy of the letter of 31 August, and advising that WAC does not object to Woodside progressing consultation on environment plans for the activities outlined on the provision that Woodside and WAC enter into a framework agreement to provide for ongoing meaningful consultation with WAC and YM members in relation to activities the subject of EPs, as outlined in the attached letter on terms suitable to both parties within a reasonable period (nominally within the next 2-3 months).
- **(2)** On 12 September 2023, Woodside emailed WAC confirming receipt of the email of 11 September.
- On 28 September 2023, Woodside emailed WAC informing them who their focal point is.
- On 3 October 2023, WAC and Woodside exchanged emails arranging a meeting date and logistics.
- **(2)** On 20 October 2023, Woodside met with WAC to discuss current EPs listed on the 11 September email by WAC. Meeting was to confirm WAC's preferred EP consultation process going forward. Woodside reiterated that WAC has an opportunity for ongoing consultation on any EP in which they have a cultural interest. Woodside acknowledged WAC is in the process of a corporate restructure which may impact WAC's response times.
- On 28 February 2024, Woodside emailed WAC seeking the contact point for WAC.
- **(2)** On 6 March 2024, Woodside emailed WAC with a letter setting out the draft terms of an agreement between WAC and Woodside, the agreement (among other things) included the following topics:
    - Sufficient Information
    - Reasonable Period.
    - Provision of Information.
    - Objection or claims.
    - Publications

○ Cost and termination. • **(2)** On 6 March 2024, WAC emailed Woodside requesting a word copy of the draft terms of agreement sent 6 March 2024. • On 6 March 2024, Woodside emailed WAC a word copy of the draft terms of agreement.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Inclusion in Environment Plan**
During face-to-face engagements related to this activity and others, WAC did not have any feedback, objection or claim on this activity. WAC did request a map of relevant Commonwealth and State EMBAS to which Woodside responded. **(1)** WAC has expressed an interest in social investment opportunities including a Ranger Program. **(2)** WAC expressed that it does not object to Woodside progressing the proposed activity on the provision that Woodside and WAC enter into a framework agreement to provide for ongoing meaningful consultation a desire for ongoing engagement and partnership through a Framework Agreement.	Woodside accepts that WAC has no feedback, objections or claim at this time. **(1)** The proposed framework agreement see (2) below will allow for reasonable funding for social investment opportunities and a Ranger Program. **(2)** Woodside has confirmed and accepts that WAC is seeking to establish a framework agreement for the purposes of ongoing consultation with Woodside. Separate from consultation under regulation 25 of the Environment Regulations, Woodside has sent a draft agreement in March 2024 and will work with WAC to finalise the agreement. Sufficient information to allow informed assessment has already been provided by other means, including summary sheets developed by Indigenous staff, a face-to-face meeting with appropriate material (pictures, maps, video) and project attendance allowing opportunity to ask questions and seek further understanding. Woodside engages in ongoing consultation 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 7.2.5 of the EP).	Existing controls considered sufficient, as described in Section 6. **(1, 2)** Although consultation for the purpose of regulation 25 of the Environment Regulations is complete, Woodside will continue to engage with WAC through ongoing engagement and continue to progress with finalising the draft framework agreement as part of Woodside's Program of Ongoing Engagement with Traditional Custodians (Appendix I). The agreement will address reasonable funding for social investment and ranger programs. 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.
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 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:** • Consultation Information Sheet was publicly available on the Woodside website since June 2023. • Provided Consultation Information Sheets and Consultation Summary Sheets developed by Indigenous staff to RRKAC. These set out details of the proposed activity, the location of the activity, the timing of the activity as well as the potential risks and impacts of the activity with controls in a digestible, plain English format. • Articulated planned and unplanned environmental risks and impacts, with proposed controls. • Confirmed the purpose of consultation and set out in detail what was being sought through consultation. • Asked for the consultation and information sheets to be distributed to members and individuals. • Provided NOPSEMA's Brochure "Consultation on offshore petroleum environment plans" and Guideline "Guideline: Consultation in the course of preparing an environment plan". • Advised that RRKAC could request the particular information provided in the consultation not be published (to align with regulation 25(2)(4)) of the Environment Regulations). **Reasonable Period:** • Woodside published advertisements in a national, state, and relevant local newspapers including The Australian, The West Australian, North West Telegraph, Pilbara News, Midwest Times (7 June 2023) advising of the proposed activities and requesting comments or feedback. • Consultation information provided to RRKAC on 20 June 2023 based on their function, interest, and activities. • Woodside has addressed and responded to RRKAC over 11 months, demonstrating a "reasonable period" of consultation. • Woodside asked RRKAC if it was aware of any other Traditional Custodian groups or individuals with whom Woodside should consult. None were identified. 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 7.2.5 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. **Summary of information provided and record of consultation for this EP:** • On 20 June 2023, Woodside emailed the RRKAC advising of the proposed activity (Record of Consultation, reference 1.53) and provided a summary Consultation Information Sheet (including a link to the detailed information sheet on Woodside's website). The email requested information on the interests that RRKAC and its members may have within the EMBA. No response was received to this email. • On 18 July 2023, Woodside emailed RRKAC NOPSEMA's Consultation Guidelines, Consultation Brochure, and Draft Policy for Managing Gender-Restricted Information. This email also reiterated Woodside's request that RRKAC advise Woodside of any other Traditional Custodian groups or individuals with whom Woodside should consult. No response was received to this email. • On 26 July 2023, Woodside emailed RRKAC Woodside's planned Program of Ongoing Engagement with Traditional Custodians.

- **(1)** On 11 August 2023, RRKAC emailed Woodside in response to another matter and in addition requesting ongoing consultation and training opportunities for rangers to prepare rangers for caring for sea and coastal country.
- **(1)** On 14 August 2023, Woodside emailed RRKAC thanking them for their response and requesting to meet to discuss training opportunities for rangers.
- On 14 August 2023, RRKAC emailed Woodside agreeing to a meeting and indicating they would arrange a suitable time for a discussion.
- **(1)** On 10 September 2023, Woodside emailed RRKAC's ranger focal point to organise a meeting to discuss training opportunities for rangers. Woodside also offered financial support to fund a marine scientist for another activity unrelated to this EP.
- On 10 September 2023, RRKAC emailed Woodside proposing an October date, time and location of ranger meeting.
- On 10 September 2023, Woodside emailed RRKAC confirming an October date, time and location of ranger meeting.
- On 10 September 2023, RRKAC emailed Woodside accepting meeting details.
- **(2)** On 15 September 2023, RRKAC emailed Woodside advising they have noted Woodside's plans, and that they aren't resourced to adequately respond, and would require Woodside to fund additional resources.
- On 18 September 2023, Woodside sent two emails to RRKAC clarifying that Woodside can provide funding to support consultation activities and requested RRKAC provide quotes and attached a Proposed Program of Ongoing Engagement with Traditional Custodians. An email was also sent from our SAP system a vendor onboarding process. No response has been received.
- **(1)** On 3 October 2023, Woodside met with RRKAC to discuss opportunities for Woodside to support ranger programs.
- On 14 November 2023, Woodside emailed RRKAC offering to meet and discuss support for RRKAC to engage in consultation.
- On 14 November 2023, RRKAC emailed Woodside advising a new point of contact.
- On 16 November 2023, Woodside emailed RRKAC advising they look forward to hearing from the new team member.
- On 19 December 2023, Woodside emailed RRKAC reiterating that Woodside is available if RRKAC or any other relevant persons required further information on any Woodside project.
- **(3, 4)** On 11 January 2024, Woodside and RRKAC, held a telephone discussion:
    - RRKAC had recently employed new personnel, RRKAC noted that once the new employees were settled in, RRKAC would be happy to consult with Woodside on relevant EPs.
    - RRKAC noted that some RRKAC country is on the coast (and would be affected by an oil spill or another such environmental incident), they feel that EMBA are far too broad, and the areas covered by EMBAs are far too big and unfeasible.
- On 5 March 2024, RRKAC emailed Woodside responding to another activity, noting that they expect to fill a team position that will be able to respond to EP matters.
- On 5 March 2024, Woodside emailed RRKAC, introducing a First Nations Engagement Adviser and requesting guidance on how the organisation would like to progress with consultation activities.
- On 20 March 2024, Woodside facilitated an online meeting with RRKAC to discuss the roles and responsibilities of both entities in the consultation process for future EPs, the importance of cultural and heritage feedback and future opportunities for engagement.On 26 March 2024, Woodside emailed RRKAC to follow up on the meeting, and to outline the upcoming activities for consultation, that reasonable financial support is available for meetings for the purpose of consultation, to ask for guidance on their preferred next steps, and to provide Woodside's Program of Ongoing Engagement.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Inclusion in Environment Plan**

RRKAC has not provided any feedback objections or claims in relation to this activity since June 2023. **(1)** RRKAC has queried Woodside in relation to supporting their interests in ranger programs and training opportunities **(2)** RRKAC noted that they are insufficiently resourced to fully engage and respond regarding EPs. **(3)** The RRKAC/HAC expressed a desire for ongoing engagement and partnership. **(4)** RRKAC noted that some RRKAC some RRKAC country is on the coast (and would be affected by an oil spill or another such environmental incident), they feel that EMBA are far too broad, and the areas covered by EMBAs are far too big and unfeasible.	Woodside accepts that WAC has no feedback, objections or claim at this time. **(1)** Woodside has responded to RRKAC's request for ranger support and met with them in October 2023 to discuss such opportunities. See (2,3) below. **(2, 3)** Woodside supports ongoing engagement and have responded to RRKACs advice about the limitations on their resources. Woodside has offered to support RRKAC in correspondence sent on 15 September and 14 November 2023, however this offer has not been taken up. Woodside has also assessed the Program of Ongoing Engagement with Traditional Custodians will support ongoing consultation with RRKAC and address appropriate support for resourcing, separate from consultation under regulation 25 of the Environment Regulations. As outlined in the consultation summary above, sufficient information and a reasonable period have been provided to demonstrate that consultation for the purpose of regulation 25 of the Environment Regulations is complete. Any further engagement with and support offered to RRKAC will be for the purpose of ongoing engagement. **(4)** RRKAC have not provided this feedback about this EP, but Woodside accepts that the EMBA is adjacent to RRKAC traditional country, Woodside engages in ongoing consultation 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 7.2.5 of the EP).	Existing controls considered sufficient, as described in Section 6. **(1, 2, 3)** Although consultation for the purpose of regulation 25 of the Environment Regulations is complete, Woodside will continue to engage with RRKAC through ongoing engagement and continue to progress with establishing a Framework Agreement as part of Woodside's Program of Ongoing Engagement with Traditional Custodians **(**Appendix I). This includes addressing RRKAC's resourcing issue and request for ranger support for ongoing consultation via a Framework Agreement. **(4)** No additional measure or controls are required, existing controls considered sufficient. 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.

Ngarluma Aboriginal Corporation (NAC)

NAC is established under the Native Title Act 1993 by the Ngarluma people to represent the Ngarlma 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 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 and a reasonable period have been provided, as described in Section 5.5 of the EP. Specifically:

Sufficient Information:

- Consultation Information Sheet was publicly available on the Woodside website since June 2023.
- Provided Consultation Information Sheets and Consultation Summary Sheets to NAC. These set out details of the proposed activity, the location of the activity, the timing of the activity as well as the potential risks and impacts of the activity in a digestible, plain English format.
- Articulated planned and unplanned environmental risks and impacts, with proposed controls.
- Confirmed the purpose of consultation and set out in detail what was being sought through consultation.
- Asked for the consultation and information sheets to be distributed to members and individuals.
- Woodside has provided NOPSEMA's Brochure "Consultation on offshore petroleum environment plans" and Guideline "Guideline: Consultation in the course of preparing an environment plan".
- Advised that NAC can request that particular information provided in the consultation not be published (to align with 25(2)(4) of the Environment Regulations).

Reasonable Period:

- Woodside published advertisements in a national, state, and relevant local newspapers including The Australian, The West Australian, North West Telegraph, Pilbara News, Midwest Times (7 June 2023) advising of the proposed activities and requesting comments or feedback.
- Consultation information provided to NAC on 20 June 2023 based on their function, interest, and activities.
- Woodside has addressed and responded to NAC over 11 months, demonstrating a "reasonable period" of consultation.
- Woodside asked NAC if it was aware of any other Traditional Custodian groups or individuals with whom Woodside should consult. None were identified.

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 7.2.5 of the 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.

Summary of information provided and record of consultation for this EP:

- On 20 June 2023, Woodside emailed the NAC advising of the proposed activity (Record of Consultation, reference 1.54) and provided a summary Consultation Information Sheet (including a link to the detailed information sheet on Woodside's website). The email requested information on the interests that NAC and its members may have within the EMBA. No response was received to this email.
- On 18 July 2023, Woodside emailed NAC NOPSEMA's Consultation Guidelines, Consultation Brochure, and Draft Policy for Managing Gender-Restricted Information. This email also reiterated Woodside's request that NAC advise Woodside of any other Traditional Custodian groups or individuals with whom Woodside should consult. No response was received to this email.
- On 26 July 2023, Woodside emailed NAC Woodside's planned Program of Ongoing Engagement with Traditional Custodians.

- On 10 August 2023, Woodside emailed NAC to confirm the point of distinction in terms of contact for EP consultations and community engagements.
- On 16 August 2023, Woodside emailed NAC to re-establish monthly meetings and offer to meet in the following week.
- **(1)** On 18 September 2023, NAC emailed Woodside proposing:
    - Establishment of Joint Working Group.
    - Woodside to provide draft agreement.
    - Working group meeting commence in October with monthly meetings.
    - Noting arrangements would cover future scope of consultations with NAC.
- On 28 September 2023, NAC representative emailed Woodside requesting a phone discussion about consultations with NAC.
- On 28 September 2023, Woodside had a phone discussion with NAC representative, they were following up on Woodside consultation requests and wished to progress a consultation meeting with NAC Working Group in October. They requested Woodside:
    - Propose date/s to meet.
    - Confirm they would cover cost.
    - Provide any relevant information prior to the meeting.
    - Advise which EPs Woodside would like to consult with NAC on.
    - Woodside agreed to follow up on the above and looked forward to meeting with the Working Group in October.
- **(1)** On 10 October 2023, Woodside emailed NAC in response to their email of 18 September 2023, in principle supporting NAC's proposal for ongoing consultation through a Working Group. Woodside requested meeting dates and confirmed that Woodside would provide a first draft of the agreement.
- On 19 October 2023, Woodside sent NAC a follow up email to their 10 October 2023 email.
- On 19 October 2023, NAC emailed Woodside thanking them for the email follow up and confirming that NAC will send a draft engagement letter in the near future. NAC also asked if there were any urgent matters pending.
- On 2 November 2023, Woodside emailed NAC outlining the top priorities for Woodside and asking to arrange consultation for a list of EPs including this one.
- On 3 November 2023, Woodside emailed NAC reiterating EP priorities in a list, including the activity, with this EP submission date planned for 10 November 2023.
- **(1)** On 3 November 2023, NAC emailed Woodside thanking them for the priority list and stating that they will email through the draft engagement protocol that day.
- **(1)** On 3 November 2023, NAC emailed Woodside the draft engagement protocol for Woodside's consideration.
- On 10 November 2023, Woodside phoned NAC and it was discussed that NAC is managing significant demand from industry. NAC informed Woodside it will take time to address internal business matters, but a future face-to-face meeting would be preferred. Woodside accepted the information and said they would send a follow up email to the phone call for future reference.
- On 13 November 2023, Woodside emailed NAC a follow up email to the phone call on 10 November 2023. Woodside included all the relevant urgent and forward planning information required for NAC to prepare for future consultation. Woodside also accepted that a face-to-face meeting is preferred.
- **(1)** On 1 March 2024, Woodside emailed NAC with a letter setting out the draft terms of an agreement between NAC and Woodside, the agreement (among other things) included the following topics:
    - Sufficient Information

- Reasonable Period.
- Provision of Information.
- Objection or claims.
- Publications
- Cost and termination.

- On 26 April 2024, Woodside emailed NAC an update of the review of the draft consultation agreement. No reply has been received.

Quarterly Heritage Meetings:

Woodside convenes a quarterly meeting of Traditional Custodian representatives from the Representative Aboriginal Corporations involved in historical native title claims over the Burrup Peninsula, including NAC. Individual attendees are nominated by their representative Aboriginal Corporations. These meetings are summarised separately in this table. NAC did not nominate attendees to quarterly meetings in 2021 or the first half of 2022 but were provided with copies of the slides used.

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Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Inclusion in Environment Plan**
NAC has not provided objections or claims in response to the information provided since consultation commenced in June 2023. **(1)** NAC proposed establishing a Joint Working Group to engage in meetings as well as an engagement protocol to formalise and streamline the consultation process going forward.	Woodside accepts that NAC has no feedback, objections or claims at this time. **(1)** Separate from consultation under regulation 25 of the Environment Regulations, Woodside will establish an agreement with NAC to work with the NAC Working Group, woodside sent a draft agreement to NAC in March 2024. The agreement and Working Group would be used to frame ongoing consultation. Sufficient information to allow informed assessment has already been provided by other means, including summary sheets developed by Indigenous staff. Woodside engages in ongoing consultation 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 7.2.5 of the EP).	Existing controls considered sufficient as described in **Section 6**. **(1)** Although consultation for the purpose of regulation 25 of the Environment Regulations is complete, Woodside will continue ongoing engagement with NAC, including through the draft agreement which will address any reasonable request for funding. 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 I). 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.

Yindjibarndi Aboriginal Corporation (YAC)

YAC is established under the *Native Title Act 1993* by the Yindjibanrdi people to represent the Yindjibanrdi 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 discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with Yindjibarndi Aboriginal Corporation 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:

- Consultation Information Sheet was publicly available on the Woodside website since June 2023.
- Provided Consultation Information Sheet and Consultation Summary Sheets to Yindjbarndi. These set out details of the proposed activity, the location of the activity, the timing of the activity as well as the potential risks and impacts of the activity in a digestible, plain English format.
- Articulated planned and unplanned environmental risks and impacts, with proposed controls.
- Confirmed the purpose of consultation and set out in detail what was being sought through consultation.
- Woodside has provided NOPSEMA's Brochure "Consultation on offshore petroleum environment plans" and Guideline "Guideline: Consultation in the course of preparing an environment plan".

Reasonable Period:

- Woodside published advertisements in a national, state, and relevant local newspapers including The Australian, The West Australian, North West Telegraph, Pilbara News, Midwest Times (7 June 2023) advising of the proposed activities and requesting comments or feedback.
- Consultation information provided to Yindjibarndi on 19 June 2023 based on their function, interest, and activities.
- Woodside has addressed and responded to Yindjibarndi over 11 months, demonstrating a "reasonable period" of consultation.

Woodside asked YAC it was aware of any other Traditional Custodian groups or individuals with whom Woodside should consult. None were identified.

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 7.2.5 of the EP).

Woodside considers the measures and controls described in this EP address the potential impact from the proposed activity on Yindjibarndi functions, interests, or activities.

Summary of information provided and record of consultation for this EP:

- On 19 June 2023, Woodside emailed the YAC advising of the proposed activity (Record of Consultation, reference 1.55) and provided a summary Consultation Information Sheet (including a link to the detailed information sheet on Woodside's website). The email requested information on the interests that YAC and its members may have within the EMBA. No response was received to this email.

- On 7 July 2023, Woodside phoned YAC and left a voicemail.
- **(1) (2)** On 7 July 2023, YAC phoned back Woodside stating that the right thing to do was to leave consultation on offshore activities to the coastal Aboriginal Corporations but noted that it would like to remain engaged with Woodside for general heritage matters and employment opportunities.
- On 18 July 2023, Woodside emailed YAC 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. No response was received to this email.
- **(3)** On 26 July 2023, Woodside emailed Yindjibarndi Woodside's planned Program of Ongoing Engagement with Traditional Custodians.
- **(3)** On 1 August 2023, YAC emailed Woodside acknowledging 26 July 2023 email, and confirming that NYFL will manage Oil and Gas matters on behalf of YAC.

See NYFL on behalf of Yindjibarndi below for record of further engagement.

On 17 April 2024, NYFL emailed Woodside noting they were 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. Woodside supports engaging with NYFL when it is appropriate for them to do so.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Inclusion in Environment Plan**
(1) Yindjibarndi has provided a response and advised that it will not be providing any comment on the proposed activity. **(2)** Yinjibarndi expressed that they would prefer that traditional owner groups with land and sea adjacent to and within the precinct of the projects provide comment. **(3)** Yindjibarndi has instructed Woodside that it will be represented by NYFL in ongoing discussion about EPs.	**(1)** Woodside accepts Yindjibarndi's response. **(2)** Woodside agrees and respects Yinjibarndi's position that traditional owners whose land and sea are adjacent to or within the precinct of the projects should be able to provide comment. **(3)** Woodside will engage with NYFL on behalf of Yindjibarndi for ongoing consultation related to this activity, separate from consultation under regulation 25 of the Environment Regulations. Woodside engages in ongoing consultation 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 7.2.5 of the EP).	**(1)** Not required. **(2)** Not required. **(3)** Future correspondence will be sent through NYFL. 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 I). 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.

Wanparta Aboriginal Corporation

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.

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with Wanparta Aboriginal Corporation 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 sought direction on Wanparta's preferred method of consultation. This resulted in a face-to-face meeting being coordinated at a location of Wanparta 's choosing, with Wanparta nominated representatives. This meeting included information that was readily accessible and appropriate.
- Consultation Information Sheet was publicly available on the Woodside website since June 2023.
- Provided Consultation Information Sheet and Consultation Summary Sheets to Wanparta. These set out details of the proposed activity, the location of the activity, the timing of the activity as well as the potential risks and impacts of the activity in a digestible, plain English format.
- Articulated planned and unplanned environmental risks and impacts, with proposed controls.
- Confirmed the purpose of consultation and set out in detail what is being sought through consultation.
- Asked for the consultation and information sheets to be distributed to members and individuals.
- Provided NOPSEMA's Brochure "Consultation on offshore petroleum environment plans" and Guideline "Guideline: Consultation in the course of preparing an environment plan".
- Provided response to questions asked about the activity through consultation. Through these questions, Wanparta has displayed an understanding of the activities under this Environment Plan.
- Advised that Wanparta can request that particular information provided in the consultation not be published (to align with 25(2)(4)).

Reasonable Period:

- Woodside published advertisements in a national, state, and relevant local newspapers including The Australian, The West Australian, North West Telegraph, Pilbara News, Midwest Times (7 June 2023) advising of the proposed activities and requesting comments or feedback.
- Consultation information provided to Wanparta on 20 June 2023 based on their functions, interests or activities.
- Woodside has addressed and responded to Wanparta over 11 months, demonstrating a "reasonable period" of consultation.
- Woodside asked Wanparta if it was aware of any other Traditional Custodian groups or individuals with whom Woodside should consult. None were identified.
- Woodside has provided a reasonable opportunity for input since June 2023 and a genuine two-way dialogue has occurred via meetings and written exchanges to further understand the environment in which the activity will take place. Wanparta has engaged with the detail of the activity asking related questions. The details of these engagements are described in the consultation summary below.

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 7.2.5 of the EP).

Woodside considers the measures and controls described in this EP address the potential impact from the proposed activity on Wanparta functions, interests or activities.

Summary of information provided and record of consultation for this EP:

- On 20 June 2023, Woodside emailed the Wanparta Aboriginal Corporation advising of the proposed activity (Record of Consultation, reference 1.56) and provided a summary Consultation Information Sheet (including a link to the detailed information sheet on Woodside's website). The email requested information on the interests that Wanparta and its members may have within the EMBA.
- On 6 July 2023, Woodside emailed Wanparta following up on various EP's noting that Woodside would happily meet with the Wanparta board and members to provide a complete overview of all planned activities.
- On 18 July 2023, Woodside emailed Wanparta NOPSEMA's Consultation Guidelines, Consultation Brochure, and Draft Policy for Managing Gender-Restricted Information. This email also reiterated Woodside's request that Wanparta advise Woodside of any other Traditional Custodian groups or individuals with whom Woodside should consult.
- On 21 July 2023, Wanparta emailed Woodside noting they were planning two board meetings in order to hear from the multiple proponents that have identified Wanparta as Relevant Persons and inviting Woodside to present at one of these meetings.
- On 24 July 2023, Woodside emailed Wanparta advising they would confirm a suitable date and seeking additional information on topics to be included in the consultation.
- On 24 July 2023, Wanparta emailed Woodside confirming topics that should be included in the consultation.
- On 25 July 2023, Woodside emailed Wanparta with further discussion on the topics to be covered and offering to fund additional consultation opportunities to ensure sufficient time to cover all topics in sufficient detail.
- On 26 July 2023, Woodside emailed Wanparta Woodside's planned Program of Ongoing Engagement with Traditional Custodians and confirming Woodside's preference to attend the 31 August 2023 board meeting.
- **(3)** On 31 August 2023, Woodside met with Wanparta Board and members in South Hedland, Woodside:
    - Described the Environment Plan framework, referring to the Offshore Petroleum and Greenhouse Gas Storage Act (Environment) Regulations, NOPSEMA's role as regulator and general contents of Environment Plans.
    - Displayed a map of activities open for feedback to be discussed in the meeting and provided a list of other upcoming activities which will be open for consultation in 2023/24.
    - Provided an overview of the broader EP activities including this activity.
    - Described the proposed activity, noting that it included removing equipment but that some buried equipment like mattresses, and anchors will be left in situ as removing them may have greater environmental impact.
    - Described the types of vessels involved.
    - Described the planned impacts and respective controls of the above activities including: the presence of vessels, seabed disturbance, underwater noise, discharge from vessels, emissions to air and external lighting.
    - Described planned and unplanned environmental risks and impacts in accordance with tables provided in the Information Sheets for the activities, emphasising that unplanned risks are not expected to occur and are unlikely.

- Displayed and spoke to the EMBA for each proposed activity, and the individual worst-case loss of containment scenarios identified, noting that they are all diesel fuel releases which would only be caused by vessel collisions.
- Stated that Woodside wanted to understand how the functions, activities or interests of Wanparta and the people it represents may be impacted by any of those activities.
- Specifically asked the following:
  - How could these activities impact your cultural values, interests, and activities - does protecting the environment do enough to protect your cultural values?
  - What are your concerns about the proposed activities and what do you think we should do about them?
  - Is there anything you would like included in the EPs before submission?
  - Is there anyone else Woodside should consult with about the activities?
- Advised that Woodside will continue to take feedback from Wanparta for the life of the EP.
- Provided personal contact details for further feedback. Woodside provided NOPSEMA contact details, should Wanparta desire to provide feedback directly to the regulator.

- **(1) (2) (3)** At the 31 August 2023 meeting Wanparta asked/noted:
  - **(1)** Wanparta asked questions about xmas trees, the location of Okha and NWS, and films left from activities.
    - Woodside provided information in response to questions including on oil spill response to contain and clean any film left.
  - **(1)** Wanparta asked what is left after decommissioning.
    - Woodside responded that we take out everything although some subsea equipment that is buried may be left, wells are plugged.
  - **(1)** Wanparta stated that water is extremely important to Ngarla people, and they feel a responsibility to look after the ocean and lore.
  - **(1)** Wanparta totems are kestrel, octopus, spiny brim and stingray – they stated they are a sea people connected through fresh and saltwater and Dreamtime stories that do connect through the sea.
  - **(1)** Wanparta asked about ranger group involvement in spill response.
    - **(3)** Woodside responded that they would get back to the team with regards to training and involvement.
  - **(2)** Wanparta is supportive of the EP submissions including this one and would like to be kept up to date on any changes.
  - Wanparta would like to engage in an annual meeting with Woodside.
  - **(2)** When asked by Woodside if there were any further questions or concerns relating to the activity presented, Wanparta did not raise anything further.
- On 4 October 2023, Woodside phoned Wanparta to discuss consultation and engagement activities.
- **(3)** On 4 October 2023, Woodside emailed Wanparta following up with a summary of the previous phone call. The outcomes of the phone discussion were:
  - **(3)** Wanparta's interest in a Wanparta Ranger program and EP funding.
  - **(3)** Wanparta's interest in a Karratha Gas Plant visit, as well as possible school visits and Perth Office visits.
  - Wanparta's request for updates on EPs unrelated to this one.
  - Woodside's query into Wanparta's thoughts on a formal authorisation/consent/endorsement process regarding future EPs.
- On 6 October 2023, Wanparta emailed Woodside thanking them for the previous summary email and stated that it will bring all the 4 October 2023 items to the Board for further consideration and will revert shortly after.

- **(3)** On 10 November 2023, Wanparta emailed Woodside with a Ngarla Ranger Proposal for Woodside's consideration.
- **(3)** On 10 November 2023, Woodside called Wanparta and discussed:
  - Ngarla Ranger Proposal
  - Further $10,000 funding request for management of EP's
  - Proposed meeting location and date - parties agreed for Woodside to host the Wanparta Board on February 23rd 2024 at the Karratha Gas Plant
- **(3)** On 12 November 2023, Woodside emailed Wanparta confirming receipt of the Ranger Proposal.
- **(3)** On 13 November 2023, Wanparta emailed Woodside with a written request for funding to assist ongoing consideration of Environmental Plans.
- On 22 November 2023, Woodside emailed Wanparta confirming the request had been received was under consideration.
- **(3)** On 24 November 2023, Woodside emailed Wanparta requesting the opportunity to call and discuss the funding request and outstanding meeting fees.
- On 30 November 2023, Wanparta emailed Woodside in relation to a financial matter, their email also noted the Directors availability for a meeting on 23 February 2024.
- Between 8 – 15 February 2024, Woodside and Wanparta exchanged emails confirming logistics of consultation and site visit meetings in Karratha for week of 26 February 2024.
- On 20 February 2024, Wanparta emailed Woodside informing of a death in the community and requesting a re-schedule of the meeting.
- On 21 February 2024, Woodside acknowledged and agreed to a re-schedule.
- On 23 February 2024, Wanparta emailed Woodside with suggested dates for a re-scheduled meeting in April 2024.
- On 26 February 2024, Woodside emailed Wanparta confirming availability for the proposed April meeting and noting logistics.
- On 19 April 2024 April, Wanparta emailed Woodside confirming a 24 April 2024 meeting for consultation on another activity and a site visit with the Wanparta Board.
- On 22 April 2024, Wanparta emailed Woodside the confirmed meeting agenda and presentation.
- On 6 May 2024, Wanparta emailed Woodside following the meeting on 24 April 2024. Wanparta responded to another activity and also advised:

  - **(4)**The Ngarla People have a deep spiritual connection to sea country.
  - **(1)** The Ngarla peoples' totem species – the octopus, stingray, spiny bream fish and kestrel – is of great significance.
  - **(5)** The protection and management of marine life and healthy ocean plays a significant role in their lore, culture and customs.
  - **(6)** That they request Woodside attends an annual Board meeting with Wanparta for the purposes of progressing ongoing and meaningful consultation.
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Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Inclusion in Environment Plan**

(1) During face-to-face engagement, related to this activity and others Wanparta requested further information on topics related to this proposed activity which was responded to during the meeting: • What chemicals in the water may be discharged during commissioning. • What remains after decommissioning. • Ranger involvement in spill response. • The importance of water and the obligation to care for the ocean was emphasised by the group. • Wanparta totems are kestrel, octopus, spiny brim and stingray. They are a sea people connected through fresh and saltwater and Dreamtime stories that do connect through the sea. **(2)** At the 31 August 2023 meeting, Wanparta expressed support for the EP, Wanparta said they had	**(1)** Woodside responded to Wanparta's requests for further information during face-to-face engagements, and no further information was requested on these topics. Woodside has noted Wanparta's values and interests in water and sea country in Section 4.8.1. **(2)** Woodside accepts that Wanparta is supportive of this EP submission. Woodside advised Wanparta of the activity start date, in recognition of Wanparta's request to be kept informed of progress of this activity and will send them a start of activity notification. **(3)** Separate from consultation under regulation 25 of the Environment Regulations, Woodside has commenced discussion with Wanparta about social investment opportunities as part of ongoing engagement. The Ranger Program Proposal provided by Wanparta is currently under consideration. **(4)** Woodside accepts Wanparta's assertion that the Ngarla people have a deep spiritual connection to sea country and has noted this value in Section 4.9.1.5. **(5)** Woodside accepts that the protection and management of marine life and healthy ocean plays a significant role in Wanparta's lore, culture and customs. This value is recorded in Section 4.9.1.5. **(6)** Woodside supports ongoing and meaningful consultation with Wanparta and supports attendance at meetings to consult with Wanparta through their preferred method of consultation. Woodside engages in ongoing consultation 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 7.2.5 of the EP).	**(1)** Existing controls considered sufficient, as described in Section 6. **(2)** Woodside has implemented a consultation program to advise relevant persons of the PAP and provide opportunity to raise objections or claims, as referenced as PS 1.8 in this EP. **(3)** Although consultation for the purpose of regulation 25 of the Environment Regulations is complete, Woodside will continue to engage with Wanparta through ongoing engagement and continue to progress with establishing a framework agreement as part of Woodside's Program of Ongoing Engagement with Traditional Custodians **(**Appendix I**).** **(4)** Cultural values and interests are recorded in Section 4.9.1.5 of the EP. **(5)** Cultural values and interests are recorded in Section 4.9.1.5 of the EP. **(6)** Not required.

no concerns regarding the activity for now and wanted to be kept updated on any changes. **(3)** Wanparta expressed interest in a range of social investment opportunities including a ranger program and have provided a Ranger Program proposal for Woodside's consideration. Wanparta stated their interest in ongoing engagement with Woodside. **(4)** On 6 May 2024, Wanparta advised that the Ngarla People have a deep spiritual connection to sea country. **(5)** On 6 May 2024, Wanparta advised that the protection and management of marine life and healthy ocean plays a significant role in their lore, culture and customs. **(6)** On 6 May 2024, Wanparta requested Woodside attend an annual Board meeting with Wanparta for the purposes of progressing ongoing and meaningful consultation.		

Native Title Representative Bodies
Yamatji Marlpa Aboriginal Corporation (YMAC) YMAC is the Native Title Representative Body 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.

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with Yamatji Marlpa Aboriginal Corporation 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 sought direction on YMAC's preferred method of consultation.
- Consultation Information Sheet was publicly available on Woodside website since June 2023. The Consultation Information Sheet and Consultation Summary Sheets were developed by Indigenous staff for YMAC. These set out details of the proposed activity, the location of the activity, the timing of the activity as well as the potential risks and impacts of the activity with controls in a digestible, plain English format.
- Articulated planned and unplanned environmental risks and impacts, with proposed controls.

Reasonable Period:

- Woodside published advertisements in national, state, and relevant local newspapers including The Australian, The West Australian, North West Telegraph, Pilbara News, Midwest Times (7 June 2023) advising of the proposed activities and requesting comments or feedback.
- Consultation information provided to YMAC on 20 June 2023 based on their functions, interests or activities.
- Woodside addressed and responded to YMAC over a 11 month period, demonstrating a "reasonable period" of consultation.
- Woodside considers that the "reasonable period" of consultation for this EP has closed.

Summary of information provided and record of consultation for this EP:

Historical Engagement:

YMAC is the Native Title Representative Body (NTRB) for the Yamatji and Pilbara regions. NTRBs exist to provide assistance to native title claimants and holders in regard to their native title rights. No native title has been recognised over the EMBA, however YMAC is identified in the North West Marine Parks Network Management Plan as the contact for identifying cultural values in nearby Australian Marine Parks.

- On 13 March 2023, Woodside emailed YMAC as to whether YMAC considers itself a 'relevant person' under regulation 25(1) of the Environment Regulations of the Environment Regulations for the purposes of consultation on EPs and, if so, whether that relevance is limited to a facilitation function in its capacity as a representative of Traditional Owner groups/corporations that overlap or adjacent to the environment that may be affected (EMBA) of a particular activity.
- **(1)** On 15 March 2023, Woodside emailed YMAC requesting a position on whether YMAC consider itself a 'relevant person' under the Environment Regulations for the purposes of consultation in EP's.
- On 20 March 2023, YMAC replied to confirm that in its view it 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 Native Title Representative Body under applicable federal legislation. YMAC does not intend to provide substantive comment on the content of EPs.

- On 20 March 2023, Woodside emailed YMAC to thank it for its reply and to advise that that this assessment would be included in Woodside's EPs.
- On 20 March 2023, YMAC emailed Woodside confirming that they agree to their advice being included in reporting (YMAC is the representative for NTGAC).
- On 12 June 2023, YMAC emailed Woodside on behalf of itself and its clients. The email attached included:
  - **(2)** A proposal to fund in-house expertise to support consultations and administration of the consultation framework.
  - **(2)** A draft consultation framework.
- On 12 June 2023, Woodside emailed YMAC, thanking them for the documents and informing them that Woodside would respond shortly.
- On 20 June 2023, Woodside emailed the Yamatji Marlpa Aboriginal Corporation advising of the proposed activity (Record of Consultation, reference 1.57) and provided a Summary Consultation Information Sheet.
- On 25 July 2023, Woodside emailed YMAC:
  - Agreeing in principle to the draft consultation framework and funding proposal but seeking further discussion on details;
  - Stating that Woodside is open to considering an industry funded position at YMAC to support the work they are facilitating.
  - Attaching Woodside's Program for Ongoing Engagement with Traditional Custodians.
  - Seeking a meeting with YMAC in relation to the draft consultation framework at YMAC's earliest convenience.
- On 14 December 2023, Woodside emailed YMAC following up on the consultation framework and providing suggestions for content to be included. No response has been received.
- On 21 December 2023, Woodside emailed YMAC providing a list of upcoming activities as requested by YMAC.
- **(2)** On 28 February 2024, Woodside emailed YMAC with a letter setting out the draft terms of an agreement between NTGAC and Woodside, the agreement (among other things) included the following topics:
  - Sufficient Information
  - Reasonable Period.
  - Provision of Information.
  - Objection or claims.
  - Publications
  - Cost and termination.
- On 29 February 2024, YMAC emailed Woodside acknowledging receipt of the information.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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 Native Title Representative Body under applicable federal legislation and does not intend to provide substantive comment on the content of EPs. **(2)** YMAC has provided feedback that it is seeking an industry funded position to support consultations for this and other activities. YMAC has provided a draft consultation framework to assist the consultation process.	**(1)** YMAC is the Native Title Representative Body for the Yamatji and Pilbara regions of Western Australia. As such, they are not a Prescribed or Registered Native Title Body Corporate representing the cultural rights of a Traditional Custodian Community but exists to assist native title claimants and holders. Woodside accepts YMAC's feedback that it is a relevant person only in relation to its facilitation and coordination function as a representative body. Woodside has consulted with YMAC in relation to its facilitation and coordination function as a Native Title Representative Body under applicable federal legislation, and it has responded that it does not intend to provide substantive comment on the content of EP's. **(2)** Woodside has assessed the Program of Ongoing Engagement with Traditional Custodians will support ongoing consultation with YMAC and/or the groups it represents. In February 2024 Woodside sent a draft agreement to YMAC as representative of NTGAC, the agreement would frame ongoing consultation, address appropriate support for resourcing, separate from consultation under regulation 25 of the Environment Regulations. Sufficient information to allow informed assessment has already been provided by other means. Woodside engages in ongoing consultation throughout the life of an 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 (see Section 7.2.5 of the EP).	**(1)** Not required **(2**) Woodside will continue to engage with YMAC in relation to its request for an industry funded position and put a proposal to YMAC in December 2023 for a Framework Agreement, and in February 2024 sent the draft terms of agreement between NTGAC (represented by YMAC) and Woodside. This is described further in the Program of Ongoing Engagement with Traditional Custodians, Appendix I.
Self-identified First Nations Groups and Individuals		
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 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 and a reasonable period have been provided, as described in Section 5.5 of the EP. Specifically:

Sufficient Information:

- Direction sought on NYFL's preferred method of consultation. NYFL requested consultation material suitable for Traditional Custodian audience, which was developed and provided. NYFL and Woodside initially agreed to hold a face-to-face consultation meeting at location of NYFL's choosing with NYFL nominated representatives, however NYFL chose to postpone the engagement for an undefined time.
- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Articulated planned and unplanned environmental risks and impacts, with proposed controls.
- Confirmed purpose of consultation and set out in detail what is being sought through consultation.
- Asked for the consultation and information sheets to be distributed to members and individuals.
- Provided NOPSEMA's Brochure "Consultation on offshore petroleum environment plans" and Guideline "Guideline: Consultation in the course of preparing and environment plan on consultation.

Reasonable Period:

- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting comments or feedback.
- Consultation information provided to NYFL on 29 June 2023 based on their functions, interests or activities.
- Woodside has addressed and responded to NYFL over 11 months, demonstrating a "reasonable period" of consultation.

Woodside asked NYFL it was aware of any other Traditional Custodian groups or individuals with whom Woodside should consult. None were identified.

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 11.8 of the EP).

Woodside considers the measures and controls described in this EP address the potential impact from the proposed activity on NYFL functions, interests, or activities.

Summary of information provided and record of consultation for this EP:

<u>Historical Engagement</u>

- On 22 May 2023, the NYFL CEO emailed Woodside in response to information not related to this activity requesting information in an appropriate format for Traditional Custodians and saying that the language and approach was not appropriate for NYFL's members.
- On 24 May 2023, Woodside spoke to NYFL by phone, explained that the information sheets were developed with a Ngarluma Traditional Custodian but that the best way to understand the materials was to take Woodside up on our offer to present to NYFL. These presentations include images and the subject matter experts are on hand to answer questions. Presentations had been well received by other groups. Woodside had budget for consultation meetings and could provide support for the meetings to occur.
- On 8 June 2023, NYFL emailed Woodside about several matters including a request for "further information/culturally appropriate comms" for this activity.
- On 8 June 2023, Woodside emailed NYFL reconfirming previous offers to meet with NYFL in relation to the activity and other activities unrelated to this EP for the purpose of face-to-face consultation. Explained that these presentations have been well received from groups. Explained also that the summary information sheets

provided were developed by Indigenous representatives for a Traditional Owner audience. Requested that if face to face consultation was not preferred by NYFL, whether they could provide some direction as to alternatives. Woodside reiterated they cover consultation costs to and can meet in Roebourne, assuming that is preferred.

- On 21 June 2023, Woodside called into the NYFL offices to advise of the community information session to be held in Roebourne on 22 June and 19 July 2023.
- On 28 June 2023, Woodside emailed NYFL confirming a consultation date of 20 July and requesting NYFL send through a quote for costs.
- On 28 June 2023, NYFL responded saying they would hold off on committing to a date while they had a chance to digest the outcomes of the NOPSEMA Summit.
- On 29 June 2023, Woodside emailed the NYFL advising of the proposed activity (Record of Consultation, reference 1.58) and provided a summary Consultation Information Sheet (including a link to the detailed information sheet on Woodside's website). The email requested information on the interests that NYFL and its members may have within the EMBA.
- **(1, 2)** On 29 June 2023, NYFL responded stating that they were a relevant person in relation to the activity but was waiting to agree to a national framework for consultation between industry and First Nations to be resolved before they consult on Environment Plans. This email was referring to the NOPSEMA Summit.
- On 10 July 2023, Woodside emailed NYFL seeking clarity in relation to their request. Woodside stated they understood the outcomes of the NOPSEMA Summit were as recorded by the facilitator was communicated to all participants as:

  It was agreed that:

  - There is a need for a National Summit of Indigenous Groups and Traditional Owners to consult together and agree what they require and what their collective and individual concerns may be;
    a. Government (DISR) will assist by mapping and compiling a list of all traditional owner groups that should be invited to this Summit,
    b. Kimberley Land Council and other PBCs will form a Steering Committee to draft the agenda for this Summit,
    c. APPEA will seek membership approval to facilitate by funding this Summit, and
    d. The Summit will be independently facilitated.
  - APPEA to further consult with their members in order to get some agreement on priorities and next steps for Industry;
  - After the National Summit of Indigenous Groups, the first of a number of meetings will be held between a smaller representative Traditional Owners group and a smaller representative Industry group, the latter to be coordinated through APPEA; and
  - There will be ongoing parallel consultations in relation to current EPs, which will continue in accordance with what is required by regulation 25(1)(d) of the Environment Regulations.

  Woodside stated it is committed to supporting the National Summit of Traditional Owners, and is committed to industry and Traditional Owners working together to agree consultation frameworks. Woodside noted, however, this will take time and necessarily must occur in parallel to ongoing consultation, with operators obliged to consult pursuant to regulation 25 of the Environment Regulations. Woodside also stated they were committing to a program of ongoing consultation for the life of the EP that would be happy to discuss that with NYFL.

- On 10 July 2023, NYFL stated that they did not agree with the facilitators record of the NOPSEMA Summit and reiterated that they looked forward to developing the negotiation framework.
- On 18 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.
- On 26 July 2023, NYFL emailed Woodside in response to Woodside's planned Program of Ongoing Engagement with Traditional Custodians, including requesting resourcing to support consultation.
- On 11 August 2023, NYFL emailed Woodside primarily in response to another matter. The email noted that:
- NYFL looks forward to progressing discussion with Woodside on the proposed program of consultation.
- **(2)** NYFL is participating with other First Nations organisations and representative bodies to develop a framework for consultation.
- There may be people, who in accordance with Indigenous tradition, may have spiritual and cultural connections to an EMBA unrelated to this EP and that have not yet been afforded the opportunity to provide information.
- **(3)** There may be additional cultural or environmental values that relate to the area that have not been identified or communicated to Woodside.
- On 15 August 2023, Woodside emailed NYFL thanking them for their correspondence and requesting availability to meet.
- On 18 August 2023, NYFL emailed Woodside proposing a date of 30 August to meet to discuss next steps.
- On 18 August 2023, Woodside emailed NYFL accepting the proposed date to meet.
- On 28 August 2023, Woodside emailed NYFL requesting a video link for the meeting so that an external consultant to Woodside could be involved in consultation and engagement going forward.
- On 28 August 2023, NYFL emailed through an agenda for the proposed meeting and stated that a video link will be sent out for Woodside's external consultant so that he may be able to join online.
- On 28 August 2023, Woodside emailed NYFL acknowledging receipt of agenda and providing contact details for engagement.
- **(4)** On 30 August 2023, Woodside met with NYFL to discuss a consultation process and engagement with NYFL and YAC, NYFL put forward the following:
- **(5)** NYFL requested Woodside fund 3 traditional Owners who would engage/consult with NYFL members.
- NYFL stated that time frames must be longer than one month for consultation.
- Woodside took the requests on notice.
- **(3, 6)** On 12 September 2023, NYFL emailed Woodside, summarising the meeting between Woodside and NYFL regarding consultation approaches on 30 August, providing a letter regarding consultation, and advising that there may be other people with whom Woodside should consult, and there may be other cultural values relating to the EMBA area. NYFL acknowledged that Woodside is developing culturally appropriate material. NYFL also stated their short- and long-term needs to support ongoing consultation including greater resourcing for consultation and capacity building. No further detail on this matter has been received beyond the specific request for 3 Traditional Owners consultant trainees which were raised in the meeting and taken on notice by Woodside.
- On 27 October 2023, NYFL emailed Woodside stating the challenges faced by NYFL in engaging in meaningful consultation and requesting an updated proposal relating to EP consultation processes.

- On 3 November 2023, Woodside emailed NYFL acknowledging this response and advising they would revert as soon as possible. Woodside also stated that they are happy to meet to discuss short-term solutions in person.
- On 7 November 2023, Woodside emailed NYFL requesting a meeting to discuss the issues raised in further detail and clarifying that NYFL had requested Woodside not progress a proposal until after the NSCAS Summit.
- On 19 November 2023, NYFL emailed Woodside acknowledging the suggestion to meet, and stating resource limitations and requesting an updated proposal for a consultation framework.
- On 20 November 2023, Woodside emailed NYFL acknowledging this response and stating it would revert as soon as possible.
- On 4 December 2023, Woodside emailed NYFL seeking clarification on NYFL's position and expectation relating to EP consultation and the development of a consultation framework.
- On 6 December 2023, NYFL emailed Woodside stating its expectation that Woodside provide a proposal to support NYFL overcome their state resourcing constraints and capacity challenges to enable meaningful engagement on EPs. The email noted that:
- At the meeting of 30 August 2023 there was discussion about challenges and proposed solutions to progress EP consultation.
- **(6)** NYFL operate in a resource-constrained environment.
- **(4)** A proposal to NYFL responding to issues raised at the above meeting was expected.
- **(2)** The Summit had been referred to as a potential useful resource for developing an updated framework.
- NYFL had agreed to progress the Program of Ongoing Engagement with Traditional Custodians.
- Social investment and capacity building funding should remain separate to consultation regarding EPs and other environment and heritage matters.
- **(4, 6)** On 14 December 2023, Woodside emailed NYFL acknowledging the stated resource constraints and proposing an outline for a consultation framework, including additional resourcing, to support NYFL to meaningfully engage in the EP consultation process. Woodside proposed/noted the following to support consultation activities that would provide NYFL with the ability to engage and provide input and feedback:
- Woodside intends engaging a senior Ngarluma person in an advisory/liaison capacity, which will include facilitating consultation with NYFL members in relation to EPs.
- An Agreement between Woodside and NYFL to consult in a meaningful and genuine manner.
- The procedures Woodside will follow when a submission requires consultation.
- Initial and ongoing consultation in relation to relevant Woodside Environmental Plans and the senior Ngarluma person's role in facilitating those consultations.
- Agreement as to how Woodside will provide NYFL with the information NYFL requires to make free, prior and informed decisions about Woodside's Environmental Plans.
- Agreement as to how NYFL will provide feedback and how that can best be represent NYFL's feedback to NOPSEMA or other relevant organisations.
- An agreed schedule of rates for NYFL's participation in the consultations regarding Woodside's Environmental Plans.
- How to manage the outputs of the consultations.
- Agreement on an approach to minimise duplication of consultation activities conducted with NAC, YAC and NYFL.
- An EP Consultation Working Group with representation from Woodside and NYFL.
- Suggested further discussion on the proposal at the NYFL/Woodside Quarterly meeting on 19 December 2023.

- **(4)** On 6 March 2024, Woodside emailed NYFL with a letter setting out the draft terms of an agreement between NYFL and Woodside, the agreement (among other things) included the following topics:
  - Sufficient Information
  - Reasonable Period.
  - Provision of Information.
  - Objection or claims.
  - Publications
  - Cost and termination.
- On 14 March 2024 NYFL emailed Woodside acknowledging receipt of their email and attachments of 6 March 2024.
- **(4)** On 19 March 2024 NYFL emailed Woodside attaching a quote for an initial review of the draft terms of agreement.
- On 17 April 2024, NYFL emailed Woodside noting they were 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. Woodside supports engaging with NYFL when it is appropriate for them to do so.

Quarterly Heritage Meetings

NYFL is also consulted through its membership on the Karratha Community Liaison Group (KCLG) and the Quarterly Heritage Group.

Summary of Feedback, Objection or Claim	Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response	Inclusion in Environment Plan
(1) NYFL self-identified and advised Woodside that they are a relevant person for this activity. Their feedback included a request for information sheets appropriate for a Traditional Custodian audience. **(2)** NYFL wished to pause consultation until after the First Nations national was held and a framework for consultation developed. NYFL noted they were working with First Nations Organisations and representative Bodies to develop a framework for consultation. This has not yet been proposed to Woodside. The summit took place in Darwin in November 2023. **(3)** NYFL expressed that there may be additional cultural and environmental values that relate to the area that have not been communicated to Woodside.	**(1)** Woodside has responded to NYFL's self-identification and consulted with them as a relevant person. 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. On 12 September NYFL recognised that Woodside continues to provide culturally appropriate consultation material, including animations. **(2)** Woodside did not consider the proposal that consultation be paused until the proposed First Nations National Summit was reasonable.	**(1)** NYFL has been consulted in accordance with the methodology described in **Section 5.5** of the EP. **(2)** Not required. **(3)** Methodology described in **Section 5.5** adequately addresses this claim. Description of cultural values and heritage features is included in Section 4.9 of the EP. (**4, 5, 6**) Although consultation for the purpose of regulation 25 of the Environment Regulations is complete, Woodside will continue to engage with NYFL through ongoing engagement

(4) NYFL have acknowledged they support an agreement to enable a process of consultation. They have previously indicated they were working with other organisations to develop a consultation framework, more recently they have indicated they are waiting on Woodside to put forward a proposal. **(5)** NYFL requested that Woodside employ three Ngarluma/Yindjibarndi Traditional Owners who would consult with NYFL members. **(6)** NYFL noted that they operate in a restrained resource environment and requested that Woodside employ three Ngarluma/Yindjibarndi Traditional Owners who would consult with NYFL members.	Woodside continued to offer to meet to progress discussions with NYFL, a meeting was held on 30 August 2023 and further meetings were proposed by Woodside over the following months during September to December but were not taken up. 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 while preparing this EP. The framework could be used to frame ongoing consultation. Sufficient information to allow informed assessment has already been provided by other means, including summary sheets developed by Indigenous staff. Woodside has an existing engagement framework in place with NYFL via the Quarterly Heritage Group which enables regular communication about Woodside activities. **(3)** Woodside has a robust understanding of the environment, cultural values and heritage features based on publicly available information and consultation with relevant persons. This is described in Section 4.9.1 of the EP **(4)** 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. The framework would be used to frame ongoing consultation. Sufficient information to allow informed assessment has already been provided by other means, including summary sheets developed by Indigenous staff. Woodside has an existing engagement framework in place with NYFL which enables regular (quarterly) communication about Woodside activities. Feedback from NYFL on 27 October 2023 requested Woodside develop a draft consultation framework. Woodside sent a draft consultation framework to NYFL on 6 March 2024 for their consideration. **(5)** Woodside does not consider NYFL's request that Woodside employ three Ngarluma/Yindjibarndi Traditional Owners to consult with NYFL members a reasonable proposal or a necessary step to allow consultation to occur. Woodside notes that consultation must be capable of reasonable and practicable discharge. Woodside's consultation efforts are informed and undertaken by personnel with significant experience in First Nations relations, including Indigenous employees. Woodside is currently finalising the employment of a Ngarluma person in an advisory position who will be facilitating consultation with NYFL.	and continue to progress with establishing a framework agreement as part of Woodside's Program of Ongoing Engagement with Traditional Custodians (**Appendix I**). The draft proposal was sent to Woodside on 6 March 2024 and will address reasonable resourcing issues.

	(6) Woodside supports reasonable funding requests. Woodside engages in ongoing consultation 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 7.2.5).	
Historical cultural heritage groups or organisations		
Western Australian Museum		
Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with Western Australian Museum for the purpose of regulation 25 is complete. Sufficient information and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically: • Consultation Information Sheet publicly available on the Woodside website since June 2023. • Consultation Information provided to WA Museum on 22 June 2023 based on their functions, interests or activities. • Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback. • Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.* • Woodside has sent follow up emails seeking feedback on the proposed activities. • Woodside has provided WA Museum with the opportunity to provide feedback over a 11 month period. **Summary of consultation provided and responses:** • On 22 June 2023, Woodside emailed WA Museum advising of the proposed activity (Record of Consultation, reference 1.22), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*. • On 10 July 2023, Woodside emailed WA Museum following up on the proposed activity (Record of Consultation, reference 2.12) and provided a Consultation Information Sheet and to request feedback.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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 further feedback be received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	The Environment Plan demonstrates that there are no known underwater heritage sites or shipwrecks within the Petroleum Activities Area and identifies that there are no credible impacts to the values of any underwater heritage or shipwrecks as a result of planned activities (Section 4.9.1.7). 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**.** No additional measures or controls are required.
Local government and community representative groups or organisations		
Shire of Exmouth		
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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically: • Consultation Information Sheet publicly available on the Woodside website since June 2023. • Consultation Information provided to Shire of Exmouth on 22 June 2023 based on their functions, interests or activities. • Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback. • Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.* • Woodside has sent follow up emails seeking feedback on the proposed activities. • Woodside has provided Shire of Exmouth with the opportunity to provide feedback over a 11-month period.		

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed Shire of Exmouth advising of the proposed activity (Record of Consultation, reference 1.23), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 10 July 2023, Woodside emailed Shire of Exmouth following up on the proposed activity (Record of Consultation, reference 2.25) and provided a Consultation Information Sheet and to request feedback.

Summary of Feedback, Objection or Claim	Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see **Section 7.2.5** of the EP).	No additional measures or controls are required.

Shire of Ashburton

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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to Shire of Ashburton on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up emails seeking feedback on the proposed activities.
- Woodside has provided Shire of Ashburton with the opportunity to provide feedback over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed Shire of Ashburton advising of the proposed activity (Record of Consultation, reference 1.24), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 23 June 2023, Shire of Ashburton emailed Woodside thanking it for the information and advised it would review and respond on behalf of the City shortly.
- On 11 July 2023, Woodside emailed Shire of Ashburton following up on the proposed activity (Record of Consultation, reference 2.26) and provided a Consultation Information Sheet and to request feedback.

- On 13 July 2023, Shire of Ashburton sent a letter to Woodside noting that the Shire's Strategic Community Plan for 2022-2023 recognises and supports the significant contribution that the oil and gas sector make to the economy and community and **(1)** raises no objection to proposed drilling commissioning and subsea installation activities. The Shire asked for consideration of the following comments:
    - **(2)** the Shire expects that Woodside will identify, manage and mitigate all possible impacts and risks in line with relevant regulatory frameworks;
    - **(3)** the Aboriginal Cultural Heritage Inquiry System (ACHIS) should be consulted to ensure site of significance are not impacted without consents;
    - **(4)** the Shire requires Woodside to brief the Shire's Local and District Emergency Management Committee's on its planned responses to such events before any activities commence;
    - **(5)** asks 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;
    - **(6)** 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;
    - **(7)** the Shire anticipates that Woodside has engaged with the community regarding what may happen in areas that are affected by the proposed activities;
    - **(8)** part of the proposed activities are associated with future decommissioning works and that Woodside may consider the Shire operated Pilbara Regional Waste Management Facility (PRWMF) for its decommissioning, recycling and waste disposal purposes;
    - **(9)** 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 7 August 2023, Woodside responded thanking the Shire for its comments and noted:
    - that 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 2009 (Environment Regulations), through the implementation of the EP. Woodside's proposed EPs will be submitted to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA) for assessment and acceptance.
    - 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.
    - Woodside welcomes the opportunity to brief the Shire on its approach to managing a hydrocarbon release in the highly unlikely event this occurs. Woodside asked the Shire to please advise whether the Shire would like a briefing prior to every activity or a high level overview and also advise on possible times for a meeting.
    - 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.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Inclusion in Environment Plan**
(1) Shire of Ashburton recognises and supports the	**(1)** Woodside noted the Shire of Ashburton had no objection to the activity.	**(1)** Not required.

contribution of oil and gas sector and raises no objection to proposed drilling commissioning and subsea installation activities. It noted a number of expectations around: **(2)** Identifying, managing and mitigating all possible impacts and risks. **(3)** Consulting ACHIS. **(4)** Brief the Shire's Local and District Emergency Management Committee. **(5)** Ensure Woodside is communicating with appropriate national and state emergency management agencies. **(6)** Assumes Woodside has emergency manage planning in place. **(7)** Woodside has engaged with the community. **(8)** Consider future decommissioning works utilises the PRWMF. **(9)** Provide updates as proposal progresses. Whilst feedback has been received, there were no objections or claims.	**(2)** 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. **(3)** Woodside routinely uses ACHIS as part of the EP development process. **(4)** Woodside welcomed the opportunity to brief the Shire at the LEMC meeting. **(5)** 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. **(6)** 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. **(7)** 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. **(8)** Woodside noted the Shire's interest in ongoing local content opportunities. **(9)** Woodside will continue to provide the Shire with updates on the proposed activities when relevant. Woodside engages in ongoing consultation throughout the life of an EP. Should feedback be received, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	**(2)** Existing controls considered sufficient as described in Section 6 of this EP. **(3)** For this EP a search of DPLH's Aboriginal Cultural Heritage Inquiry System was undertaken (Appendix C). **(4)** Not required. **(5, 6)** In the course of developing this EP, Woodside has developed oil spill preparedness and response positions (see Appendix H of this EP). **(7)** Woodside consults relevant persons in the course of developing an EP as described in Section 5.3 of this EP. **(8)** Not required. **(9)** Woodside has implemented a consultation program to advise relevant persons of the PAP and provide opportunity to raise objections or claims. No additional measures or controls are required.
City of Karratha		

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 and a reasonable period have been provided, as described in Section 5. of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to City of Karratha on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up emails seeking feedback on the proposed activities.
- Woodside has provided City of Karratha with the opportunity to provide feedback over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed City of Karratha advising of the proposed activity (Record of Consultation, reference 1.25), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 10 July 2023, Woodside emailed City of Karratha following up on the proposed activity (Record of Consultation, reference 2.24) and provided a Consultation Information Sheet and to request feedback.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.

Town of Port Hedland

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with Town of Port Hedland for the purpose of regulation 25 is complete. Sufficient information and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to Town of Port Hedland on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up emails seeking feedback on the proposed activities.
- Woodside has provided Town of Port Hedland with the opportunity to provide feedback over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed Town of Port Hedland advising of the proposed activity (Record of Consultation, reference 1.27), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 10 July 2023, Woodside emailed Town of Port Hedland following up on the proposed activity (Record of Consultation, reference 2.13) and provided a Consultation Information Sheet and to request feedback.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.

Shire of Broome

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with Shire of Broome for the purpose of regulation 25 is complete. Sufficient information and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to Shire of Broome on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside addressed and responded to Shire of Broome over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed Shire of Broome advising of the proposed activity (Record of Consultation, reference 1.26), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- **(1)** On 30 June 2023, Shire of Broome emailed Woodside thanking it for referring the Angel Facility Operations EP consultation information sheet to the Shire of Broome. The Shire of Broome noted that given the Shire is located outside of the EMBA, it had no specific comment to make on the project.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its Response**	**Inclusion in Environment Plan**
(1) Shire of Broome reviewed information and had no comment to make on the revised EP.	**(1)** Woodside notes Shire of Broome has confirmed it has no feedback relating to the proposed activity.	**(1)** Not required. No additional measures or controls are required.

Whilst 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 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 7.2.5 of the EP).	

Exmouth Community Liaison Group (CLG)

- 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
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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically: • Consultation Information Sheet publicly available on the Woodside website since June 2023. • Consultation Information provided to Exmouth CLG on 22 June 2023 based on their functions, interests or activities. • Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback. • Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.* • Woodside has sent follow up emails seeking feedback on the proposed activities. • Woodside has provided Exmouth CLG Australia with the opportunity to provide feedback over a 11-month period. **Summary of consultation provided and responses:** • On 22 June 2023, Woodside emailed Exmouth CLG advising of the proposed activity (Record of Consultation, reference 1.28), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*. • On 10 July 2023, Woodside emailed Exmouth CLG following up on the proposed activity (Record of Consultation, reference 2.21 and provided a Consultation Information Sheet and to request feedback. The summary above demonstrates that consultation for the purpose of regulation 25 of the Environment Regulations is complete, however, as per Woodside's commitment to ongoing consultation, engagement had continued as summarised below: **Ongoing consultation:** • On 27 July 2023, the Exmouth CLG met with Woodside and other companies and discussed a number of projects including: o Woodside acknowledged the increase in consultation material the CLG members had been receiving and reminded members of the changes requiring consultation based on EMBAs. o Woodside presented a slide listing EPs that members had been consulted on recently and potential EPs in the remainder of 2023. o Woodside provided summary consultation information sheets for three other EPs (Angel Facility Operations, Macedon Commonwealth and State Operations, North West Shelf and Julimar Exploration Wellhead Decommissioning) which were also sent to members in July 2023. o No feedback was received regarding the EPs. All CLG members were emailed a copy of the meeting slides after the meeting.

Summary of Feedback, Objection or Claim	Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.
Karratha Community Liaison Group (CLG) • 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 **MAC was consulted directly as described above.*		
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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically: • Consultation Information Sheet publicly available on the Woodside website since June 2023. • Consultation Information provided to Karratha Community Liaison Group on 22 June 2023 based on their functions, interests or activities. • Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback. • Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.* • Woodside has sent follow up emails seeking feedback on the proposed activities. • Woodside has provided Karratha Community Liaison Group with the opportunity to provide feedback over a 11- month period.		

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed Karratha CLG advising of the proposed activity (Record of Consultation, reference 1.29), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 12 July 2023, Woodside emailed Karratha CLG following up on the proposed activity (Record of Consultation, reference 2.25) and provided a Consultation Information Sheet and to request feedback.

The summary above demonstrates that consultation for the purpose of regulation 25 of the Environment Regulations is complete, however, as per Woodside's commitment to ongoing consultation, engagement had continued as summarised below:

Ongoing consultation:

- On 29 September 2023, Woodside met and presented to the Karratha CLG where a number of EPs were discussed including the Angel Facility Operations Environment Plan. Woodside hosts quarterly Community Liaison Group (CLG) meetings 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.

  Woodside presented a slide which listed Environment Plans on which the CLG members had recently been consulted and Environment Plans it is currently consulting on (Record of Consultation reference 2.39). The slide included a QR and URL to Consultation Activities page of the Woodside website.
  14 individuals attended the meeting representing:
  - City of Karratha – Council representatives and staff representatives
  - Karratha Central Health Care
  - Bechtel
  - Dampier Community Association
  - Pilbara Development Commission
  - Regional Development Australia
  - Karratha & Districts Chamber of Commerce & Industry
  - Ngarluma Yindjibarndi Foundation Ltd.
  - Pilbara Ports Authority

  Summary of general discussion:
  - Employment opportunities provided by the resources sector
  - General interest in the location of the Scarborough Project and development activities
  - General interest in the Scarborough Seismic EP and Federal Court's decision.
  - Query as to whether the Federal Court's decision would impact the timeline of the Scarborough project.
  - Stakeholder commented they appreciated the consultation information received and would like to continue to receive the materials.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.

Onslow Chamber of Commerce and Industry

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with Onslow Chamber of Commerce and Industry for the purpose of regulation 25 is complete. Sufficient information and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to Onslow Chamber of Commerce on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up emails seeking feedback on the proposed activities.
- Woodside has provided Onslow Chamber of Commerce with the opportunity to provide feedback over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed Onslow Chamber of Commerce advising of the proposed activity (Record of Consultation, reference 1.30), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 11 July 2023, Woodside emailed Onslow Chamber of Commerce following up on the proposed activity (Record of Consultation, reference 2.23) and provided a Consultation Information Sheet and to request feedback.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.

Broome Chamber of Commerce and Industry

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with Broome Chamber of Commerce for the purpose of regulation 25 is complete. Sufficient information and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to Broome Chamber of Commerce on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up emails seeking feedback on the proposed activities.
- Woodside has provided Broome Chamber of Commerce with the opportunity to provide feedback over a 9 month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed Broome Chamber of Commerce advising of the proposed activity (Record of Consultation, reference 1.32), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 10 July 2023, Woodside emailed Broome Chamber of Commerce following up on the proposed activity (Record of Consultation, reference 2.22) and provided a Consultation Information Sheet and to request feedback.

Summary of Feedback, Objection or Claim	Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.

Port Hedland Chamber of Commerce and Industry

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with Port Hedland Chamber of Commerce for the purpose of regulation 25 is complete. Sufficient information and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to Port Hedland Chamber of Commerce on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up emails seeking feedback on the proposed activities.
- Woodside has provided Port Hedland Chamber of Commerce with the opportunity to provide feedback over a 11-month period.

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed Port Hedland Chamber of Commerce advising of the proposed activity (Record of Consultation, reference 1.32), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 10 July 2023, Woodside emailed Port Hedland Chamber of Commerce following up on the proposed activity (Record of Consultation, reference 2.22) and provided a Consultation Information Sheet and to request feedback.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.

Other non-government groups or organisations

Friends of Australian Rock Art (FARA)

Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with Sea Shepherd Australia for the purpose of regulation 25 is complete. Sufficient information and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to FARA on 11 September 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up emails seeking feedback on the proposed activities.
- Woodside has provided FARA with the opportunity to provide feedback over a 6 month period.

Summary of consultation provided and responses:

- On 11 September 2023, Woodside emailed FARA advising of the proposed activity (Record of Consultation, reference 2.33), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 11 October 2023, Woodside emailed FARA following up on the proposed activity (Record of Consultation, reference 2.35) and provided a Consultation Information Sheet and to request feedback.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.
Research institutes and local conservation groups or organisations		
Cape Conservation Group (CCG)		
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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically: • Consultation Information Sheet publicly available on the Woodside website since June 2023. • Consultation Information provided to CCG on 22 June 2023 based on their functions, interests or activities. • Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback. • Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.* • Woodside has sent follow up emails seeking feedback on the proposed activities. • Woodside has provided CCG with the opportunity to provide feedback over a 11-month period. **Summary of consultation provided and responses:** • On 22 June 2023, Woodside emailed CCG advising of the proposed activity (Record of Consultation, reference 1.34), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*. • On 10 July 2023, Woodside emailed CCG following up on the proposed activity (Record of Consultation, reference 2.28) and provided a Consultation Information Sheet and to request feedback.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.
Protect Ningaloo		

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 and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically:

- Consultation Information Sheet publicly available on the Woodside website since June 2023.
- Consultation Information provided to Protect Ningaloo on 22 June 2023 based on their functions, interests or activities.
- Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback.
- Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.*
- Woodside has sent follow up emails seeking feedback on the proposed activities.
- Woodside has provided Protect Ningaloo with the opportunity to provide feedback over a 11-month period.
-

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed Protect Ningaloo advising of the proposed activity (Record of Consultation, reference 1.3), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 10 July 2023, Woodside emailed Protect Ningaloo following up on the proposed activity (Record of Consultation, reference 2.1) and provided a Consultation Information Sheet and to request feedback.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.
Other		
Save Our Songlines (SOS)		
Woodside has discharged its obligations for consultation under regulation 25 of the Environment Regulations and consultation with SOS for the purpose of regulation 25 is complete. Sufficient information and a reasonable period have been provided, as described in Section 5.4 of the EP. Specifically: • Consultation Information Sheet publicly available on the Woodside website since June 2023. • Consultation Information provided to SOS on 28 September 2023 based on their functions, interests or activities. • Woodside published advertisements in a national, state and relevant local newspapers on 7 June 2023 advising of the proposed activities and requesting feedback. • Woodside provided a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community.* • Woodside has sent follow up emails seeking feedback on the proposed activities. • Woodside has provided SOS with the opportunity to provide feedback over a 6 month period.		

Summary of consultation provided and responses:

- On 28 September 2023, Woodside emailed SOS advising of the proposed activity (Record of Consultation, reference 2.32), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 17 October 2023, Woodside emailed SOS following up on the proposed activity (Record of Consultation, reference 2.34) and provided a Consultation Information Sheet and to request feedback.

Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.

Table 3: Engagement Report with Persons or Organisations Assessed as Not Relevant

Other non-government groups or organisations		
350 Australia (350A)		
Summary of consultation provided and responses: • On 22 June 2023, Woodside emailed 350A advising of the proposed activity (Record of Consultation, reference 1.33), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*. • On 10 July 2023, Woodside emailed 350A following up on the proposed activity (Record of Consultation, reference 2.10) and provided a Consultation Information Sheet and to request feedback.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.
Australian Conservation Foundation (ACF)		
Summary of consultation provided and responses: • On 22 June 2023, Woodside emailed ACF advising of the proposed activity (Record of Consultation, reference 1.33), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*. • On 10 July 2023, Woodside emailed ACF following up on the proposed activity (Record of Consultation, reference 2.10) and provided a Consultation Information Sheet and to request feedback.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.

Australian Marine Conservation Society (AMCS)		
Summary of consultation provided and responses: • On 22 June 2023, Woodside emailed AMCS advising of the proposed activity (Record of Consultation, reference 1.33), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*. • On 10 July 2023, Woodside emailed AMCS following up on the proposed activity (Record of Consultation, reference 2.10) and provided a Consultation Information Sheet and to request feedback.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.
Conservation Council of Western Australia (CCWA)		
Summary of consultation provided and responses: • On 22 June 2023, Woodside emailed CCWA advising of the proposed activity (Record of Consultation, reference 1.33), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*. • On 10 July 2023, Woodside emailed CCWA following up on the proposed activity (Record of Consultation, reference 2.10) and provided a Consultation Information Sheet and to request feedback.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.

Greenpeace Australia Pacific (GAP)		
Summary of consultation provided and responses: • On 22 June 2023, Woodside emailed GAP advising of the proposed activity (Record of Consultation, reference 1.33), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*. • On 10 July 2023, Woodside emailed GAP following up on the proposed activity (Record of Consultation, reference 2.10) and provided a Consultation Information Sheet and to request feedback.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.
Sea Shepherd Australia (SSA)		
Summary of consultation provided and responses: • On 22 June 2023, Woodside emailed SSA advising of the proposed activity (Record of Consultation, reference 1.33), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*. • On 10 July 2023, Woodside emailed SSA following up on the proposed activity (Record of Consultation, reference 2.10) and provided a Consultation Information Sheet and to request feedback.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.

Research institutes and local conservation groups or organisations		
University of Western Australia (UWA)		
Summary of consultation provided and responses: • On 22 June 2023, Woodside emailed UWA advising of the proposed activity (Record of Consultation, reference 1.35), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*. • On 10 July 2023, Woodside emailed UWA following up on the proposed activity (Record of Consultation, reference 2.30) and provided a Consultation Information Sheet and to request feedback.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.
Western Australian Marine Science Institution (WAMSI)		
Summary of consultation provided and responses: • On 22 June 2023, Woodside emailed WAMSI advising of the proposed activity (Record of Consultation, reference 1.35), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*. • On 10 July 2023, Woodside emailed WAMSI following up on the proposed activity (Record of Consultation, reference 2.30) and provided a Consultation Information Sheet and to request feedback.		
Summary of Feedback, Objection or Claim	**Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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, it will be assessed and, where appropriate, Woodside will	No additional measures or controls are required.

	apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	

Commonwealth Scientific and Industrial Research Organisation (CSIRO)

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed CSIRO advising of the proposed activity (Record of Consultation, reference 1.37), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 10 July 2023, Woodside emailed CSIRO following up on the proposed activity (Record of Consultation, reference 2.15) and provided a Consultation Information Sheet and to request feedback.

Summary of Feedback, Objection or Claim	Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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, it will be assessed and, where appropriate, Woodside will apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	No additional measures or controls are required.

Australian Institute of Marine Science (AIMS)

Summary of consultation provided and responses:

- On 22 June 2023, Woodside emailed AIMS advising of the proposed activity (Record of Consultation, reference 1.37), provided a Consultation Information Sheet, and a link to NOPSEMA's brochure *Consultation on offshore petroleum environment plans: Information for the community*.
- On 10 July 2023, Woodside emailed AIMS following up on the proposed activity (Record of Consultation, reference 2.15) and provided a Consultation Information Sheet and to request feedback.

Summary of Feedback, Objection or Claim	Woodside Energy's Assessment of Merits of Feedback, Objection or Claim and its 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, it will be assessed and, where appropriate, Woodside will	No additional measures or controls are required.

	apply its Management of Change and Revision process (see Section 7.2.5 of the EP).	

RECORD OF CONSULTATION

RECORD OF CONSULTATION

1. Initial Consultation

1.1 Consultation Information Sheet

Woodside Energy

CONSULTATION

INFORMATION SHEET

June 2023

ANGEL FACILITY OPERATIONS ENVIRONMENT PLAN

NORTH-WEST SHELF, 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. We want relevant persons whose functions, interests or activities that 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

Overview

Woodside is submitting a revision of the Operations EP for the Angel Facility (Angel) operations in Commonwealth waters, in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009* (Cth) (regulations). The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to Angel and Lambert Deep reservoirs. It is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. Aside from the production changes associated with Lambert West, the routine operational aspects of the EP remain the same as the in-force EP. This includes a number of exploration wells with wellheads not linked to the production systems.

Location and Operations

Angel platform and associated subsea infrastructure is situated in Production Licence WA-3-L and Pipeline Licence WA-14-PL (see **Figure 1**). The Lambert Deep and West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform and around 138 km north-west of Dampier in Permit Area WA-16-L. The Lambert West well is currently proposed to be developed within approximately 300m from the Lambert Deep well, and tied in to the subsea infrastructure via Lambert Deep.

Until late 2020 gas and condensate were produced from the Angel field via three wells tied back to the Angel Facility by rigid flowlines. The wells were shut in following high water cut and are currently being monitored while decommissioning planning and associated EP development and assessment of long-term management plans for the wells is undertaken.

Angel topsides processing equipment and subsea infrastructure were subsequently placed in preservation mode, with topsides processing equipment recommissioned at the start-up of the Lambert Deep well tie-back in 2022. Dry gas and condensate is currently produced from the Lambert Deep reservoirs. Production will continue, and once commissioned, dry gas and condensate from the Lambert West well will also be processed via the single train on the Angel facility. Condensate and gas will be comingled for export and transport along a 49 km export pipeline to the North Rankin Complex (NRC) and then to Karratha Gas Plant (KGP) for processing via one of the North West Shelf (NWS) Project's trunklines.

The Angel platform is a not normally manned facility, with the subsea system and processing equipment typically controlled from the NRC via an integrated power and control cable.

Table 1 summarises the project activities, which will be managed under the Angel Facility Operations EP.

Proposed Activity Overview – Production/Operations

The production scope of the EP includes the following activities to be undertaken during the next five year operational period for Angel:

- Routine production and operations;
- Routine inspection, monitoring, maintenance and repair (IMMR) activities; and
- Non-routine and unplanned activities and incidents associated with the above.

Production

Production commenced from the Lambert Deep reservoir in Q3 2022. Production is planned to commence from the Lambert West reservoir in 2025 following construction and commissioning of the LDA-02 well and associated subsea infrastructure in late 2024/early 2025.

Inspection

Inspection of infrastructure is the process of physical verification and assessment of subsea components in order 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.

Decommissioning

The subsea infrastructure tying the three Angel wells back to the Angel facility are to be flushed of hydrocarbons. This will be completed in preparation for the permanent plugging for abandonment of the three wells, which will be the subject of a separate Environment Plan. Following plugging and abandonment the associated subsea infrastructure is to be decommissioned, with these activities also proposed to be covered under separate Environment Plans.

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 emergency.

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 new gas from the previously unproduced Lambert West field to the Angel platform, and on for processing utilizing spare capacity at KGP. This includes directly installing infrastructure from the installation vessels 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 Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth;
- Install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system;
- Disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth;
- Conduct 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 Lambert West well (LDA-02) 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 Q3 2024, subsea installation in Q4 2024, and commissioning activities are currently anticipated in H1 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 Lambert West drilling and tie-back will be performed using a moored or hybrid (DP/moored) mobile offshore drilling unit (MODU). During the subsea installation campaign, a construction / installation primary 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 expected to take around 50 to 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 four weeks. Drilling and installation of subsea infrastructure may be performed over multiple campaigns.

The support and installation vessels will operate on dynamic positioning (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 Angel is marked on nautical charts and is surrounded by a 500 m radius petroleum safety zone (PSZ). A 4.5 km radius Operational Area will be applied around the Lambert West 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 but should take care when entering the Operational Area 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. A number of mitigation and management measures will be implemented and are summarised in **Table 2**. Further details will be provided in the EP.

In preparing the EP, Woodside's intent is to minimize environmental and social impacts associated with the proposed activities, and Woodside is seeking any interest or comments you may have to inform Woodside's decision making.

Joint Venture

Woodside is the Titleholder for this activity, on behalf of the NWS Joint Venture including Woodside Energy Ltd, BP Developments Australia Pty Ltd, Chevron Australia Pty Ltd, Japan Australia LNG (MIMI) Pty Ltd, CNOOC NWS Private Ltd and Shell Australia Pty Ltd.

We welcome your feedback by 7 July 2023.

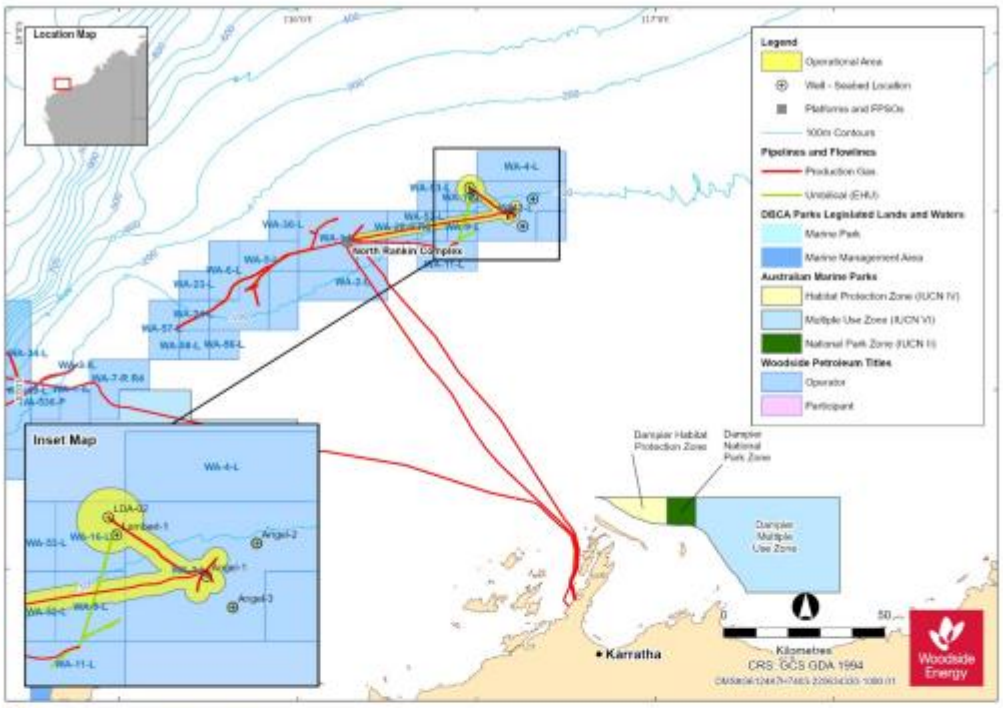


Figure 1. Petroleum Activity Program Operational Areas

Table 1. Activity Summary

Angel Operations Facility Environment Plan	
Facility type	• Fixed platform, processing equipment, pipelines.
Production License Areas	• WA-3-L, WA-16-L
Pipeline Licenses	• WA-14-PL, WA-31-PL
Approximate water depth	• ~ 70 – 130 m
Activities Summary	Routine Operations: • Routine production and operations (Lambert Deep, LDA-01; incorporation of Lambert West, LDA-02 following drilling and tie-back). • Routine inspection, monitoring, maintenance and repair (IMMR) activities. • Non-routine and unplanned activities and incidents associated with the above. Lambert West Drilling and Tie-back: • Drill one new well (LDA-02) in the Lambert West (LW) field. • Installation of a subsea distribution unit, flexible flowline and flying leads and disconnection of the existing LDA-01 well flying leads from the Lambert Deep Umbilical Termination Assembly reconnecting it to the subsea distribution unit. • Pre-commissioning and commissioning activities.
Infrastructure	• Wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals, and explorations wells with wellhead (see **Table 2**)
Vessels	• Moored MODU, DP MODU or hybrid moored/DP MODU (required for Lambert West drilling) • Primary Installation Vessel (required for Lambert West subsea installation). • Inspection, Monitor, Maintenance and Repair (IMMR) 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.
Key dates	Routine Operations: • Ongoing Lambert West Drilling and Tie-Back: • Drilling is currently anticipated in Q3 2024. • Subsea installation is currently anticipated to commence when the relevant wells have been drilled in Q4 2024 / Q1 2025. • Pre-commissioning and commissioning activities are currently anticipated to commence in H1 2025.

Angel Operations Facility Environment Plan	
Approximate duration of Lambert West drilling and tie-back	• Drilling: Activities are currently anticipated to take around 50 - 60 days per well to complete. • Subsea installation: Activities are currently anticipated to have a cumulative duration of around four 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	Routine Operations: • The Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility • the export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC ITL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure • Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure • Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1500m around the subsea infrastructure • Exploration wells with wellheads and an area of 500 m around each wellhead. Lambert West Drilling and Tie-Back: • The Operational Area includes a radius of 4500 m from the Lambert Deep Manifold 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	• - 126 km north-north-west of Dampier
Distance to nearest marine park/nature reserve	• - 55 km north of the Montebello Marine Park – Multiple Use Zone (Cwlth)

Table 2. Approximate locations of key infrastructure related to the Angel Facility Operations Petroleum Activity Program

Structure	Water Depth (m)	Latitude[1]	Longitude	Exclusion Zone	Permit Area
Production Wells					
LDA-01	130 m	19° 26' 07.220" S	116° 28' 51.314" E		WA-16-L
LDA-02[2]	130 m	19o 26' 2.3" S	116o 28' 51.3" E		WA-16-L
Production Wells (shut-in)					
AP2 well	80 m	19° 28' 59.7433" S	116° 36' 37.4083" E		WA-3-L
AP3 well	80 m	19° 30' 38.5126" S	116° 36' 18.5726" E		WA-3-L
AP4 well	80 m	19° 31' 18.1097" S	116° 35' 13.4346" E		WA-3-L
Exploration wells with Wellhead					
Angel-1	91 m	19° 30' 14.901" S	116° 35' 52.545" E		WA-3-L
Angel-2	88 m	19° 27' 53.638" S	116° 39' 29.501" E		WA-3-L
Lambert-1	127 m	19° 27' 18.163" S	116° 29' 27.442" E		WA-16-L
Production subsea infrastructure					
Angel Platform	80 m	19° 29' 55.144" S	116° 35' 53.066" E	500 m radius - Petroleum Safety Zone	WA-3-L
Angel export pipeline	80 m (Angel) 125 m (NRC)	19° 29' 54.72169" S (Angel) 19° 35' 11.11086" S (NRC)	116° 35' 52.9073" E (Angel) 116 ° 8 ' 23.9984" E (NRC)		WA-14-PL
LDA manifold	130 m	19° 26' 15.029" S	116° 29' 28.721" E	500 m radius temporary safety exclusion zone[3]	WA-16-L
LD flowline	80 m (platform) 130 m (well)	19° 19' 53.70" (platform) 19° 26' 10.95" S (well)	116° 35' 52.21" E (platform) 116° 28' 57.02" E (well)		WA-31-PL
LD umbilical	80 m (platform) 129 m (well)	19° 29' 53.91" S (platform) 19° 26' 8.84" S (well)	116° 35' 52.29" E (platform) 116° 28' 52.69" E (well)		WA-16-L and WA-3-L
AP2 umbilical	80 m (platform) 84 m (well)	19° 29' 53.97" S (platform) 19° 28' 59.71" S (well)	116° 35' 52.49" E (platform) 116° 36' 37.38" E (well)		WA-3-L

Structure	Water Depth (m)	Latitude[1]	Longitude	Exclusion Zone	Permit Area
AP3 umbilical	80 m (platform) 78 m (well)	19° 29' 53.91" S (platform) 19° 30' 38.96" S (well)	116° 35' 52.68" E (platform) 116° 36' 18.57" E (well)		WA-3-L
AP4 umbilical	80 m (platform) 77 m (well)	19° 29' 55.46" S (platform) 19° 31'18.56" S (well)	116° 35' 52.17" E (platform) 116° 35' 13.40" E (well)		WA-3-L
Shut-in subsea infrastructure					
AP2 Flowline	80 m (platform) 84m (well)	19° 29'52.95" S (platform) 19° 28' 59.06" S (well)	116° 35' 51.23" E (platform) 116° 36' 36.67" E (well)		WA-3-L
AP3 Flowline	83 m (platform) 80m (well)	19° 29' 53.39" S (platform) 19° 30' 37.28" S (well)	116° 35' 54.75" E (platform) 116° 36' 19.43" E(well)		WA-3-L
AP4 Flowline	82 m (platform) 80m (well)	19° 29' 54.30" S (platform) 19° 31' 17.32" S (well)	116° 35' 50.08" E (platform) 116° 35' 12.78" E (well)		WA-3-L

1 Datum: GDA94 MGA50
2 Well location may vary but will be within 500m of the LDA manifold
3 Exclusion zone applies to mobile offshore drilling unit and installation vessel during Lambert West drilling and tie-back activities only

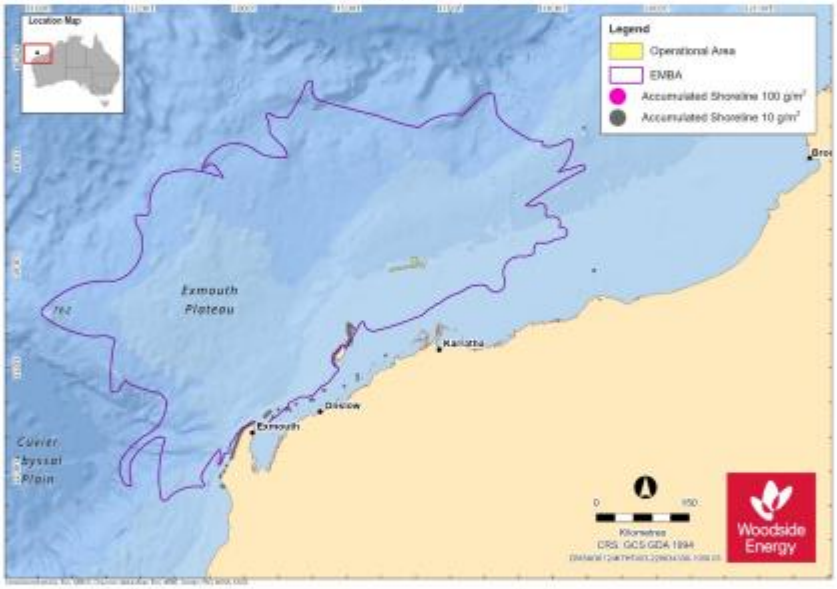


Figure 2 Environment that May Be Affected by the Angel Facility Operations Petroleum Activities Program including Lambert West drilling and tie-back

Environment That May Be Affected (EMBA)

The environment that may be affected (EMBA) is the largest spatial extent where Angel Facility Operations (including Lambert West drilling and tie-back activities) could potentially have an environmental consequence (direct or indirect impact). The broadest extent of the EMBA takes into consideration planned and unplanned activities, and for this EP is determined by a highly unlikely release of hydrocarbons to the environment as a result of well loss of integrity and a vessel collision. This is depicted in **Figure 2**.

The EMBA does not represent the extent of predicted impact of the highly unlikely hydrocarbon release. Rather, the EMBA represents the merged area of many possible paths a hydrocarbon release could travel 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 entire EMBA will not be affected and the specific and minimal part of the EMBA that is affected will only be known at the time of the release.

For this EP Woodside has defined the EMBA by combining the potential spatial extent of surface and in-water (dissolved and entrained) hydrocarbons, resulting from a worst-case credible spill, loss of well integrity, and vessel collision.

Mitigation and Management Measures

Woodside has undertaken an assessment to identify potential impacts and risks to the marine environment arising from the proposed activities considering timing, duration, location. A number of 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 Angel Facility Operations, including Lambert West drilling and tie-back.

Potential Impact/ Risk	Description of Source of Potential Impact/ Risk	Description of Potential Impacts	Preliminary Draft Mitigation and/ or Management Measure
Planned Activities (Routine and Non-routine)			

Physical Presence: Interaction with Other Marine Users	**Operations**
	Presence of the Angel facility and subsea infrastructure excluding and/or displacing other users from Petroleum Safety Zone (PSZ) and routine/IMMR activities within in the Operational Area respectively.
	
	Drilling and Tie-back Activities
	Physical presence of anchor system (incl buoy), mobile offshore drilling unit (MODU), support vessels, anchor handling vessels, installation vessels, and associated safety exclusion zones.
	Physical presence of subsea infrastructure
		Operations
		Potential isolated social impact potentially resulting from interference 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 and commercial shipping vessels.
			• Establish a 500 m safety exclusion zone around MODU and the installation vessel which is communicated to marine users.
			• Notify the Australian Hydrographic Office (AHO) prior to commencement of the activity to enable them to update maritime charts ensuring marine users are aware of the activity.
			• Continued consultation relating to the Petroleum Activities Program.
			• The Angel facility is equipped with navigational aids, including an automatic identification system (AIS) transponder and radar during manned periods reporting to the NRC Central Control Room providing collision avoidance alarms during manned conditions.
			• Lighting and sound signals are also provided in compliance with International Association of Lighthouse Authorities (IALA) identification of offshore facilities.
			• 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 Angel facility and subsea infrastructure modifying marine habitats. Subsea operations, inspection, maintenance and repair activities including installation of pig receivers at the subsea wells resulting in disturbance to seabed. Presence of redundant infrastructure remaining infield until Facility EOFL. **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 PAA. **Drilling and Tie-back Activities** Loss or damage to benthic habitats, including benthic communities and marine primary producers.	• Infrastructure will be placed on the seabed within the predefined design footprint using positioning technology to limit seabed disturbance. • Infrastructure wet parked (temporarily placed) on the seabed will be tracked and removed. • Well site locations consider seabed sensitivities. • Updating locations of subsea infrastructure. • Adhere to Woodside internal guidance and procedures. • Mooring systems (chains/wires and anchors) to be removed • Impacts to cultural heritage areas or prospective areas to be avoided and/ or mitigated in accordance with Woodside's First Nations Communities Policy. • Comply with regulatory requirements for Underwater Cultural Heritage. • Positioning technology used for equipment placement
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 Angel platform.	• Comply with regulatory requirements for interactions with marine fauna to prevent adverse interactions. • Implement an adaptive management procedure prior to and during MODU and installation vessel moves. • Cetacean and whale shark sightings will be reported to support greater environmental knowledge. • Woodside internal guidance and procedures are adhered to.

Potential Impact/ Risk	Description of Source of Potential Impact/ Risk	Description of Potential Impacts	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 an adaptive management procedure prior to and during MODU and installation vessel moves. • Cetacean and whale shark sightings will be reported to support greater environmental knowledge. • Woodside internal guidance and procedures are adhered to.

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.
			• 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. • 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 vessels, MODU and riser platform to the marine environment. Discharge of deck, bilge and drain water from vessels, MODU and facility to the marine environment. Discharge brine and cooling water from MODU and 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** Negligible, localised increase in salinity at the discharge location. Potential slight, localised increase in water temperature, and short-term water quality changes around discharge location. **Drilling and Tie-back Activities** Impacts to water quality through localise eutrophication of the water column a localise adverse effects to marine biota.	• 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 potential for loss of primary containment of oil and chemicals on the MODU, deck drainage to be collected via a closed drainage system. E.g. drill floor.

Potential Impact/ Risk	Description of Source of Potential Impact/ Risk	Description of Potential Impacts	Preliminary Draft Mitigation and/ or Management Measure
Routine and Non-routine Emissions	**Operations** Operational flaring, fugitive emissions Operational emissions associated with energy generation at NRC, onshore processing of Angel 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. • Manage vessel speed to reduce fuel combustion where reasonably practicable.
Routine Light Emissions: Light Emissions from Riser 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 in close proximity to Angel platform and vessels including fish, marine reptiles and seabirds.	• Lighting limited to the minimum required for navigational and safety requirements, except for emergency events. • Flaring restricted to a duration necessary to achieve the well objectives, eliminating unnecessary flared volumes and corresponding light emissions. • Implementation of the Woodside Seabird Management Plan.

Routine and Non-Routine Discharges: Drill Cuttings, Drilling Fluids and Well Removal Fluids	Routine discharge of water based muds (WBM) drill cuttings to the seabed and the marine environment.
	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 BM 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 intended or likely to be discharged into the marine environment reduced to ALARP using 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
			  • Oil % content in displacement, brine, workover or intervention fluids, pit and tank wash
			  • PTW system
			  • Chemical Selection and Assessment
			  • Solid Control Equipment
			  • Discharge below water line
			  • Woodside Engineering Standard for Rig Equipment.

Potential Impact/ Risk	Description of Source of Potential Impact/ Risk	Description of Potential Impacts	Preliminary Draft Mitigation and/ or Management Measure
Routine and Non-Routine Discharges: Cement, Cementing Fluids, Subsea Well Fluids, Unused Bulk Product and Subsea Chemicals	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 intended or likely to be discharged into the marine environment reduced to ALARP using Woodside's 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 filtration treatment package prior to discharge to the environment. • No bulk cement, bentonite or barite will be discharged without a documented environmental assessment.
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** • Wells drilled 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 Preparation document (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. • Potential moderate short-term impacts to the marine environment: Including disruption to marine fauna, including protected species and/or impacts to water quality.	**Preventing loss of pipeline and riser containment** • The pipeline, flowline and riser design includes a range of measures that specifically aid in minimising the risk of external damage • Checks completed during well operations to establish a minimum acceptable standard of well integrity. • ROV inspections of trunklines and other subsea equipment (e.g. subsea isolation valves [SSIVs]). • Pressure, temperature and flow rates are continually monitored and recorded • Relevant maintenance and operating procedures • For subsea IMMR activities, the Woodside Engineering Standard – Subsea Isolation **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	Preliminary Draft Mitigation and/ or Management Measure

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.
	Marine environment footprint and associated hydrocarbon and chemical release associated with structural collapse of riser platform.
		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
			• The pipeline, flowline and riser design includes a range of measures that specifically aid in minimising the risk of external damage
			• Checks completed during well operations to establish a minimum acceptable standard of well integrity.
			• ROV inspections of trunklines and other subsea equipment (e.g. SSIVs).
			• Pressure, temperature and flow rates are continually monitored and recorded
			• designed to withstand extreme and abnormal environmental loading;
			• Design specification to protect against fire and blast;
			• Material selection to protect against corrosion; and
			• Substructure maintenance includes marine growth.
			• Relevant Performance Standards adhered to
			• Other operational control measures in place to prevent a loss of structural integrity of the Angel facility, which are in accordance with good oilfield practice include:
			  • Ongoing process and structural monitoring, inspection, planned maintenance and repair, to ensure process and structural integrity are maintained within the design envelope;
			  • Continuous monitoring of facilities' instrumentation, fire and gas detection systems and CCTV by the operators;
			  • Communication with approaching vessels
			  • Vessels entering the 500 m petroleum safety zone (PSZ) are managed in accordance with the facility operating procedures; and
			  • Helicopters visit the facility during daylight hours only, unless required for a high-priority reason (usually restricted to serious injury of operations personnel requiring urgent medivac).
			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	Preliminary Draft Mitigation and/ or Management Measure

Unplanned Hydrocarbon Release: Loss of Marine Vessel Separation	A loss of marine vessel separation between a vessel and the riser platform may result in a loss of hydrocarbon containment from the Angel facility and/or the release of fuel from the vessel.
	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.
	Marine environment footprint and associated hydrocarbon and chemical release associated with structural collapse of riser platform.
	Surface release from support vessel diesel tank.
		Potential significant impacts to the marine environment:
		• Short to medium term impacts to the offshore 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
			• Compliance with the accepted plans including implementation of barriers to prevent a loss of marine vessel separation
			• Relevant Performance Standards.
			• Other operational control measures in place to prevent a loss of marine vessel separation from the Angel facility, which are in accordance with good oilfield and marine practice include:
			  • The Angel facility and support vessels are equipped with navigation aids and competent crew maintaining 24 hour visual (CCTV), radio and radar watch during manned periods;
			  • Support vessels use approved navigation systems and depth sounders;
			  • Adherence to standard maritime safety/navigation procedures;
			  • Woodside has a marine assurance process in place to ensure contracted vessels are in class and suitable for the intended purpose; and
			  • In the event of a vessel collision leading to loss of containment, fuel tanks are interconnected allowing for transfer between tanks to minimise the quantity released.
			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.
			• Adhere to relevant guidelines and codes

Unplanned Hydrocarbon Release: Topsides Loss of Containment	Hydrocarbon release from topsides process equipment to the marine environment and atmosphere.	Potential moderate short term impacts to the marine environment: Including disruption to marine fauna, including protected species and/or impacts to water quality. 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. • 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.

Potential Impact/ Risk	Description of Source of Potential Impact/ Risk	Description of Potential Impacts	Preliminary Draft Mitigation and/ or Management Measure
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 moderate short-term impacts to the marine environment: Including disruption to marine fauna, including protected species and/or impacts to water quality.	**Preventing loss of control of suspended load** • Comply with regulatory requirements for the prevention of vessel collisions and safety and emergency arrangements. • The platform cranes include a range of measures that specifically aid in minimising the risk of external damage. • Relevant Performance Standards as identified and implemented.
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 impacts to marine biota, a decline in water quality and oiling of marine megafauna resulting in effects on a range of receptors including biological, physical and social receptors.	**Preventing loss of well control** • 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. • First strike plan • Emergency response activities would be implemented in line with the OPEP
Unplanned Hydrocarbon Release: Vessel Collision	Loss of hydrocarbons to marine environment due to a vessel collision (e.g. project vessels or other marine users).	Impacts may result in impacts on marine biota, a decline in water quality and oiling of mega fauna with the potential to effect the on a broad range of receptors.	**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. • Notify AHO of vessel locations and activities for MODU and installation vessel • Notify fisheries in accordance with stakeholder notification requirements of vessel locations and activities • Notify AMSA of vessel locations and activities • Marine Diesel Oil (MDO) fuel to be used • Where required Simops plan to manage vessel movements **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 • First strike plan

Potential Impact/ Risk	Description of Source of Potential Impact/ Risk	Description of Potential Impacts	Preliminary Draft Mitigation and/ or Management Measure
Unplanned Hydrocarbon Release: Loss of well suspension integrity	Well barrier failure prior to installation of Xmas tree. Undetected or chance detected low rate leak <6 months).	Potential localised impacts on marine biota on benthic communities, marine mammals, reptiles, fish and marine primary producers. Short term decreases in water quality.	**Preventing loss of well control** • 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. • First strike plan
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 minor short-term impacts to the marine environment: Including disruption to marine fauna, including protected species and/or temporary impacts to water quality.	**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.	Localised impacts to marine biota and a decline in water quality with potential effects to the following receptors including fish, marine mammals and reptiles as well as marine primary producers.	• 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 the vessel (near potential spill points such as transfer stations). • Chemicals will be 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	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.	• Impacts may be felt on marine biota, a decline in water quality, potentially impacting benthic communities, fish, marine mammals, reptiles and marine primary producers.	• Chemicals will be selected with the lowest reasonably practicable environmental impacts and risks subject to technical constraints and approved through the Woodside chemical assessment process.
			• Deck drainage collected via a closed drainage system where there is a potential for loss of primary containment of oil and chemicals on the MODU.
			• No overboard disposal of bulk NWBM.
			• Compliance with Contractor procedures for the management of drilling fluids to reduce the likelihood and potential severity of a spill
			• Other controls may include:
			  • Oil % content in displacement, brine, workover or intervention fluids, pit and tank wash
			  • PTW system
			  • Chemical Selection and Assessment
			  • Solid Control Equipment
			  • Discharge below water line

Unplanned Discharges: Hazardous and Non-Hazardous Waste Management	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.	• Comply with regulatory requirements for the prevention of marine pollution and handling of hazardous wastes. • Implement waste management procedures which provide 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. • Compliance with Woodside Environmental Performance Operating Standard

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.
		Localised impact to benthic habitat (filter feeding community) as well as potential seabed infrastructure damage.	• MODU/installation vessel inductions include control measures for dropped object prevention.
			• Dropped objects to be recovered and relocated 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.
			• Other controls may include:
			  • Station keeping requirements
			  • Mooring analysis
			  • Woodside Well Location and Site Appraisal Data Sheet (WLSADS) which informs the MODU mooring locations selection.
			  • Mooring failure risk assessment & design documentation
			  • Installation acceptance criteria
			  • Cyclone contingency plan
			  • Emergency response procedures
			  • Designed exclusion zones for mooring line placement
			  • Safe lifting zones
			  • Installation procedures
			  • Attempt recovery of object if safe and practical to do
			  • MODU / vessel Work Procedures
			  • MODU / vessel Inductions
			  • Dropped object studies

Potential Impact/ Risk	Description of Source of Potential Impact/ Risk	Description of Potential Impacts	Preliminary Draft Mitigation and/ or Management Measure
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, out competed 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 **7 July 2023** 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:

www.woodside.com/sustainability/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 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 activity, which will be submitted to the NOPSEMA for acceptance in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009* (Cth) or the *Petroleum (Submerged Lands) (Environment) Regulations 2009* (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

1.2 Summary Consultation Information Sheet

Woodside Energy

CONSULTATION

INFORMATION SHEET

June 2023

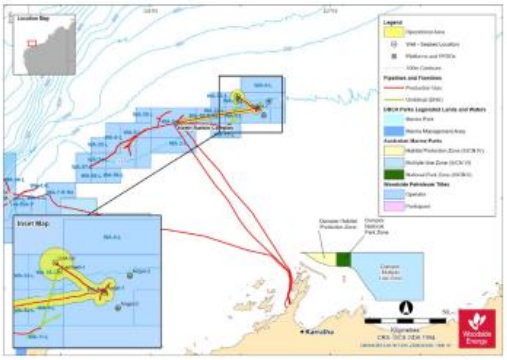
ANGEL FACILITY OPERATIONS

This is a summary of the activity in plain English. More detailed information is included in the Activity Update – Angel Facility Operations Environment Plan (EP) Information Sheet.

Overview

Woodside is revising and will resubmit the Angel Facility Operations EP to integrate drilling, subsea installation, commissioning, and production from a new natural gas production well named LDA-02 located in the Lambert West gas field. LDA-02 will connect to Woodside's existing subsea production system and offshore platform, the North Rankin Complex, located approximately 126 km north-north-west of Dampier. Woodside is planning to start this work in 2024 upon government acceptance of the EP.

The activities described above are planned to occur in defined operational areas. A map of the location of the operational areas is shown below.



Work Program

Production

Production at the Angel Facility commenced in 2022 and will be ongoing. Production is planned to commence from LDA-02 in 2025, following construction and commissioning of this new production well and associated subsea infrastructure.

Monitoring and Inspection

Woodside plans to continue to monitor and inspect subsea infrastructure for changes on an ongoing basis. Various techniques may be used for this including remote monitoring and visual inspection from submersible vessels for example.

Maintenance and Repair

Maintenance of infrastructure is required at regular planned intervals, and otherwise as required, to keep equipment in good condition and to prevent its deterioration or failure. There are many maintenance and repair activities including opening and closing of valves and leak pressure testing.

Drilling and installation activities will occur around 2024–2025 and will include the following:

Drilling

To install the LDA-02 production well, Woodside intends to conduct inspections and monitor the sea floor, drill the holes for the well, and then install the well. Large vessels and support boats will be used to do this work, and a large offshore drilling rig. LDA-02 is in about 130 m of water and the drilling program to establish LDA-02 is expected to take approximately 60 days to complete.

Subsea installation and commissioning

After drilling and installing the LDA-02 well, Woodside plans to install new subsea equipment to connect the LDA-02 to existing pipelines and infrastructure on the sea floor. The new equipment will be tested and prepared before the natural gas will be gradually introduced to the Angel Facility for production.

Subsea installation and commissioning activities are expected to take approximately 30 days to complete.

Project vessels

The drilling activity will be performed by a semi-submersible mobile offshore drilling unit (MODU), otherwise known as a drilling rig. MODU moorings may be pre-installed up to three months prior to MODU arrival on location. The installation of equipment on the seabed is planned to be undertaken by a large subsea construction and installation vessel. Up to three other support vessels may be required to support the activity.

Operations support vessels will be used to undertake inspection, maintenance, monitoring and repair (IMMR) of subsea infrastructure on an ongoing basis. The vessel size and type will depend on the work scope. The vessels will not anchor during IMMR activities unless in an emergency.

Commercial fishers and other marine users are allowed to enter the operational area, but temporary exclusion zones of 500 m in radius will be in place around Woodside's vessels during some work activities.

Environmental Impacts and Management

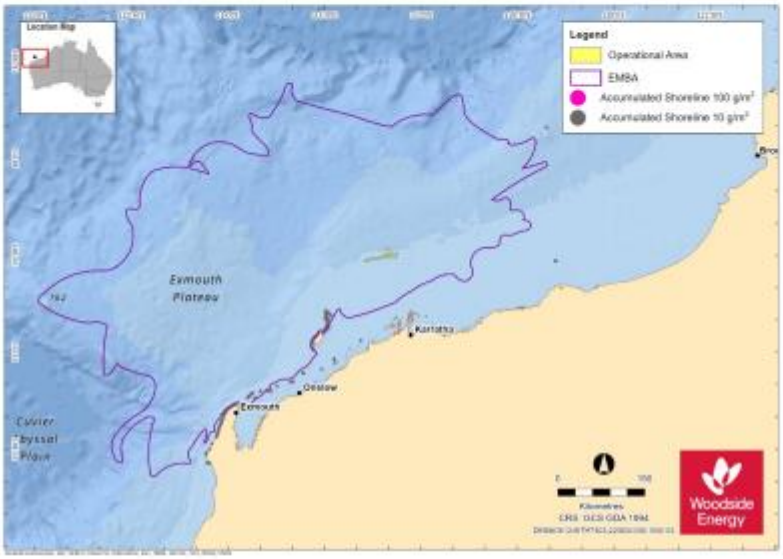
This work program includes planned activities but may also result in unplanned events. Both planned activities and unplanned events may impact the environment. Woodside manages the work program to reduce impacts and risks to as low as reasonably practicable.

Planned activities are activities that Woodside knows will happen as part of this work program. For example, planned activities include other marine users being temporarily stopped from accessing the work area, and the marine vessels and drill rig used for the work may disturb the seabed, generate noise, light emissions, atmospheric emissions, and routine discharges (such as sewage, waste, and deck drainage), and other authorised waste.

Unplanned events are not planned as part of the work program, but may be the result of an accident, incident, or emergency. It is highly unlikely that there will be an unplanned event. Unplanned events might include a spill of fuel or oil, a release of hydrocarbons from the well, a spill on the deck of a vessel (such as during refuelling), unplanned seabed disturbance, accidental collision with marine animals, waste entering the environment and accidental introduction of invasive species from outside the region. Management measures will be in place to reduce the likelihood and impacts of these unplanned activities to as low as practicable.

A table showing planned activities and unplanned events, potential impacts, and management measures for each is included in the Angel Facility Operations Environment Plan Information Sheet in Table 3 that is attached and available at www.woodside.com/docs/default-source/current-consultation-activities/lambert-west.pdf?sfvrsn=a161f003_12.

The total area over which unplanned events could have environmental impacts is shown in the map below. This is referred to as the environment that may be affected (EMBA), which is predicted using computer modelling. The location in which the Angel Facility Operations activities will occur, known as the Operational Area, is also shown on the map below. In the highly unlikely event such as a fuel spill from a vessel collision or a release of hydrocarbons from the well while drilling, the entire EMBA will not be affected. The part of the EMBA that is affected will only be known at the time of the event and will depend on several variables, such as the direction and strength of the wind, tide, and currents for example. Locations where oil may build up and contact the shoreline if there is an unplanned event are shown on the map below as 'Accumulated Shoreline'.



Providing Feedback

If you have an interest in the area of the "environment that may be affected" (EMBA) by this work program, would like more information, have any concerns and / or any suggestions for how Woodside can minimise potential environmental impacts you can tell Woodside by calling 1800 442 977 or send an email to Feedback@woodside.com.au. Please also tell Woodside if you know anyone else, or any organisation, who may be interested in these matters and feel free to pass this information to them.

If you would prefer to speak to the government directly, they can be contacted on +61 (0)8 6188 8700 or send an email to communications@nopsema.gov.au.

Conclusion

Woodside produces energy that Western Australia, Australia, and the world needs. Woodside has made this energy from its oil and gas projects in Western Australia for over 35 years safely, reliably, and without any major environmental incident. Woodside is very proud of this legacy.

There are always potential risks with activities like this. Woodside has carefully planned this work program so that the risk of environmental impact is reduced to as low as reasonably practicable and of an acceptable level. There are also strict government laws in place to protect the environment. Woodside complies with these laws and has systems in place to keep following these laws and rules for each project it undertakes.

If you would like information about Woodside's work to study and care for the environment, you can find it at www.woodside.com/sustainability/environment.

Further Information

The more detailed Information Sheet for this proposed activity can be found on Woodside's website at www.woodside.com/sustainability/consultation-activities. Please also contact Woodside directly on the details above and visit Woodside's website for further information about the company, its projects and environmental management.

1.3 Email sent to Australian Border Force (ABF), Department of Industry, Science and Resources (DISR), Department of Transport (DoT), Australian Petroleum Production and Exploration Association (APPEA), Department of Biodiversity, Conservation and Attractions (DBCA), Department of Mines, Industry Regulation and Safety (DMIRS), Protect Ningaloo (22 June 2023)

Dear Stakeholder

Woodside is planning to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Following recent 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, the broadest extent of the EMBA has been determined by the highly unlikely event of a hydrocarbon release from activities within the scope the EP. The worst-case credible spill scenario for this EP is a well loss of integrity.

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.

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.

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 **22 July 2023**.

Activity: Angel Facility Operations Environment Plan

Angel Facility Operations Environment Plan	
Summary	Routine Operations: • Routine production and operations (Lambert Deep, LDA-01; incorporation of Lambert West, LDA-02 following drilling and tie-back). • Routine inspection, monitoring, maintenance and repair (IMMR) activities. • Non-routine and unplanned activities and incidents associated with the above. Lambert West Drilling and Tie-back: • Drill one new well (LDA-02) in the Lambert West (LW) field. • Installation of a subsea distribution unit, flexible flowline and flying leads and disconnection of the existing LDA-01 well flying leads from the Lambert Deep Umbilical Termination Assembly reconnecting it to the subsea distribution unit. • Pre-commissioning and commissioning activities
Permit Area	Activities will occur predominantly within the WA-3-L and WA-16-L title areas and the Pipeline licence areas within WA-14-PL and WA-31-PL.
Location	~ 126 km north-north-west of Dampier
Approx. Water Depth (m)	~ 70 – 130 m
Schedule	Routine Operations: • Ongoing Lambert West Drilling and Tie-Back: • Drilling is currently anticipated in Q3 2024, subject to EP approval. • Subsea installation is currently anticipated to commence when the relevant wells have been drilled in Q4 2024 / Q1 2025, subject to EP approval. • Pre-commissioning and commissioning activities are currently anticipated to commence in H1 2025, subject to EP approval.

Approx. Estimated Duration	Drilling: • Activities are currently anticipated to take approximately 50 - 60 days per well to complete. Subsea installation and commissioning: • Activities are currently anticipated to have a cumulative duration of around four 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.
Exclusionary/ Cautionary Zone	Routine Operations: 1. The Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility 2. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure 3. Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure 4. Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1,500m around the subsea infrastructure 5. Exploration wells with wellheads and an area of 500 m around each wellhead. Lambert West Drilling and Tie-Back: 6. The Operational Area includes a radius of 4,500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities. 7. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	• Wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals, and explorations wells with wellhead
Vessels	• Moored MODU, DP MODU or hybrid moored/DP MODU • Primary Installation Vessel • Inspection, Monitor, Maintenance and Repair (IMMR) Vessel • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and general supply/support 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 **22 July 2023.**

Your feedback and our response will be included in our Environment Plan 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 2009* (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

Regards,

1.3.1 Email sent to Australian Border Force (ABF), Department of Industry, Science and Resources (DISR), Department of Transport (DoT), Australian Petroleum Production and Exploration Association (APPEA), Department of Biodiversity, Conservation and Attractions (DBCA), Department of Mines, Industry Regulation and Safety (DMIRS), Protect Ningaloo (22 June 2023)

Dear Stakeholder,

Apologies – now with the correct information sheet attached.

Regards,

Woodside Feedback

Woodside Energy
Mia Yellagonga
Karlak, 11 Mount Street
Perth WA 6000
Australia

T: 1800 442 977
E: feedback@woodside.com.au
www.woodside.com

1.4 Email sent to Ningaloo Coast World Heritage Advisory Committee (NCWHAC) (22 June 2023)

Dear [redacted]

Woodside is planning to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing

Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Following recent 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, the broadest extent of the EMBA has been determined by the highly unlikely event of a hydrocarbon release from activities within the scope the EP. The worst-case credible spill scenario for this EP is a well loss of integrity.

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.

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.

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 **22 July 2023**.

Activity: Angel Facility Operations Environment Plan

Angel Facility Operations Environment Plan	
Summary	Routine Operations: • Routine production and operations (Lambert Deep, LDA-01; incorporation of Lambert West, LDA-02 following drilling and tie-back). • Routine inspection, monitoring, maintenance and repair (IMMR) activities. • Non-routine and unplanned activities and incidents associated with the above.

	Lambert West Drilling and Tie-back: • Drill one new well (LDA-02) in the Lambert West (LW) field. • Installation of a subsea distribution unit, flexible flowline and flying leads and disconnection of the existing LDA-01 well flying leads from the Lambert Deep Umbilical Termination Assembly reconnecting it to the subsea distribution unit. • Pre-commissioning and commissioning activities
Permit Area	Activities will occur predominantly within the WA-3-L and WA-16-L title areas and the Pipeline licence areas within WA-14-PL and WA-31-PL.
Location	~ 126 km north-north-west of Dampier
Approx. Water Depth (m)	~ 70 – 130 m
Schedule	Routine Operations: • Ongoing Lambert West Drilling and Tie-Back: • Drilling is currently anticipated in Q3 2024, subject to EP approval. • Subsea installation is currently anticipated to commence when the relevant wells have been drilled in Q4 2024 / Q1 2025, subject to EP approval. • Pre-commissioning and commissioning activities are currently anticipated to commence in H1 2025, subject to EP approval.
Approx. Estimated Duration	Drilling: • Activities are currently anticipated to take approximately 50 - 60 days per well to complete. Subsea installation and commissioning: • Activities are currently anticipated to have a cumulative duration of around four 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.
Exclusionary/ Cautionary Zone	Routine Operations: 8. The Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility 9. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure 10. Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure 11. Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1,500m around the subsea infrastructure

	12. Exploration wells with wellheads and an area of 500 m around each wellhead. Lambert West Drilling and Tie-Back: 13. The Operational Area includes a radius of 4,500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities. 14. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	• Wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals, and explorations wells with wellhead
Vessels	• Moored MODU, DP MODU or hybrid moored/DP MODU • Primary Installation Vessel • Inspection, Monitor, Maintenance and Repair (IMMR) Vessel • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and general supply/support 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 **22 July 2023.**

Your feedback and our response will be included in our Environment Plan 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 2009* (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

Regards,

1.4.1 Email sent to Ningaloo Coast World Heritage Advisory Committee (NCWHAC) (22 June 2023)

Dear [redacted]

Apologies – now with the correct information sheet attached.

Regards,

Woodside Feedback

Woodside Energy
Mia Yellagonga
Karlak, 11 Mount Street
Perth WA 6000
Australia

T: 1800 442 977
E: feedback@woodside.com.au
www.woodside.com

1.5 Email sent to Department of Primary, Industries and Regional Development (DPIRD) (22 June 2023)

Dear [redacted] and [redacted]

Woodside is planning to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Exclusionary / Cautionary Zones

For the routine operation of the Angel Facility, the Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure.

For the Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure. For the Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1500m around the subsea infrastructure. The Exploration wells with wellheads and an area of 500 m around each wellhead.

For the Lambert West Drilling and Tie-Back the Operational Area includes a radius of 4500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities with a temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.

Following recent changes to Commonwealth EP consultation requirements, Woodside is now consulting persons or organisations whom are located within the environment that may be affected (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, the broadest extent of the EMBA has been determined by the highly unlikely event of a hydrocarbon release from activities within the scope the EP. The worst-case credible spill scenario for this EP is a well loss of integrity.

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.

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.

We have identified potential impacts to active commercial fishers and the environment, which are summarised below. We have endeavoured to reduce these risks to an as low as reasonably practicable level.

Fisheries have been identified as being relevant based on fishing licence overlap, assessment of government fishing effort data (including Fishcube and AFMA) from recent years, fishing methods and water depth.

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 **22 July 2023**.

Activity: Angel Facility Operations Environment Plan

Angel Facility Operations Environment Plan	
Summary	Routine Operations: • Routine production and operations (Lambert Deep, LDA-01; incorporation of Lambert West, LDA-02 following drilling and tie-back). • Routine inspection, monitoring, maintenance and repair (IMMR) activities. • Non-routine and unplanned activities and incidents associated with the above. Lambert West Drilling and Tie-back: • Drill one new well (LDA-02) in the Lambert West (LW) field.

	• Installation of a subsea distribution unit, flexible flowline and flying leads and disconnection of the existing LDA-01 well flying leads from the Lambert Deep Umbilical Termination Assembly reconnecting it to the subsea distribution unit. • Pre-commissioning and commissioning activities
Permit Area	Activities will occur predominantly within the WA-3-L and WA-16-L title areas and the Pipeline licence areas within WA-14-PL and WA-31-PL.
Location	~ 126 km north-north-west of Dampier
Approx. Water Depth (m)	~ 70 – 130 m
Schedule	Routine Operations: • Ongoing Lambert West Drilling and Tie-Back: • Drilling is currently anticipated in Q3 2024, subject to EP approval. • Subsea installation is currently anticipated to commence when the relevant wells have been drilled in Q4 2024 / Q1 2025, subject to EP approval. • Pre-commissioning and commissioning activities are currently anticipated to commence in H1 2025, subject to EP approval.
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Exclusionary/ Cautionary Zone	Routine Operations: 15. The Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility 16. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure 17. Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure 18. Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1,500m around the subsea infrastructure 19. Exploration wells with wellheads and an area of 500 m around each wellhead. Lambert West Drilling and Tie-Back:

	20. The Operational Area includes a radius of 4,500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities. 21. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	• Wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals, and explorations wells with wellhead
Vessels	• Moored MODU, DP MODU or hybrid moored/DP MODU • Primary Installation Vessel • Inspection, Monitor, Maintenance and Repair (IMMR) Vessel • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and general supply/support vessels
Relevant fisheries	**State fisheries** • **Operational Area:** Pilbara Trawl Fishery, Pilbara Trap Fishery and Pilbara Line Fishery • **EMBA:** Marine Aquarium Managed Fishery, Mackerel Managed Fishery (Area 2 and 3), Pilbara Crab Managed Fishery, West Coast Deep Sea Crustacean Managed Fishery, Specimen Shell Managed Fishery, Onslow Prawn Managed Fishery, Western Australian Sea Cucumber Fishery, Exmouth Gulf Prawn Managed Fishery, Nickol Bay Prawn Managed Fishery, Pilbara Trawl Fishery, Pilbara Trap Fishery and Pilbara Line Fishery

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 **22 July 2023**.

Your feedback and our response will be included in our Environment Plan 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 2009* (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

Regards,

1.5.1 Email sent to Department of Primary Industries and Regional Development (DPIRD) (22 June 2023)

Dear [redacted] and [redacted],

Apologies – now with the correct information sheet attached.

Regards,

Woodside Feedback

Woodside Energy
Mia Yellagonga
Karlak, 11 Mount Street
Perth WA 6000
Australia

T: 1800 442 977
E: feedback@woodside.com.au
www.woodside.com

1.6 Email sent to Western Gas, Exxon Mobil Australia Resources Company, Shell Australia, BP Developments Australia, Carnarvon Energy, PE Wheatstone, Kyushu Electric Wheatstone, Eni Australia, Vermillion Oil & Gas Australia, Finder Energy No 16, Jadestone, KUFPEC, Santos NA Energy Holdings / Santos Ltd / 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, Longreach Capital Investments / Beagle No. 1 Pty Ltd, INPEX Alpha, JX Nippon O&G Exploration (Australia), OPIC Australia, Dorado Petroleum (22 June 2023)

Dear Titleholder

Woodside is planning to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

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Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Following recent 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, the broadest extent of the EMBA has been determined by the highly unlikely event of a hydrocarbon release from activities within the scope the EP. The worst-case credible spill scenario for this EP is a well loss of integrity.

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.

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.

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 **22 July 2023**.

Activity: Angel Facility Operations Environment Plan

Angel Facility Operations Environment Plan	
Summary	Routine Operations: • Routine production and operations (Lambert Deep, LDA-01; incorporation of Lambert West, LDA-02 following drilling and tie-back). • Routine inspection, monitoring, maintenance and repair (IMMR) activities. • Non-routine and unplanned activities and incidents associated with the above. Lambert West Drilling and Tie-back: • Drill one new well (LDA-02) in the Lambert West (LW) field. • Installation of a subsea distribution unit, flexible flowline and flying leads and disconnection of the existing LDA-01 well flying leads from the Lambert Deep Umbilical Termination Assembly reconnecting it to the subsea distribution unit. • Pre-commissioning and commissioning activities
Permit Area	Activities will occur predominantly within the WA-3-L and WA-16-L title areas and the Pipeline licence areas within WA-14-PL and WA-31-PL.

Location	~ 126 km north-north-west of Dampier
Approx. Water Depth (m)	~ 70 – 130 m
Schedule	Routine Operations: • Ongoing Lambert West Drilling and Tie-Back: • Drilling is currently anticipated in Q3 2024, subject to EP approval. • Subsea installation is currently anticipated to commence when the relevant wells have been drilled in Q4 2024 / Q1 2025, subject to EP approval. • Pre-commissioning and commissioning activities are currently anticipated to commence in H1 2025, subject to EP approval.
Approx. Estimated Duration	Drilling: • Activities are currently anticipated to take approximately 50 - 60 days per well to complete. Subsea installation and commissioning: • Activities are currently anticipated to have a cumulative duration of around four 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.
Exclusionary/ Cautionary Zone	Routine Operations: 22. The Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility 23. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure 24. Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure 25. Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1,500m around the subsea infrastructure 26. Exploration wells with wellheads and an area of 500 m around each wellhead. Lambert West Drilling and Tie-Back: 27. The Operational Area includes a radius of 4,500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities. 28. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.

Infrastructure	• Wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals, and explorations wells with wellhead
Vessels	• Moored MODU, DP MODU or hybrid moored/DP MODU • Primary Installation Vessel • Inspection, Monitor, Maintenance and Repair (IMMR) Vessel • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and general supply/support 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 **22 July 2023.**

Your feedback and our response will be included in our Environment Plan 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 2009* (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

Regards,

1.7 Email sent to Chevron Australia Osaka Gas Gorgon, Tokyo Gas Gorgon, JERA Gorgon (22 June 2023)

Dear Chevron

Woodside is planning to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Following recent 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, the broadest extent of the EMBA has been determined by the highly unlikely event of a hydrocarbon release from activities within the scope the EP. The worst-case credible spill scenario for this EP is a well loss of integrity.

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.

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.

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 **22 July 2023**.

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.

Activity: Angel Facility Operations Environment Plan

Angel Facility Operations Environment Plan	
Summary	Routine Operations: • Routine production and operations (Lambert Deep, LDA-01; incorporation of Lambert West, LDA-02 following drilling and tie-back). • Routine inspection, monitoring, maintenance and repair (IMMR) activities. • Non-routine and unplanned activities and incidents associated with the above.

	Lambert West Drilling and Tie-back: • Drill one new well (LDA-02) in the Lambert West (LW) field. • Installation of a subsea distribution unit, flexible flowline and flying leads and disconnection of the existing LDA-01 well flying leads from the Lambert Deep Umbilical Termination Assembly reconnecting it to the subsea distribution unit. • Pre-commissioning and commissioning activities
Permit Area	Activities will occur predominantly within the WA-3-L and WA-16-L title areas and the Pipeline licence areas within WA-14-PL and WA-31-PL.
Location	~ 126 km north-north-west of Dampier
Approx. Water Depth (m)	~ 70 – 130 m
Schedule	Routine Operations: • Ongoing Lambert West Drilling and Tie-Back: • Drilling is currently anticipated in Q3 2024, subject to EP approval. • Subsea installation is currently anticipated to commence when the relevant wells have been drilled in Q4 2024 / Q1 2025, subject to EP approval. • Pre-commissioning and commissioning activities are currently anticipated to commence in H1 2025, subject to EP approval.
Approx. Estimated Duration	Drilling: • Activities are currently anticipated to take approximately 50 - 60 days per well to complete. Subsea installation and commissioning: • Activities are currently anticipated to have a cumulative duration of around four 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.
Exclusionary/ Cautionary Zone	Routine Operations: 29. The Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility 30. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure 31. Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure 32. Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1,500m around the subsea infrastructure

	33. Exploration wells with wellheads and an area of 500 m around each wellhead. Lambert West Drilling and Tie-Back: 34. The Operational Area includes a radius of 4,500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities. 35. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	• Wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals, and explorations wells with wellhead
Vessels	• Moored MODU, DP MODU or hybrid moored/DP MODU • Primary Installation Vessel • Inspection, Monitor, Maintenance and Repair (IMMR) Vessel • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and general supply/support 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 **22 July 2023**.

Your feedback and our response will be included in our Environment Plan 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 2009* (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

Regards,

1.8 Email sent to Australian Hydrographic Office (AHO), Australian Maritime Safety Authority (AMSA) – Marine Safety (22 June 2023)

Dear AHO / AMSA

Woodside is planning to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Environment that May Be Affected (EMBA)

Following recent 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, the broadest extent of the EMBA has been determined by the highly unlikely event of a hydrocarbon release from activities within the scope the EP. The worst-case credible spill scenario for this EP is a well loss of integrity.

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. **A shipping lane map is also attached.** You can also subscribe to receive updates on our consultation activities by subscribing here.

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.

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 **22 July 2023.**

Activity: Angel Facility Operations Environment Plan

Angel Facility Operations Environment Plan	
Summary	Routine Operations: • Routine production and operations (Lambert Deep, LDA-01; incorporation of Lambert West, LDA-02 following drilling and tie-back). • Routine inspection, monitoring, maintenance and repair (IMMR) activities. • Non-routine and unplanned activities and incidents associated with the above. Lambert West Drilling and Tie-back: • Drill one new well (LDA-02) in the Lambert West (LW) field. • Installation of a subsea distribution unit, flexible flowline and flying leads and disconnection of the existing LDA-01 well flying leads from the Lambert Deep Umbilical Termination Assembly reconnecting it to the subsea distribution unit. • Pre-commissioning and commissioning activities
Permit Area	Activities will occur predominantly within the WA-3-L and WA-16-L title areas and the Pipeline licence areas within WA-14-PL and WA-31-PL.
Location	~ 126 km north-north-west of Dampier
Approx. Water Depth (m)	~ 70 – 130 m
Schedule	Routine Operations: • Ongoing Lambert West Drilling and Tie-Back: • Drilling is currently anticipated in Q3 2024, subject to EP approval. • Subsea installation is currently anticipated to commence when the relevant wells have been drilled in Q4 2024 / Q1 2025, subject to EP approval. • Pre-commissioning and commissioning activities are currently anticipated to commence in H1 2025, subject to EP approval.
Approx. Estimated Duration	Drilling: • Activities are currently anticipated to take approximately 50 - 60 days per well to complete. Subsea installation and commissioning: • Activities are currently anticipated to have a cumulative duration of around four 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.

Exclusionary/ Cautionary Zone	Routine Operations: 36. The Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility 37. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure 38. Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure 39. Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1,500m around the subsea infrastructure 40. Exploration wells with wellheads and an area of 500 m around each wellhead. Lambert West Drilling and Tie-Back: 41. The Operational Area includes a radius of 4,500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities. 42. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	• Wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals, and explorations wells with wellhead
Vessels	• Moored MODU, DP MODU or hybrid moored/DP MODU • Primary Installation Vessel • Inspection, Monitor, Maintenance and Repair (IMMR) Vessel • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and general supply/support 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 **22 July 2023**.

Your feedback and our response will be included in our Environment Plan 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 2009* (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

Regards,

1.9 Email sent to Australian Maritime Safety Authority (AMSA) – Marine Pollution (22 June 2023)

Dear [redacted]

Woodside is planning to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Environment that May Be Affected (EMBA)

Following recent 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, the broadest extent of the EMBA has been determined by the highly unlikely event of a hydrocarbon release from activities within the scope the EP. The worst-case credible spill scenario for this EP is a well loss of integrity.

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. **A shipping lane map is also attached.** You can also subscribe to receive updates on our consultation activities by subscribing here.

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.

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 **22 July 2023.**

Activity: Angel Facility Operations Environment Plan

Angel Facility Operations Environment Plan	
Summary	Routine Operations: • Routine production and operations (Lambert Deep, LDA-01; incorporation of Lambert West, LDA-02 following drilling and tie-back). • Routine inspection, monitoring, maintenance and repair (IMMR) activities. • Non-routine and unplanned activities and incidents associated with the above. Lambert West Drilling and Tie-back: • Drill one new well (LDA-02) in the Lambert West (LW) field. • Installation of a subsea distribution unit, flexible flowline and flying leads and disconnection of the existing LDA-01 well flying leads from the Lambert Deep Umbilical Termination Assembly reconnecting it to the subsea distribution unit. • Pre-commissioning and commissioning activities
Permit Area	Activities will occur predominantly within the WA-3-L and WA-16-L title areas and the Pipeline licence areas within WA-14-PL and WA-31-PL.
Location	~ 126 km north-north-west of Dampier
Approx. Water Depth (m)	~ 70 – 130 m
Schedule	Routine Operations: • Ongoing Lambert West Drilling and Tie-Back: • Drilling is currently anticipated in Q3 2024, subject to EP approval. • Subsea installation is currently anticipated to commence when the relevant wells have been drilled in Q4 2024 / Q1 2025, subject to EP approval. • Pre-commissioning and commissioning activities are currently anticipated to commence in H1 2025, subject to EP approval.
Approx. Estimated Duration	Drilling: • Activities are currently anticipated to take approximately 50 - 60 days per well to complete.

	Subsea installation and commissioning: • Activities are currently anticipated to have a cumulative duration of around four 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.
Exclusionary/ Cautionary Zone	Routine Operations: 43. The Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility 44. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure 45. Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure 46. Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1,500m around the subsea infrastructure 47. Exploration wells with wellheads and an area of 500 m around each wellhead. Lambert West Drilling and Tie-Back: 48. The Operational Area includes a radius of 4,500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities. 49. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	• Wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals, and explorations wells with wellhead
Vessels	• Moored MODU, DP MODU or hybrid moored/DP MODU • Primary Installation Vessel • Inspection, Monitor, Maintenance and Repair (IMMR) Vessel • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and general supply/support 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 **22 July 2023**.

Your feedback and our response will be included in our Environment Plan 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 2009* (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

Regards,

1.10 Email sent to Australian Fisheries Management Authority (AFMA) (22 June 2023)

Dear AFMA

Woodside is planning to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Exclusionary / Cautionary Zones
For the routine operation of the Angel Facility, the Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure.

For the Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure. For the Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1500m around the subsea infrastructure. The Exploration wells with wellheads and an area of 500 m around each wellhead.

For the Lambert West Drilling and Tie-Back the Operational Area includes a radius of 4500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities with a temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.

Following recent changes to Commonwealth EP consultation requirements, Woodside is now consulting persons or organisations whom are located within the environment that may be affected (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, the broadest extent of the EMBA has been determined by the highly unlikely event of a hydrocarbon release from activities within the scope the EP. The worst-case credible spill scenario for this EP is a well loss of integrity.

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.

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.

We have identified potential impacts to active commercial fishers and the environment, which are summarised below. We have endeavoured to reduce these risks to an as low as reasonably practicable level.

Fisheries have been identified as being relevant based on fishing licence overlap, assessment of government fishing effort data (including Fishcube and AFMA) from recent years, fishing methods and water depth.

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 **22 July 2023**.

Activity: Angel Facility Operations Environment Plan

Angel Facility Operations Environment Plan	
Summary	Routine Operations: • Routine production and operations (Lambert Deep, LDA-01; incorporation of Lambert West, LDA-02 following drilling and tie-back). • Routine inspection, monitoring, maintenance and repair (IMMR) activities. • Non-routine and unplanned activities and incidents associated with the above. Lambert West Drilling and Tie-back: • Drill one new well (LDA-02) in the Lambert West (LW) field. • Installation of a subsea distribution unit, flexible flowline and flying leads and disconnection of the existing LDA-01 well flying leads from the Lambert Deep Umbilical Termination Assembly reconnecting it to the subsea distribution unit. • Pre-commissioning and commissioning activities
Permit Area	Activities will occur predominantly within the WA-3-L and WA-16-L title areas and the Pipeline licence areas within WA-14-PL and WA-31-PL.
Location	~ 126 km north-north-west of Dampier
Approx. Water Depth (m)	~ 70 – 130 m
Schedule	Routine Operations: • Ongoing Lambert West Drilling and Tie-Back: • Drilling is currently anticipated in Q3 2024, subject to EP approval. • Subsea installation is currently anticipated to commence when the relevant wells have been drilled in Q4 2024 / Q1 2025, subject to EP approval. • Pre-commissioning and commissioning activities are currently anticipated to commence in H1 2025, subject to EP approval.
Approx. Estimated Duration	Drilling: • Activities are currently anticipated to take approximately 50 - 60 days per well to complete. Subsea installation and commissioning: • Activities are currently anticipated to have a cumulative duration of around four 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.

Exclusionary/ Cautionary Zone	Routine Operations: 50. The Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility 51. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure 52. Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure 53. Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1,500m around the subsea infrastructure 54. Exploration wells with wellheads and an area of 500 m around each wellhead. Lambert West Drilling and Tie-Back: 55. The Operational Area includes a radius of 4,500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities. 56. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	• Wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals, and explorations wells with wellhead
Vessels	• Moored MODU, DP MODU or hybrid moored/DP MODU • Primary Installation Vessel • Inspection, Monitor, Maintenance and Repair (IMMR) Vessel • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and general supply/support vessels
Relevant fisheries	**Commonwealth fisheries** • **Operational Area:** None • **EMBA:** North West Slope Trawl Fishery, Western Deepwater Trawl Fishery

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 **22 July 2023.**

Your feedback and our response will be included in our Environment Plan 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 2009* (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

Regards,

1.10.1 Australian Fisheries Management Authority (AFMA) (22 June 2023)

Dear AFMA,

Apologies – now with the correct information sheet attached.

Regards,

Woodside Feedback

Woodside Energy
Mia Yellagonga
Karlak, 11 Mount Street
Perth WA 6000
Australia

T: 1800 442 977
E: feedback@woodside.com.au
www.woodside.com

1.11 Email sent to Pilbara Trawl Fishery, Pilbara Trap Fishery and Pilbara Line Fishery (22 June 2023)

Dear Fishery Stakeholder

Woodside is planning to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Exclusionary / Cautionary Zones
For the routine operation of the Angel Facility, the Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure.

For the Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure. For the Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1500m around the subsea infrastructure. The Exploration wells with wellheads and an area of 500 m around each wellhead.

For the Lambert West Drilling and Tie-Back the Operational Area includes a radius of 4500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities with a temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.

Environment that May be Affected (EMBA)
Following recent changes to Commonwealth EP consultation requirements, Woodside is now consulting persons or organisations whom are located within the environment that may be affected (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, the broadest extent of the EMBA has been determined by the highly unlikely event of a hydrocarbon release from activities within the scope the EP. The worst-case credible spill scenario for this EP is a well loss of integrity.

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.

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.

We have identified potential impacts to active commercial fishers and the environment, which are summarised below. We have endeavoured to reduce these risks to an as low as reasonably practicable level.

Fisheries have been identified as being relevant based on fishing licence overlap, assessment of government fishing effort data (including Fishcube and AFMA) from recent years, fishing methods and water depth.

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 **22 July 2023**.

Activity: Angel Facility Operations Environment Plan

Angel Facility Operations Environment Plan	
Summary	Routine Operations: • Routine production and operations (Lambert Deep, LDA-01; incorporation of Lambert West, LDA-02 following drilling and tie-back). • Routine inspection, monitoring, maintenance and repair (IMMR) activities. • Non-routine and unplanned activities and incidents associated with the above. Lambert West Drilling and Tie-back: • Drill one new well (LDA-02) in the Lambert West (LW) field. • Installation of a subsea distribution unit, flexible flowline and flying leads and disconnection of the existing LDA-01 well flying leads from the Lambert Deep Umbilical Termination Assembly reconnecting it to the subsea distribution unit. • Pre-commissioning and commissioning activities
Permit Area	Activities will occur predominantly within the WA-3-L and WA-16-L title areas and the Pipeline licence areas within WA-14-PL and WA-31-PL.
Location	~ 126 km north-north-west of Dampier
Approx. Water Depth (m)	~ 70 – 130 m
Schedule	Routine Operations: • Ongoing Lambert West Drilling and Tie-Back: • Drilling is currently anticipated in Q3 2024, subject to EP approval. • Subsea installation is currently anticipated to commence when the relevant wells have been drilled in Q4 2024 / Q1 2025, subject to EP approval. • Pre-commissioning and commissioning activities are currently anticipated to commence in H1 2025, subject to EP approval.
Approx. Estimated Duration	Drilling: • Activities are currently anticipated to take approximately 50 - 60 days per well to complete. Subsea installation and commissioning: • Activities are currently anticipated to have a cumulative duration of around four 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.
Exclusionary/ Cautionary Zone	Routine Operations: 57. The Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility 58. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure 59. Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure 60. Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1,500m around the subsea infrastructure 61. Exploration wells with wellheads and an area of 500 m around each wellhead. Lambert West Drilling and Tie-Back: 62. The Operational Area includes a radius of 4,500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities. 63. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	• Wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals, and explorations wells with wellhead
Vessels	• Moored MODU, DP MODU or hybrid moored/DP MODU • Primary Installation Vessel • Inspection, Monitor, Maintenance and Repair (IMMR) Vessel • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and general supply/support vessels
Relevant fisheries	**State fisheries** • **Operational Area:** Pilbara Trawl Fishery, Pilbara Trap Fishery and Pilbara Line Fishery • **EMBA:** Marine Aquarium Managed Fishery, Mackerel Managed Fishery (Area 2 and 3), Pilbara Crab Managed Fishery, West Coast Deep Sea Crustacean Managed Fishery, Specimen Shell Managed Fishery, Onslow Prawn Managed Fishery, Western Australian Sea Cucumber Fishery, Exmouth Gulf Prawn Managed Fishery, Nickol Bay Prawn Managed Fishery, Pilbara Trawl Fishery, Pilbara Trap Fishery and Pilbara Line Fishery

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 **22 July 2023.**

Your feedback and our response will be included in our Environment Plan 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 2009* (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

Regards,

1.12 Email sent to Western Australian Fishing Industry Council (WAFIC) (22 June 2023)

Dear [redacted] and [redacted]

Woodside is planning to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Exclusionary / Cautionary Zones

For the routine operation of the Angel Facility, the Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure.

For the Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure. For the Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1500m around the subsea infrastructure. The Exploration wells with wellheads and an area of 500 m around each wellhead.

For the Lambert West Drilling and Tie-Back the Operational Area includes a radius of 4500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities with a temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.

Environment that May be Affected (EMBA)

Following recent changes to Commonwealth EP consultation requirements, Woodside is now consulting persons or organisations whom are located within the environment that may be affected (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, the broadest extent of the EMBA has been determined by the highly unlikely event of a hydrocarbon release from activities within the scope the EP. The worst-case credible spill scenario for this EP is a well loss of integrity.

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.

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.

We have identified potential impacts to active commercial fishers and the environment, which are summarised below. We have endeavoured to reduce these risks to an as low as reasonably practicable level.

Fisheries have been identified as being relevant based on fishing licence overlap, assessment of government fishing effort data (including Fishcube and AFMA) from recent years, fishing methods and water depth.

Woodside acknowledges WAFIC's consultation guidance and has applied this by consulting fisheries that are assessed as having a potential for interaction in the Operational Area directly and consulting fisheries assessed as having a potential for interaction in the EMBA via WAFIC.

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 **22 July 2023**.

Activity: Angel Facility Operations Environment Plan

Angel Facility Operations Environment Plan	
Summary	Routine Operations: • Routine production and operations (Lambert Deep, LDA-01; incorporation of Lambert West, LDA-02 following drilling and tie-back). • Routine inspection, monitoring, maintenance and repair (IMMR) activities. • Non-routine and unplanned activities and incidents associated with the above. Lambert West Drilling and Tie-back: • Drill one new well (LDA-02) in the Lambert West (LW) field. • Installation of a subsea distribution unit, flexible flowline and flying leads and disconnection of the existing LDA-01 well flying leads from the Lambert Deep Umbilical Termination Assembly reconnecting it to the subsea distribution unit. • Pre-commissioning and commissioning activities
Permit Area	Activities will occur predominantly within the WA-3-L and WA-16-L title areas and the Pipeline licence areas within WA-14-PL and WA-31-PL.
Location	~ 126 km north-north-west of Dampier
Approx. Water Depth (m)	~ 70 – 130 m
Schedule	Routine Operations: • Ongoing Lambert West Drilling and Tie-Back: • Drilling is currently anticipated in Q3 2024, subject to EP approval. • Subsea installation is currently anticipated to commence when the relevant wells have been drilled in Q4 2024 / Q1 2025, subject to EP approval. • Pre-commissioning and commissioning activities are currently anticipated to commence in H1 2025, subject to EP approval.
Approx. Estimated Duration	Drilling: • Activities are currently anticipated to take approximately 50 - 60 days per well to complete. Subsea installation and commissioning: • Activities are currently anticipated to have a cumulative duration of around four 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.
Exclusionary/ Cautionary Zone	Routine Operations: 64. The Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility 65. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure 66. Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure 67. Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1,500m around the subsea infrastructure 68. Exploration wells with wellheads and an area of 500 m around each wellhead. Lambert West Drilling and Tie-Back: 69. The Operational Area includes a radius of 4,500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities. 70. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	• Wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals, and explorations wells with wellhead
Vessels	• Moored MODU, DP MODU or hybrid moored/DP MODU • Primary Installation Vessel • Inspection, Monitor, Maintenance and Repair (IMMR) Vessel • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and general supply/support vessels
Relevant fisheries	**State fisheries** • **Operational Area:** Pilbara Trawl Fishery, Pilbara Trap Fishery and Pilbara Line Fishery • **EMBA:** Marine Aquarium Managed Fishery, Mackerel Managed Fishery (Area 2 and 3), Pilbara Crab Managed Fishery, West Coast Deep Sea Crustacean Managed Fishery, Specimen Shell Managed Fishery, Onslow Prawn Managed Fishery, Western Australian Sea Cucumber Fishery, Exmouth Gulf Prawn Managed Fishery, Nickol Bay Prawn Managed Fishery, Pilbara Trawl Fishery, Pilbara Trap Fishery and Pilbara Line Fishery

Feedback:
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Your feedback and our response will be included in our Environment Plan 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 2009* (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

Regards,

1.13 Email sent to North West Slope and Trawl Fishery, Western Deepwater Trawl Fishery, Commonwealth Fisheries Association (CFA) (22 June 2023)

Dear Fishery Stakeholder

Woodside is planning to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

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Exclusionary / Cautionary Zones
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For the Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure. For the Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1500m around the subsea infrastructure. The Exploration wells with wellheads and an area of 500 m around each wellhead.

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Activity: Angel Facility Operations Environment Plan

Angel Facility Operations Environment Plan	
Summary	Routine Operations: • Routine production and operations (Lambert Deep, LDA-01; incorporation of Lambert West, LDA-02 following drilling and tie-back). • Routine inspection, monitoring, maintenance and repair (IMMR) activities. • Non-routine and unplanned activities and incidents associated with the above. Lambert West Drilling and Tie-back: • Drill one new well (LDA-02) in the Lambert West (LW) field. • Installation of a subsea distribution unit, flexible flowline and flying leads and disconnection of the existing LDA-01 well flying leads from the Lambert Deep Umbilical Termination Assembly reconnecting it to the subsea distribution unit. • Pre-commissioning and commissioning activities
Permit Area	Activities will occur predominantly within the WA-3-L and WA-16-L title areas and the Pipeline licence areas within WA-14-PL and WA-31-PL.
Location	~ 126 km north-north-west of Dampier
Approx. Water Depth (m)	~ 70 – 130 m
Schedule	Routine Operations: • Ongoing Lambert West Drilling and Tie-Back: • Drilling is currently anticipated in Q3 2024, subject to EP approval. • Subsea installation is currently anticipated to commence when the relevant wells have been drilled in Q4 2024 / Q1 2025, subject to EP approval. • Pre-commissioning and commissioning activities are currently anticipated to commence in H1 2025, subject to EP approval.
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Exclusionary/ Cautionary Zone	Routine Operations: 71. The Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility 72. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure 73. Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure 74. Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1,500m around the subsea infrastructure 75. Exploration wells with wellheads and an area of 500 m around each wellhead. Lambert West Drilling and Tie-Back: 76. The Operational Area includes a radius of 4,500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities. 77. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	• Wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals, and explorations wells with wellhead
Vessels	• Moored MODU, DP MODU or hybrid moored/DP MODU • Primary Installation Vessel • Inspection, Monitor, Maintenance and Repair (IMMR) Vessel • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and general supply/support vessels
Relevant fisheries	**Commonwealth fisheries** • **Operational Area:** None • **EMBA:** North West Slope Trawl Fishery, Western Deepwater Trawl Fishery

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 **22 July 2023**.

Your feedback and our response will be included in our Environment Plan 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 2009* (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

Regards,

1.14 Letter sent to Marine Aquarium Managed Fishery, Mackerel Managed Fishery (Area 2), Pilbara Crab Managed Fishery, West Coast Deep Sea Crustacean Managed Fishery, Specimen Shell Managed Fishery, Onslow Prawn Managed Fishery, Western Australian Sea Cucumber Managed Fishery, Exmouth Gulf Prawn Managed Fishery, Nickol Bay Prawn Managed Fishery (22 June 2023)

22 June 2023

Dear Stakeholder

CONSULTATION ON ANGEL FACILITY OPERATIONS ENVIRONMENT PLAN

Woodside is planning to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Exclusionary / Cautionary Zones
For the routine operation of the Angel Facility, the Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure.

For the Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure. For the Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1500m around the subsea infrastructure. The Exploration wells with wellheads and an area of 500 m around each wellhead.

For the Lambert West Drilling and Tie-Back the Operational Area includes a radius of 4500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities with a temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.

Following recent changes to Commonwealth EP consultation requirements, Woodside is now consulting persons or organisations whom are located within the environment that may be affected (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, the broadest extent of the EMBA has been determined by the highly unlikely event of a hydrocarbon release from activities within the scope the EP. The worst-case credible spill scenario for this EP is a well loss of integrity.

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.

We have identified potential impacts to active commercial fishers and the environment, which are summarised below. We have endeavoured to reduce these risks to an as low as reasonably practicable level.

Fisheries have been identified as being relevant based on fishing licence overlap, assessment of government fishing effort data (including Fishcube and AFMA) from recent years, fishing methods and water depth.

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Angel Facility Operations Environment Plan	
Summary	Routine Operations: • Routine production and operations (Lambert Deep, LDA-01; incorporation of Lambert West, LDA-02 following drilling and tie-back). • Routine inspection, monitoring, maintenance and repair (IMMR) activities.

	• Non-routine and unplanned activities and incidents associated with the above. Lambert West Drilling and Tie-back: • Drill one new well (LDA-02) in the Lambert West (LW) field. • Installation of a subsea distribution unit, flexible flowline and flying leads and disconnection of the existing LDA-01 well flying leads from the Lambert Deep Umbilical Termination Assembly reconnecting it to the subsea distribution unit. • Pre-commissioning and commissioning activities
Permit Area	Activities will occur predominantly within the WA-3-L and WA-16-L title areas and the Pipeline licence areas within WA-14-PL and WA-31-PL.
Location	~ 126 km north-north-west of Dampier
Approx. Water Depth (m)	~ 70 – 130 m
Schedule	Routine Operations: • Ongoing Lambert West Drilling and Tie-Back: • Drilling is currently anticipated in Q3 2024, subject to EP approval. • Subsea installation is currently anticipated to commence when the relevant wells have been drilled in Q4 2024 / Q1 2025, subject to EP approval. • Pre-commissioning and commissioning activities are currently anticipated to commence in H1 2025, subject to EP approval.
Approx. Estimated Duration	Drilling: • Activities are currently anticipated to take approximately 50 - 60 days per well to complete. Subsea installation and commissioning: • Activities are currently anticipated to have a cumulative duration of around four 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.
Exclusionary/ Cautionary Zone	Routine Operations: 78. The Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility 79. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure 80. Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure

	81. Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1,500m around the subsea infrastructure 82. Exploration wells with wellheads and an area of 500 m around each wellhead. Lambert West Drilling and Tie-Back: 83. The Operational Area includes a radius of 4,500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities. 84. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	• Wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals, and explorations wells with wellhead
Vessels	• Moored MODU, DP MODU or hybrid moored/DP MODU • Primary Installation Vessel • Inspection, Monitor, Maintenance and Repair (IMMR) Vessel • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and general supply/support vessels
Relevant fisheries	• **Operational Area:** Pilbara Trawl Fishery, Pilbara Trap Fishery and Pilbara Line Fishery • **EMBA:** Marine Aquarium Managed Fishery, Mackerel Managed Fishery (Area 2 and 3), Pilbara Crab Managed Fishery, West Coast Deep Sea Crustacean Managed Fishery, Specimen Shell Managed Fishery, Onslow Prawn Managed Fishery, Western Australian Sea Cucumber Fishery, Exmouth Gulf Prawn Managed Fishery, Nickol Bay Prawn Managed Fishery, Pilbara Trawl Fishery, Pilbara Trap Fishery and Pilbara Line Fishery

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 **22 July 2023**.

Your feedback and our response will be included in our Environment Plan 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 2009* (Cth).

For the State operations, please note that your feedback and our response will be included in our Environment Plan for the proposed activities, which will be submitted to the Department of Mines, Industry Regulation and Safety (DMIRS) for acceptance in accordance

with the Petroleum (Submerged Lands) (Environment) Regulations 2012 (WA) and the Petroleum Pipelines (Environment) Regulations 2012 (WA).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA or DMIRS upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA or DMIRS.

Regards,

Please direct all responses/queries to:
Woodside Feedback
T: 1800 442 977
E: Feedback@woodside.com.au

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ACN 004 898 962
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Perth WA 6000
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T: +61 8 9348 4000
www.woodside.com

22 June 2023

1

DAMPIER WA 6713

Dear Stakeholder

ANGEL FACILITY OPERATIONS ENVIRONMENT PLAN

Woodside is planning to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

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- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Exclusionary / Cautionary Zones

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	Umbilical Termination Assembly reconnecting it to the subsea distribution unit. • Pre-commissioning and commissioning activities
Permit Area	Activities will occur predominantly within the WA-3-L and WA-16-L title areas and the Pipeline licence areas within WA-14-PL and WA-31-PL.
Location	~ 126 km north-north-west of Dampier
Approx. Water Depth (m)	~ 70 – 130 m
Schedule	Routine Operations: • Ongoing Lambert West Drilling and Tie-Back: • Drilling is currently anticipated in Q3 2024, subject to EP approval. • Subsea installation is currently anticipated to commence when the relevant wells have been drilled in Q4 2024 / Q1 2025, subject to EP approval. • Pre-commissioning and commissioning activities are currently anticipated to commence in H1 2025, subject to EP approval.
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Infrastructure	• Wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals, and explorations wells with wellhead
Vessels	• Moored MODU, DP MODU or hybrid moored/DP MODU • Primary Installation Vessel • Inspection, Monitor, Maintenance and Repair (IMMR) Vessel • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and general supply/support vessels
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Regards,

Woodside Feedback

Woodside Energy
Mia Yellagonga
Karlak, 11 Mount Street
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Australia

T: 1800 442 977
E: feedback@woodside.com.au
www.woodside.com

1.15 Letter sent to Broome Recreational Marine Users, Gascoyne Recreational Marine Users and Pilbara/Kimberley Recreational Marine Users (22 June 2023)

22 June 2023

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Permit Area	Activities will occur predominantly within the WA-3-L and WA-16-L title areas and the Pipeline licence areas within WA-14-PL and WA-31-PL.
Location	~ 126 km north-north-west of Dampier
Approx. Water Depth (m)	~ 70 – 130 m
Schedule	Routine Operations: • Ongoing Lambert West Drilling and Tie-Back: • Drilling is currently anticipated in Q3 2024, subject to EP approval. • Subsea installation is currently anticipated to commence when the relevant wells have been drilled in Q4 2024 / Q1 2025, subject to EP approval. • Pre-commissioning and commissioning activities are currently anticipated to commence in H1 2025, subject to EP approval.
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Exclusionary/ Cautionary Zone	Routine Operations: 85. The Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility 86. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure 87. Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure 88. Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1,500m around the subsea infrastructure 89. Exploration wells with wellheads and an area of 500 m around each wellhead. Lambert West Drilling and Tie-Back: 90. The Operational Area includes a radius of 4,500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities. 91. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	• Wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals, and explorations wells with wellhead
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Regards,

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ACN 004 898 962
Mia Yellagonga
11 Mount Street
Perth WA 6000
Australia
T: +61 8 9348 4000
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22 June 2023

WEMBLEY DOWNS WA 6019

Dear Stakeholder

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Exclusionary/ Cautionary Zone	Routine Operations: • The Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility • The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure • Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure • Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1,500m around the subsea infrastructure • Exploration wells with wellheads and an area of 500 m around each wellhead. Lambert West Drilling and Tie-Back: • The Operational Area includes a radius of 4,500 m from the Lambert Deep Manifold 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	• Wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals, and explorations wells with wellhead
Vessels	• Moored MODU, DP MODU or hybrid moored/DP MODU • Primary Installation Vessel • Inspection, Monitor, Maintenance and Repair (IMMR) Vessel • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and general supply/support 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 **22 July 2023**.

Your feedback and our response will be included in our Environment Plan 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 2009* (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

Regards,

Woodside Feedback

Woodside Energy
Mia Yellagonga
Karlak, 11 Mount Street
Perth WA 6000
Australia

T: 1800 442 977
E: feedback@woodside.com.au
www.woodside.com

1.16 Email sent to Exmouth Recreational Marine Users, Karratha Recreational Marine Users, Recfishwest, Marine Tourism Association, WA Game Fishing Association (22 June 2023)

Dear Stakeholder

Woodside is planning to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Exclusionary / Cautionary Zones

For the routine operation of the Angel Facility, the Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure.

For the Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure. For the Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1500m around the subsea infrastructure. The Exploration wells with wellheads and an area of 500 m around each wellhead.

For the Lambert West Drilling and Tie-Back the Operational Area includes a radius of 4500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities with a temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.

Environment that May be Affected (EMBA)
Following recent changes to Commonwealth EP consultation requirements, Woodside is now consulting persons or organisations whom are located within the environment that may be affected (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, the broadest extent of the EMBA has been determined by the highly unlikely event of a hydrocarbon release from activities within the scope the EP. The worst-case credible spill scenario for this EP is a well loss of integrity.

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.

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.

We have identified potential impacts to active commercial fishers and the environment, which are summarised below. We have endeavoured to reduce these risks to an as low as reasonably practicable level.

Fisheries have been identified as being relevant based on fishing licence overlap, assessment of government fishing effort data (including Fishcube and AFMA) from recent years, fishing methods and water depth.

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 **22 July2023**.

Activity: Angel Facility Operations Environment Plan

Angel Facility Operations Environment Plan	
Summary	Routine Operations: • Routine production and operations (Lambert Deep, LDA-01; incorporation of Lambert West, LDA-02 following drilling and tie-back). • Routine inspection, monitoring, maintenance and repair (IMMR) activities. • Non-routine and unplanned activities and incidents associated with the above. Lambert West Drilling and Tie-back: • Drill one new well (LDA-02) in the Lambert West (LW) field. • Installation of a subsea distribution unit, flexible flowline and flying leads and disconnection of the existing LDA-01 well flying leads from the Lambert Deep Umbilical Termination Assembly reconnecting it to the subsea distribution unit. • Pre-commissioning and commissioning activities
Permit Area	Activities will occur predominantly within the WA-3-L and WA-16-L title areas and the Pipeline licence areas within WA-14-PL and WA-31-PL.
Location	~ 126 km north-north-west of Dampier

Approx. Water Depth (m)	~ 70 – 130 m
Schedule	Routine Operations: • Ongoing Lambert West Drilling and Tie-Back: • Drilling is currently anticipated in Q3 2024, subject to EP approval. • Subsea installation is currently anticipated to commence when the relevant wells have been drilled in Q4 2024 / Q1 2025, subject to EP approval. • Pre-commissioning and commissioning activities are currently anticipated to commence in H1 2025, subject to EP approval.
Approx. Estimated Duration	Drilling: • Activities are currently anticipated to take approximately 50 - 60 days per well to complete. Subsea installation and commissioning: • Activities are currently anticipated to have a cumulative duration of around four 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.
Exclusionary/ Cautionary Zone	Routine Operations: 92. The Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility 93. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure 94. Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure 95. Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1,500m around the subsea infrastructure 96. Exploration wells with wellheads and an area of 500 m around each wellhead. Lambert West Drilling and Tie-Back: 97. The Operational Area includes a radius of 4,500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities. 98. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.

Infrastructure	• Wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals, and explorations wells with wellhead
Vessels	• Moored MODU, DP MODU or hybrid moored/DP MODU • Primary Installation Vessel • Inspection, Monitor, Maintenance and Repair (IMMR) Vessel • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and general supply/support 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 **22 July 2023**.

Your feedback and our response will be included in our Environment Plan 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 2009* (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

Regards,

1.17 Email sent to Department of Agriculture Fisheries and Forestry (DAFF) – Fisheries and Biosecurity (22 June 2023)

Dear DAFF – Fisheries and Biosecurity

Woodside is planning to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Exclusionary / Cautionary Zones

For the routine operation of the Angel Facility, the Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure.

For the Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure. For the Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1500m around the subsea infrastructure. The Exploration wells with wellheads and an area of 500 m around each wellhead.

For the Lambert West Drilling and Tie-Back the Operational Area includes a radius of 4500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities with a temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.

Environment that May Be Affected (EMBA)

Following recent 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, the broadest extent of the EMBA has been determined by the highly unlikely event of a hydrocarbon release from activities within the scope the EP. The worst-case credible spill scenario for this EP is a well loss of integrity.

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.

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.

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 **22 July 2023.**

Activity: Angel Facility Operations Environment Plan

Angel Facility Operations Environment Plan	
Summary	Routine Operations: • Routine production and operations (Lambert Deep, LDA-01; incorporation of Lambert West, LDA-02 following drilling and tie-back). • Routine inspection, monitoring, maintenance and repair (IMMR) activities. • Non-routine and unplanned activities and incidents associated with the above. Lambert West Drilling and Tie-back: • Drill one new well (LDA-02) in the Lambert West (LW) field. • Installation of a subsea distribution unit, flexible flowline and flying leads and disconnection of the existing LDA-01 well flying leads from the Lambert Deep Umbilical Termination Assembly reconnecting it to the subsea distribution unit. • Pre-commissioning and commissioning activities
Permit Area	Activities will occur predominantly within the WA-3-L and WA-16-L title areas and the Pipeline licence areas within WA-14-PL and WA-31-PL.
Location	~ 126 km north-north-west of Dampier
Approx. Water Depth (m)	~ 70 – 130 m
Schedule	Routine Operations: • Ongoing Lambert West Drilling and Tie-Back: • Drilling is currently anticipated in Q3 2024, subject to EP approval. • Subsea installation is currently anticipated to commence when the relevant wells have been drilled in Q4 2024 / Q1 2025, subject to EP approval. • Pre-commissioning and commissioning activities are currently anticipated to commence in H1 2025, subject to EP approval.

Approx. Estimated Duration	Drilling: • Activities are currently anticipated to take approximately 50 - 60 days per well to complete. Subsea installation and commissioning: • Activities are currently anticipated to have a cumulative duration of around four 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.
Exclusionary/ Cautionary Zone	Routine Operations: 99. The Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility 100. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure 101. Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure 102. Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1500m around the subsea infrastructure 103. Exploration wells with wellheads and an area of 500 m around each wellhead. Lambert West Drilling and Tie-Back: 104. The Operational Area includes a radius of 4500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities. 105. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements. 106.
Infrastructure	107. Wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals, and explorations wells with wellhead
Vessels	• Moored MODU, DP MODU or hybrid moored/DP MODU • Primary Installation Vessel • Inspection, Monitor, Maintenance and Repair (IMMR) Vessel • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and general supply/support vessels
Relevant fisheries	**Commonwealth fisheries** • **Operational Area:** None • **EMBA:** North West Slope and Trawl Fishery, Western Deepwater Trawl Fishery

Biosecurity:

With respect to the biosecurity matters, please note the following information below:

Environment description:	
The Petroleum Activity Area (which include the Angel Operational Area and the Lambert West Operational Area) is located in water depths of approximately 70 to 130 m deep on the continental shelf. The bathymetry within the Petroleum Activity Area is generally flat and has a gentle seaward gradient. The seabed in the Petroleum Activity Area is likely to be dominated by soft sediment comprised of fine to coarse sands, which typify the sediments of the North West Marine Region.	
Potential IMS risk	***IMS mitigation management***
Accidental introduction and establishment of invasive marine species	Vessels are required to comply with the Australian Biosecurity Act 2015, specifically the 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 Sediments) to prevent introducing IMS. Vessels will be assessed and managed to prevent the introduction of invasive marine species in accordance with Woodside's Invasive Marine Species Management Plan. Woodside's Invasive Marine Species Management Plan includes a risk assessment process that is applied to vessels undertaking Activities. 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.

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 **22 July 2023.**

Your feedback and our response will be included in our Environment Plan 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 2009* (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

Regards,

Email sent to Department of Defence (DoD) (22 June 2023)

Dear Department of Defence

Woodside is planning to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Environment that May Be Affected (EMBA)

Following recent 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, the broadest extent of the EMBA has been determined by the highly unlikely event of a hydrocarbon release from activities within the scope the EP. The worst-case credible spill scenario for this EP is a well loss of integrity.

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.

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.

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 **22 July 2023**.

Activity: Angel Facility Operations Environment Plan

Angel Facility Operations Environment Plan	
Summary	Routine Operations: • Routine production and operations (Lambert Deep, LDA-01; incorporation of Lambert West, LDA-02 following drilling and tie-back). • Routine inspection, monitoring, maintenance and repair (IMMR) activities. • Non-routine and unplanned activities and incidents associated with the above. Lambert West Drilling and Tie-back: • Drill one new well (LDA-02) in the Lambert West (LW) field. • Installation of a subsea distribution unit, flexible flowline and flying leads and disconnection of the existing LDA-01 well flying leads from the Lambert Deep Umbilical Termination Assembly reconnecting it to the subsea distribution unit. • Pre-commissioning and commissioning activities
Permit Area	Activities will occur predominantly within the WA-3-L and WA-16-L title areas and the Pipeline licence areas within WA-14-PL and WA-31-PL.
Location	~ 126 km north-north-west of Dampier
Approx. Water Depth (m)	~ 70 – 130 m
Schedule	Routine Operations: • Ongoing Lambert West Drilling and Tie-Back: • Drilling is currently anticipated in Q3 2024, subject to EP approval. • Subsea installation is currently anticipated to commence when the relevant wells have been drilled in Q4 2024 / Q1 2025, subject to EP approval. • Pre-commissioning and commissioning activities are currently anticipated to commence in H1 2025, subject to EP approval.
Approx. Estimated Duration	Drilling: • Activities are currently anticipated to take approximately 50 - 60 days per well to complete. Subsea installation and commissioning: • Activities are currently anticipated to have a cumulative duration of around four 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.
Exclusionary/ Cautionary Zone	Routine Operations: 108. The Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility 109. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure 110. Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure 111. Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1,500m around the subsea infrastructure 112. Exploration wells with wellheads and an area of 500 m around each wellhead. Lambert West Drilling and Tie-Back: 113. The Operational Area includes a radius of 4,500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities. 114. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	• Wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals, and explorations wells with wellhead
Vessels	• Moored MODU, DP MODU or hybrid moored/DP MODU • Primary Installation Vessel • Inspection, Monitor, Maintenance and Repair (IMMR) Vessel • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and general supply/support 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 **22 July 2023.**

Your feedback and our response will be included in our Environment Plan 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 2009* (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

Regards,

1.19 Email sent to Department of Climate Change, Energy, the Environment and Water (DCCEEW) (22 June 2023)

Dear DCCEEW

Woodside is planning to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Environment that May Be Affected (EMBA)

Following recent 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, the broadest extent of the

EMBA has been determined by the highly unlikely event of a hydrocarbon release from activities within the scope the EP. The worst-case credible spill scenario for this EP is a well loss of integrity.

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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.

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 **22 July 2023**.

Activity: Angel Facility Operations Environment Plan

Angel Facility Operations Environment Plan	
Summary	Routine Operations: • Routine production and operations (Lambert Deep, LDA-01; incorporation of Lambert West, LDA-02 following drilling and tie-back). • Routine inspection, monitoring, maintenance and repair (IMMR) activities. • Non-routine and unplanned activities and incidents associated with the above. Lambert West Drilling and Tie-back: • Drill one new well (LDA-02) in the Lambert West (LW) field. • Installation of a subsea distribution unit, flexible flowline and flying leads and disconnection of the existing LDA-01 well flying leads from the Lambert Deep Umbilical Termination Assembly reconnecting it to the subsea distribution unit. • Pre-commissioning and commissioning activities
Permit Area	Activities will occur predominantly within the WA-3-L and WA-16-L title areas and the Pipeline licence areas within WA-14-PL and WA-31-PL.
Location	~ 126 km north-north-west of Dampier
Approx. Water Depth (m)	~ 70 – 130 m
Schedule	Routine Operations: • Ongoing Lambert West Drilling and Tie-Back: • Drilling is currently anticipated in Q3 2024, subject to EP approval.

	• Subsea installation is currently anticipated to commence when the relevant wells have been drilled in Q4 2024 / Q1 2025, subject to EP approval. • Pre-commissioning and commissioning activities are currently anticipated to commence in H1 2025, subject to EP approval.
Approx. Estimated Duration	Drilling: • Activities are currently anticipated to take approximately 50 - 60 days per well to complete. Subsea installation and commissioning: • Activities are currently anticipated to have a cumulative duration of around four 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.
Exclusionary/ Cautionary Zone	Routine Operations: 115. The Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility 116. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure 117. Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure 118. Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1,500m around the subsea infrastructure 119. Exploration wells with wellheads and an area of 500 m around each wellhead. Lambert West Drilling and Tie-Back: 120. The Operational Area includes a radius of 4,500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities. 121. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	• Wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals, and explorations wells with wellhead
Vessels	• Moored MODU, DP MODU or hybrid moored/DP MODU • Primary Installation Vessel • Inspection, Monitor, Maintenance and Repair (IMMR) Vessel • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and general supply/support 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 **22 July 2023**.

Your feedback and our response will be included in our Environment Plan 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 2009* (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

Regards,

1.20 Email sent to Director of National Parks (DNP) (22 June 2023)

Dear Director of National Parks

Woodside is planning to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L,Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Australian Marine Parks (AMPs)

We note Australian Government Guidance on consultation activities and confirm that:

- The proposed activities are outside the boundaries of a proclaimed Australian Marine Parks, with the Angel Facility located approximately 55km north east of the Commonwealth boundary of the Montebello Islands Australian Marine Park, approximately 277 km north east of the Gascoyne Australian Marine Park and approximately 183 km south east of the Agro Rowley Terrace Australian Marine Park.
- We have assessed potential risks to Australian Marine Parks (AMPs) in the development of the proposed Environment Plan and believe that there are no credible risks as part of planned activities that have potential to impact the values of the Marine Parks.
- The worst-case credible spill scenario assessed in this EP is the remote likelihood event of a loss of well integrity. 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:
    - Agro-Rowley Terrace (Multiple Use Zone VI)
    - Gascoyne (Multiple Use Zone VI)
    - Montebello (Multiple Use Zone VI)
    - Ningaloo (Recreational Use Zone IV)
- 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 the Marine Park.

Environment that May Be Affected (EMBA)

Following recent 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, the broadest extent of the EMBA has been determined by the highly unlikely event of a hydrocarbon release from activities within the scope the EP. The worst-case credible spill scenario for this EP is a well loss of integrity.

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.

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.

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 **22 July 2023**.

Activity: Angel Facility Operations Environment Plan

Angel Facility Operations Environment Plan	
Summary	Routine Operations: • Routine production and operations (Lambert Deep, LDA-01; incorporation of Lambert West, LDA-02 following drilling and tie-back). • Routine inspection, monitoring, maintenance and repair (IMMR) activities. • Non-routine and unplanned activities and incidents associated with the above. Lambert West Drilling and Tie-back: • Drill one new well (LDA-02) in the Lambert West (LW) field. • Installation of a subsea distribution unit, flexible flowline and flying leads and disconnection of the existing LDA-01 well flying leads from the Lambert Deep Umbilical Termination Assembly reconnecting it to the subsea distribution unit. • Pre-commissioning and commissioning activities
Permit Area	Activities will occur predominantly within the WA-3-L and WA-16-L title areas and the Pipeline licence areas within WA-14-PL and WA-31-PL.
Location	~ 126 km north-north-west of Dampier
Approx. Water Depth (m)	~ 70 – 130 m
Schedule	Routine Operations: • Ongoing Lambert West Drilling and Tie-Back: • Drilling is currently anticipated in Q3 2024, subject to EP approval. • Subsea installation is currently anticipated to commence when the relevant wells have been drilled in Q4 2024 / Q1 2025, subject to EP approval. • Pre-commissioning and commissioning activities are currently anticipated to commence in H1 2025, subject to EP approval.
Approx. Estimated Duration	Drilling: • Activities are currently anticipated to take approximately 50 - 60 days per well to complete. Subsea installation and commissioning: • Activities are currently anticipated to have a cumulative duration of around four 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.
Exclusionary/ Cautionary Zone	Routine Operations: 122. The Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility 123. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure 124. Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure 125. Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1500m around the subsea infrastructure 126. Exploration wells with wellheads and an area of 500 m around each wellhead. Lambert West Drilling and Tie-Back: 127. The Operational Area includes a radius of 4500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities. 128. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements. 129.
Infrastructure	130. Wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals, and explorations wells with wellhead
Vessels	• Moored MODU, DP MODU or hybrid moored/DP MODU • Primary Installation Vessel • Inspection, Monitor, Maintenance and Repair (IMMR) Vessel • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and general supply/support 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 **22 July 2023**.

Your feedback and our response will be included in our Environment Plan 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 2009* (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

Regards,

1.21 Email sent to Department of Planning, Lands and Heritage (DPLH) (22 June 2023)

Dear DPLH

Woodside is planning to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Environment that May Be Affected (EMBA)
Following recent 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, the broadest extent of the EMBA has been determined by the highly unlikely event of a hydrocarbon release from activities within the scope the EP. The worst-case credible spill scenario for this EP is a well loss of integrity.

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.

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.

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 **22 July 2023**.

Activity: Angel Facility Operations Environment Plan

Angel Facility Operations Environment Plan	
Summary	Routine Operations: • Routine production and operations (Lambert Deep, LDA-01; incorporation of Lambert West, LDA-02 following drilling and tie-back). • Routine inspection, monitoring, maintenance and repair (IMMR) activities. • Non-routine and unplanned activities and incidents associated with the above. Lambert West Drilling and Tie-back: • Drill one new well (LDA-02) in the Lambert West (LW) field. • Installation of a subsea distribution unit, flexible flowline and flying leads and disconnection of the existing LDA-01 well flying leads from the Lambert Deep Umbilical Termination Assembly reconnecting it to the subsea distribution unit. • Pre-commissioning and commissioning activities
Permit Area	Activities will occur predominantly within the WA-3-L and WA-16-L title areas and the Pipeline licence areas within WA-14-PL and WA-31-PL.
Location	~ 126 km north-north-west of Dampier
Approx. Water Depth (m)	~ 70 – 130 m
Schedule	Routine Operations: • Ongoing

	Lambert West Drilling and Tie-Back: • Drilling is currently anticipated in Q3 2024, subject to EP approval. • Subsea installation is currently anticipated to commence when the relevant wells have been drilled in Q4 2024 / Q1 2025, subject to EP approval. • Pre-commissioning and commissioning activities are currently anticipated to commence in H1 2025, subject to EP approval.
Approx. Estimated Duration	Drilling: • Activities are currently anticipated to take approximately 50 - 60 days per well to complete. Subsea installation and commissioning: • Activities are currently anticipated to have a cumulative duration of around four 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.
Exclusionary/ Cautionary Zone	Routine Operations: 131. The Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility 132. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure 133. Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure 134. Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1,500m around the subsea infrastructure 135. Exploration wells with wellheads and an area of 500 m around each wellhead. Lambert West Drilling and Tie-Back: 136. The Operational Area includes a radius of 4,500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities. 137. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	• Wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals, and explorations wells with wellhead
Vessels	• Moored MODU, DP MODU or hybrid moored/DP MODU • Primary Installation Vessel

	• Inspection, Monitor, Maintenance and Repair (IMMR) Vessel • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and general supply/support 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 **22 July 2023.**

Your feedback and our response will be included in our Environment Plan 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 2009* (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

Regards,

1.22 Email sent to Western Australian Museum (22 June 2023)

Dear Western Australian Museum

Woodside is planning to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Environment that May Be Affected (EMBA)
Following recent 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, the broadest extent of the EMBA has been determined by the highly unlikely event of a hydrocarbon release from activities within the scope the EP. The worst-case credible spill scenario for this EP is a well loss of integrity.

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.

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.

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 **22 July 2023**.

Activity: Angel Facility Operations Environment Plan

Angel Facility Operations Environment Plan	
Summary	Routine Operations: • Routine production and operations (Lambert Deep, LDA-01; incorporation of Lambert West, LDA-02 following drilling and tie-back). • Routine inspection, monitoring, maintenance and repair (IMMR) activities. • Non-routine and unplanned activities and incidents associated with the above. Lambert West Drilling and Tie-back: • Drill one new well (LDA-02) in the Lambert West (LW) field. • Installation of a subsea distribution unit, flexible flowline and flying leads and disconnection of the existing LDA-01 well flying leads from the Lambert Deep Umbilical Termination Assembly reconnecting it to the subsea distribution unit. • Pre-commissioning and commissioning activities

Permit Area	Activities will occur predominantly within the WA-3-L and WA-16-L title areas and the Pipeline licence areas within WA-14-PL and WA-31-PL.
Location	~ 126 km north-north-west of Dampier
Approx. Water Depth (m)	~ 70 – 130 m
Schedule	Routine Operations: • Ongoing Lambert West Drilling and Tie-Back: • Drilling is currently anticipated in Q3 2024, subject to EP approval. • Subsea installation is currently anticipated to commence when the relevant wells have been drilled in Q4 2024 / Q1 2025, subject to EP approval. • Pre-commissioning and commissioning activities are currently anticipated to commence in H1 2025, subject to EP approval.
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Exclusionary/ Cautionary Zone	Routine Operations: 138. The Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility 139. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure 140. Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure 141. Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1,500m around the subsea infrastructure 142. Exploration wells with wellheads and an area of 500 m around each wellhead. Lambert West Drilling and Tie-Back: 143. The Operational Area includes a radius of 4,500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities.

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Infrastructure	• Wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals, and explorations wells with wellhead
Vessels	• Moored MODU, DP MODU or hybrid moored/DP MODU • Primary Installation Vessel • Inspection, Monitor, Maintenance and Repair (IMMR) Vessel • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and general supply/support vessels

Feedback:
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Your feedback and our response will be included in our Environment Plan 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 2009* (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA

Regards,

1.23 Email sent to Shire of Exmouth (22 June 2023)

Dear [redacted]

Woodside is planning to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

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Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

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Activity: Angel Facility Operations Environment Plan

Angel Facility Operations Environment Plan

Summary	Routine Operations: • Routine production and operations (Lambert Deep, LDA-01; incorporation of Lambert West, LDA-02 following drilling and tie-back). • Routine inspection, monitoring, maintenance and repair (IMMR) activities. • Non-routine and unplanned activities and incidents associated with the above. Lambert West Drilling and Tie-back: • Drill one new well (LDA-02) in the Lambert West (LW) field. • Installation of a subsea distribution unit, flexible flowline and flying leads and disconnection of the existing LDA-01 well flying leads from the Lambert Deep Umbilical Termination Assembly reconnecting it to the subsea distribution unit. • Pre-commissioning and commissioning activities
Permit Area	Activities will occur predominantly within the WA-3-L and WA-16-L title areas and the Pipeline licence areas within WA-14-PL and WA-31-PL.
Location	~ 126 km north-north-west of Dampier
Approx. Water Depth (m)	~ 70 – 130 m
Schedule	Routine Operations: • Ongoing Lambert West Drilling and Tie-Back: • Drilling is currently anticipated in Q3 2024, subject to EP approval. • Subsea installation is currently anticipated to commence when the relevant wells have been drilled in Q4 2024 / Q1 2025, subject to EP approval. • Pre-commissioning and commissioning activities are currently anticipated to commence in H1 2025, subject to EP approval.
Approx. Estimated Duration	Drilling: • Activities are currently anticipated to take approximately 50 - 60 days per well to complete. Subsea installation and commissioning: • Activities are currently anticipated to have a cumulative duration of around four 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.

Exclusionary/ Cautionary Zone	Routine Operations: 145. The Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility 146. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure 147. Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure 148. Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1,500m around the subsea infrastructure 149. Exploration wells with wellheads and an area of 500 m around each wellhead. Lambert West Drilling and Tie-Back: 150. The Operational Area includes a radius of 4,500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities. 151. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
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Vessels	• Moored MODU, DP MODU or hybrid moored/DP MODU • Primary Installation Vessel • Inspection, Monitor, Maintenance and Repair (IMMR) Vessel • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and general supply/support 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 **22 July 2023.**

Your feedback and our response will be included in our Environment Plan 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 2009* (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

Regards,

1.24 Email sent to Shire of Ashburton (22 June 2023)

Dear [redacted]

Woodside is planning to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Environment that May Be Affected (EMBA)

Following recent 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, the broadest extent of the EMBA has been determined by the highly unlikely event of a hydrocarbon release from activities within the scope the EP. The worst-case credible spill scenario for this EP is a well loss of integrity.

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.

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.

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 **22 July 2023**.

Activity: Angel Facility Operations Environment Plan

Angel Facility Operations Environment Plan	
Summary	Routine Operations: • Routine production and operations (Lambert Deep, LDA-01; incorporation of Lambert West, LDA-02 following drilling and tie-back). • Routine inspection, monitoring, maintenance and repair (IMMR) activities. • Non-routine and unplanned activities and incidents associated with the above. Lambert West Drilling and Tie-back: • Drill one new well (LDA-02) in the Lambert West (LW) field. • Installation of a subsea distribution unit, flexible flowline and flying leads and disconnection of the existing LDA-01 well flying leads from the Lambert Deep Umbilical Termination Assembly reconnecting it to the subsea distribution unit. • Pre-commissioning and commissioning activities
Permit Area	Activities will occur predominantly within the WA-3-L and WA-16-L title areas and the Pipeline licence areas within WA-14-PL and WA-31-PL.
Location	~ 126 km north-north-west of Dampier
Approx. Water Depth (m)	~ 70 – 130 m
Schedule	Routine Operations: • Ongoing Lambert West Drilling and Tie-Back: • Drilling is currently anticipated in Q3 2024, subject to EP approval. • Subsea installation is currently anticipated to commence when the relevant wells have been drilled in Q4 2024 / Q1 2025, subject to EP approval. • Pre-commissioning and commissioning activities are currently anticipated to commence in H1 2025, subject to EP approval.
Approx. Estimated Duration	Drilling: • Activities are currently anticipated to take approximately 50 - 60 days per well to complete. Subsea installation and commissioning:

	• Activities are currently anticipated to have a cumulative duration of around four 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.
Exclusionary/ Cautionary Zone	Routine Operations: 152. The Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility 153. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure 154. Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure 155. Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1,500m around the subsea infrastructure 156. Exploration wells with wellheads and an area of 500 m around each wellhead. Lambert West Drilling and Tie-Back: 157. The Operational Area includes a radius of 4,500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities. 158. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	• Wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals, and explorations wells with wellhead
Vessels	• Moored MODU, DP MODU or hybrid moored/DP MODU • Primary Installation Vessel • Inspection, Monitor, Maintenance and Repair (IMMR) Vessel • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and general supply/support 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 **22 July 2023.**

Your feedback and our response will be included in our Environment Plan 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 2009* (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

Regards,

1.25 Email to City of Karratha (22 June 2023)

Dear [redacted]

Woodside is planning to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Environment that May Be Affected (EMBA)

Following recent 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, the broadest extent of the EMBA has been determined by the highly unlikely event of a hydrocarbon release from

activities within the scope the EP. The worst-case credible spill scenario for this EP is a well loss of integrity.

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.

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.

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 **22 July 2023**.

Activity: Angel Facility Operations Environment Plan

Angel Facility Operations Environment Plan	
Summary	Routine Operations: • Routine production and operations (Lambert Deep, LDA-01; incorporation of Lambert West, LDA-02 following drilling and tie-back). • Routine inspection, monitoring, maintenance and repair (IMMR) activities. • Non-routine and unplanned activities and incidents associated with the above. Lambert West Drilling and Tie-back: • Drill one new well (LDA-02) in the Lambert West (LW) field. • Installation of a subsea distribution unit, flexible flowline and flying leads and disconnection of the existing LDA-01 well flying leads from the Lambert Deep Umbilical Termination Assembly reconnecting it to the subsea distribution unit. • Pre-commissioning and commissioning activities
Permit Area	Activities will occur predominantly within the WA-3-L and WA-16-L title areas and the Pipeline licence areas within WA-14-PL and WA-31-PL.
Location	~ 126 km north-north-west of Dampier
Approx. Water Depth (m)	~ 70 – 130 m
Schedule	Routine Operations: • Ongoing Lambert West Drilling and Tie-Back: • Drilling is currently anticipated in Q3 2024, subject to EP approval. • Subsea installation is currently anticipated to commence when the relevant wells have been drilled in Q4 2024 / Q1 2025, subject to EP approval.

	• Pre-commissioning and commissioning activities are currently anticipated to commence in H1 2025, subject to EP approval.
Approx. Estimated Duration	Drilling: • Activities are currently anticipated to take approximately 50 - 60 days per well to complete. Subsea installation and commissioning: • Activities are currently anticipated to have a cumulative duration of around four 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.
Exclusionary/ Cautionary Zone	Routine Operations: 159. The Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility 160. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure 161. Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure 162. Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1,500m around the subsea infrastructure 163. Exploration wells with wellheads and an area of 500 m around each wellhead. Lambert West Drilling and Tie-Back: 164. The Operational Area includes a radius of 4,500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities. 165. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	• Wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals, and explorations wells with wellhead
Vessels	• Moored MODU, DP MODU or hybrid moored/DP MODU • Primary Installation Vessel • Inspection, Monitor, Maintenance and Repair (IMMR) Vessel • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and general supply/support 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 **22 July 2023.**

Your feedback and our response will be included in our Environment Plan 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 2009* (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

Regards,

1.26 Email to Shire of Broome (22 June 2023)

Dear [redacted]

Woodside is planning to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Environment that May Be Affected (EMBA)
Following recent 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, the broadest extent of the EMBA has been determined by the highly unlikely event of a hydrocarbon release from activities within the scope the EP. The worst-case credible spill scenario for this EP is a well loss of integrity.

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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 **22 July 2023**.

Activity: Angel Facility Operations Environment Plan

Angel Facility Operations Environment Plan	
Summary	Routine Operations: • Routine production and operations (Lambert Deep, LDA-01; incorporation of Lambert West, LDA-02 following drilling and tie-back). • Routine inspection, monitoring, maintenance and repair (IMMR) activities. • Non-routine and unplanned activities and incidents associated with the above. Lambert West Drilling and Tie-back: • Drill one new well (LDA-02) in the Lambert West (LW) field. • Installation of a subsea distribution unit, flexible flowline and flying leads and disconnection of the existing LDA-01 well flying leads from the Lambert Deep Umbilical Termination Assembly reconnecting it to the subsea distribution unit. • Pre-commissioning and commissioning activities
Permit Area	Activities will occur predominantly within the WA-3-L and WA-16-L title areas and the Pipeline licence areas within WA-14-PL and WA-31-PL.
Location	~ 126 km north-north-west of Dampier
Approx. Water Depth (m)	~ 70 – 130 m

Schedule	Routine Operations: • Ongoing Lambert West Drilling and Tie-Back: • Drilling is currently anticipated in Q3 2024, subject to EP approval. • Subsea installation is currently anticipated to commence when the relevant wells have been drilled in Q4 2024 / Q1 2025, subject to EP approval. • Pre-commissioning and commissioning activities are currently anticipated to commence in H1 2025, subject to EP approval.
Approx. Estimated Duration	Drilling: • Activities are currently anticipated to take approximately 50 - 60 days per well to complete. Subsea installation and commissioning: • Activities are currently anticipated to have a cumulative duration of around four 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.
Exclusionary/ Cautionary Zone	Routine Operations: 166. The Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility 167. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure 168. Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure 169. Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1,500m around the subsea infrastructure 170. Exploration wells with wellheads and an area of 500 m around each wellhead. Lambert West Drilling and Tie-Back: 171. The Operational Area includes a radius of 4,500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities. 172. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	• Wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals, and explorations wells with wellhead

Vessels	• Moored MODU, DP MODU or hybrid moored/DP MODU • Primary Installation Vessel • Inspection, Monitor, Maintenance and Repair (IMMR) Vessel • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and general supply/support vessels

Feedback:
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Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

Regards,

1.27 Email to Town of Port Hedland (22 June 2023)

Dear Town of Port Hedland

Woodside is planning to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

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Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to

the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

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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 **22 July 2023**.

Activity: Angel Facility Operations Environment Plan

Angel Facility Operations Environment Plan	
Summary	Routine Operations: • Routine production and operations (Lambert Deep, LDA-01; incorporation of Lambert West, LDA-02 following drilling and tie-back). • Routine inspection, monitoring, maintenance and repair (IMMR) activities. • Non-routine and unplanned activities and incidents associated with the above. Lambert West Drilling and Tie-back: • Drill one new well (LDA-02) in the Lambert West (LW) field. • Installation of a subsea distribution unit, flexible flowline and flying leads and disconnection of the existing LDA-01 well flying leads from the Lambert Deep Umbilical Termination Assembly reconnecting it to the subsea distribution unit. • Pre-commissioning and commissioning activities

Permit Area	Activities will occur predominantly within the WA-3-L and WA-16-L title areas and the Pipeline licence areas within WA-14-PL and WA-31-PL.
Location	~ 126 km north-north-west of Dampier
Approx. Water Depth (m)	~ 70 – 130 m
Schedule	Routine Operations: • Ongoing Lambert West Drilling and Tie-Back: • Drilling is currently anticipated in Q3 2024, subject to EP approval. • Subsea installation is currently anticipated to commence when the relevant wells have been drilled in Q4 2024 / Q1 2025, subject to EP approval. • Pre-commissioning and commissioning activities are currently anticipated to commence in H1 2025, subject to EP approval.
Approx. Estimated Duration	Drilling: • Activities are currently anticipated to take approximately 50 - 60 days per well to complete. Subsea installation and commissioning: • Activities are currently anticipated to have a cumulative duration of around four 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.
Exclusionary/ Cautionary Zone	Routine Operations: 173. The Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility 174. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure 175. Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure 176. Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1,500m around the subsea infrastructure 177. Exploration wells with wellheads and an area of 500 m around each wellhead. Lambert West Drilling and Tie-Back: 178. The Operational Area includes a radius of 4,500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities.

	179. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	• Wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals, and explorations wells with wellhead
Vessels	• Moored MODU, DP MODU or hybrid moored/DP MODU • Primary Installation Vessel • Inspection, Monitor, Maintenance and Repair (IMMR) Vessel • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and general supply/support vessels

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Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

Regards,

1.28 Email sent to Exmouth Community Liaison Group (22 June 2023)

Dear Exmouth Community Liaison Group

Woodside is planning to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

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Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

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Activity: Angel Facility Operations Environment Plan

Angel Facility Operations Environment Plan

Summary	Routine Operations: • Routine production and operations (Lambert Deep, LDA-01; incorporation of Lambert West, LDA-02 following drilling and tie-back). • Routine inspection, monitoring, maintenance and repair (IMMR) activities. • Non-routine and unplanned activities and incidents associated with the above. Lambert West Drilling and Tie-back: • Drill one new well (LDA-02) in the Lambert West (LW) field. • Installation of a subsea distribution unit, flexible flowline and flying leads and disconnection of the existing LDA-01 well flying leads from the Lambert Deep Umbilical Termination Assembly reconnecting it to the subsea distribution unit. • Pre-commissioning and commissioning activities
Permit Area	Activities will occur predominantly within the WA-3-L and WA-16-L title areas and the Pipeline licence areas within WA-14-PL and WA-31-PL.
Location	~ 126 km north-north-west of Dampier
Approx. Water Depth (m)	~ 70 – 130 m
Schedule	Routine Operations: • Ongoing Lambert West Drilling and Tie-Back: • Drilling is currently anticipated in Q3 2024, subject to EP approval. • Subsea installation is currently anticipated to commence when the relevant wells have been drilled in Q4 2024 / Q1 2025, subject to EP approval. • Pre-commissioning and commissioning activities are currently anticipated to commence in H1 2025, subject to EP approval.
Approx. Estimated Duration	Drilling: • Activities are currently anticipated to take approximately 50 - 60 days per well to complete. Subsea installation and commissioning: • Activities are currently anticipated to have a cumulative duration of around four 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.

Exclusionary/ Cautionary Zone	Routine Operations: 180. The Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility 181. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure 182. Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure 183. Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1,500m around the subsea infrastructure 184. Exploration wells with wellheads and an area of 500 m around each wellhead. Lambert West Drilling and Tie-Back: 185. The Operational Area includes a radius of 4,500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities. 186. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	• Wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals, and explorations wells with wellhead
Vessels	• Moored MODU, DP MODU or hybrid moored/DP MODU • Primary Installation Vessel • Inspection, Monitor, Maintenance and Repair (IMMR) Vessel • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and general supply/support 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 **22 July 2023.**

Your feedback and our response will be included in our Environment Plan 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 2009* (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

Regards,

1.29 Email sent to Karratha Community Liaison Group (22 June 2023)

Dear Karratha Community Liaison Group

Woodside is planning to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Environment that May Be Affected (EMBA)

Following recent 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, the broadest extent of the EMBA has been determined by the highly unlikely event of a hydrocarbon release from activities within the scope the EP. The worst-case credible spill scenario for this EP is a well loss of integrity.

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.

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.

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 **22 July 2023**.

Activity: Angel Facility Operations Environment Plan

Angel Facility Operations Environment Plan	
Summary	Routine Operations: • Routine production and operations (Lambert Deep, LDA-01; incorporation of Lambert West, LDA-02 following drilling and tie-back). • Routine inspection, monitoring, maintenance and repair (IMMR) activities. • Non-routine and unplanned activities and incidents associated with the above. Lambert West Drilling and Tie-back: • Drill one new well (LDA-02) in the Lambert West (LW) field. • Installation of a subsea distribution unit, flexible flowline and flying leads and disconnection of the existing LDA-01 well flying leads from the Lambert Deep Umbilical Termination Assembly reconnecting it to the subsea distribution unit. • Pre-commissioning and commissioning activities
Permit Area	Activities will occur predominantly within the WA-3-L and WA-16-L title areas and the Pipeline licence areas within WA-14-PL and WA-31-PL.
Location	~ 126 km north-north-west of Dampier
Approx. Water Depth (m)	~ 70 – 130 m
Schedule	Routine Operations: • Ongoing Lambert West Drilling and Tie-Back: • Drilling is currently anticipated in Q3 2024, subject to EP approval. • Subsea installation is currently anticipated to commence when the relevant wells have been drilled in Q4 2024 / Q1 2025, subject to EP approval. • Pre-commissioning and commissioning activities are currently anticipated to commence in H1 2025, subject to EP approval.
Approx. Estimated Duration	Drilling: • Activities are currently anticipated to take approximately 50 - 60 days per well to complete. Subsea installation and commissioning:

	• Activities are currently anticipated to have a cumulative duration of around four 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.
Exclusionary/ Cautionary Zone	Routine Operations: 187. The Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility 188. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure 189. Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure 190. Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1,500m around the subsea infrastructure 191. Exploration wells with wellheads and an area of 500 m around each wellhead. Lambert West Drilling and Tie-Back: 192. The Operational Area includes a radius of 4,500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities. 193. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	• Wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals, and explorations wells with wellhead
Vessels	• Moored MODU, DP MODU or hybrid moored/DP MODU • Primary Installation Vessel • Inspection, Monitor, Maintenance and Repair (IMMR) Vessel • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and general supply/support 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 **22 July 2023.**

Your feedback and our response will be included in our Environment Plan 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 2009* (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

Regards,

1.30 Email sent to Onslow Chamber of Commerce and Industry (22 June 2023)

Dear [redacted]

Woodside is planning to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Environment that May Be Affected (EMBA)

Following recent 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, the broadest extent of the EMBA has been determined by the highly unlikely event of a hydrocarbon release from activities within the scope the EP. The worst-case credible spill scenario for this EP is a well loss of integrity.

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.

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.

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 **22 July 2023**.

Activity: Angel Facility Operations Environment Plan

Angel Facility Operations Environment Plan	
Summary	Routine Operations: • Routine production and operations (Lambert Deep, LDA-01; incorporation of Lambert West, LDA-02 following drilling and tie-back). • Routine inspection, monitoring, maintenance and repair (IMMR) activities. • Non-routine and unplanned activities and incidents associated with the above. Lambert West Drilling and Tie-back: • Drill one new well (LDA-02) in the Lambert West (LW) field. • Installation of a subsea distribution unit, flexible flowline and flying leads and disconnection of the existing LDA-01 well flying leads from the Lambert Deep Umbilical Termination Assembly reconnecting it to the subsea distribution unit. • Pre-commissioning and commissioning activities
Permit Area	Activities will occur predominantly within the WA-3-L and WA-16-L title areas and the Pipeline licence areas within WA-14-PL and WA-31-PL.
Location	~ 126 km north-north-west of Dampier
Approx. Water Depth (m)	~ 70 – 130 m
Schedule	Routine Operations: • Ongoing Lambert West Drilling and Tie-Back: • Drilling is currently anticipated in Q3 2024, subject to EP approval.

	• Subsea installation is currently anticipated to commence when the relevant wells have been drilled in Q4 2024 / Q1 2025, subject to EP approval. • Pre-commissioning and commissioning activities are currently anticipated to commence in H1 2025, subject to EP approval.
Approx. Estimated Duration	Drilling: • Activities are currently anticipated to take approximately 50 - 60 days per well to complete. Subsea installation and commissioning: • Activities are currently anticipated to have a cumulative duration of around four 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.
Exclusionary/ Cautionary Zone	Routine Operations: 194. The Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility 195. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure 196. Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure 197. Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1,500m around the subsea infrastructure 198. Exploration wells with wellheads and an area of 500 m around each wellhead. Lambert West Drilling and Tie-Back: 199. The Operational Area includes a radius of 4,500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities. 200. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	• Wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals, and explorations wells with wellhead
Vessels	• Moored MODU, DP MODU or hybrid moored/DP MODU • Primary Installation Vessel • Inspection, Monitor, Maintenance and Repair (IMMR) Vessel • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and general supply/support 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 **22 July 2023.**

Your feedback and our response will be included in our Environment Plan 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 2009* (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

Regards,

1.31 Email sent to Port Hedland Chamber of Commerce and Industry (22 June 2023)

Dear Port Hedland Chamber of Commerce and Industry

Woodside is planning to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Environment that May Be Affected (EMBA)
Following recent 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, the broadest extent of the EMBA has been determined by the highly unlikely event of a hydrocarbon release from activities within the scope the EP. The worst-case credible spill scenario for this EP is a well loss of integrity.

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.

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.

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 **22 July 2023**.

Activity: Angel Facility Operations Environment Plan

Angel Facility Operations Environment Plan	
Summary	Routine Operations: • Routine production and operations (Lambert Deep, LDA-01; incorporation of Lambert West, LDA-02 following drilling and tie-back). • Routine inspection, monitoring, maintenance and repair (IMMR) activities. • Non-routine and unplanned activities and incidents associated with the above. Lambert West Drilling and Tie-back: • Drill one new well (LDA-02) in the Lambert West (LW) field. • Installation of a subsea distribution unit, flexible flowline and flying leads and disconnection of the existing LDA-01 well flying leads from the Lambert Deep Umbilical Termination Assembly reconnecting it to the subsea distribution unit. • Pre-commissioning and commissioning activities
Permit Area	Activities will occur predominantly within the WA-3-L and WA-16-L title areas and the Pipeline licence areas within WA-14-PL and WA-31-PL.
Location	~ 126 km north-north-west of Dampier

Approx. Water Depth (m)	~ 70 – 130 m
Schedule	Routine Operations: • Ongoing Lambert West Drilling and Tie-Back: • Drilling is currently anticipated in Q3 2024, subject to EP approval. • Subsea installation is currently anticipated to commence when the relevant wells have been drilled in Q4 2024 / Q1 2025, subject to EP approval. • Pre-commissioning and commissioning activities are currently anticipated to commence in H1 2025, subject to EP approval.
Approx. Estimated Duration	Drilling: • Activities are currently anticipated to take approximately 50 - 60 days per well to complete. Subsea installation and commissioning: • Activities are currently anticipated to have a cumulative duration of around four 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.
Exclusionary/ Cautionary Zone	Routine Operations: 201. The Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility 202. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure 203. Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure 204. Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1,500m around the subsea infrastructure 205. Exploration wells with wellheads and an area of 500 m around each wellhead. Lambert West Drilling and Tie-Back: 206. The Operational Area includes a radius of 4,500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities. 207. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.

Infrastructure	• Wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals, and explorations wells with wellhead
Vessels	• Moored MODU, DP MODU or hybrid moored/DP MODU • Primary Installation Vessel • Inspection, Monitor, Maintenance and Repair (IMMR) Vessel • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and general supply/support 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 **22 July 2023.**

Your feedback and our response will be included in our Environment Plan 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 2009* (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

Regards,

1.32 Email sent to Broome Chamber of Commerce and Industry (22 June 2023)

Dear Broome Chamber of Commerce

Woodside is planning to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Environment that May Be Affected (EMBA)
Following recent 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, the broadest extent of the EMBA has been determined by the highly unlikely event of a hydrocarbon release from activities within the scope the EP. The worst-case credible spill scenario for this EP is a well loss of integrity.

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.

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.

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 **22 July 2023**.

Activity: Angel Facility Operations Environment Plan

Angel Facility Operations Environment Plan	
Summary	Routine Operations: • Routine production and operations (Lambert Deep, LDA-01; incorporation of Lambert West, LDA-02 following drilling and tie-back). • Routine inspection, monitoring, maintenance and repair (IMMR) activities. • Non-routine and unplanned activities and incidents associated with the above. Lambert West Drilling and Tie-back: • Drill one new well (LDA-02) in the Lambert West (LW) field.

	• Installation of a subsea distribution unit, flexible flowline and flying leads and disconnection of the existing LDA-01 well flying leads from the Lambert Deep Umbilical Termination Assembly reconnecting it to the subsea distribution unit. • Pre-commissioning and commissioning activities
Permit Area	Activities will occur predominantly within the WA-3-L and WA-16-L title areas and the Pipeline licence areas within WA-14-PL and WA-31-PL.
Location	~ 126 km north-north-west of Dampier
Approx. Water Depth (m)	~ 70 – 130 m
Schedule	Routine Operations: • Ongoing Lambert West Drilling and Tie-Back: • Drilling is currently anticipated in Q3 2024, subject to EP approval. • Subsea installation is currently anticipated to commence when the relevant wells have been drilled in Q4 2024 / Q1 2025, subject to EP approval. • Pre-commissioning and commissioning activities are currently anticipated to commence in H1 2025, subject to EP approval.
Approx. Estimated Duration	Drilling: • Activities are currently anticipated to take approximately 50 - 60 days per well to complete. Subsea installation and commissioning: • Activities are currently anticipated to have a cumulative duration of around four 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.
Exclusionary/ Cautionary Zone	Routine Operations: 208. The Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility 209. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure 210. Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure 211. Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1,500m around the subsea infrastructure

	212. Exploration wells with wellheads and an area of 500 m around each wellhead. Lambert West Drilling and Tie-Back: 213. The Operational Area includes a radius of 4,500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities. 214. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	• Wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals, and explorations wells with wellhead
Vessels	• Moored MODU, DP MODU or hybrid moored/DP MODU • Primary Installation Vessel • Inspection, Monitor, Maintenance and Repair (IMMR) Vessel • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and general supply/support 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 **22 July 2023.**

Your feedback and our response will be included in our Environment Plan 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 2009* (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

Regards,

1.33 Email sent to Australian Conservation Foundation (ACF), Australian Marine Conservation Society (AMCS), Conservation Council of Western Australia (CCWA), Greenpeace Australia Pacific (GAP), Sea Shepherd Australia (SSA), and 350 Australia (350A) (22 June 2023)

Dear Stakeholder

Woodside is planning to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Environment that May Be Affected (EMBA)

Following recent 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, the broadest extent of the EMBA has been determined by the highly unlikely event of a hydrocarbon release from activities within the scope the EP. The worst-case credible spill scenario for this EP is a well loss of integrity.

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.

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.

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 **22 July 2023**.

Activity: Angel Facility Operations Environment Plan

Angel Facility Operations Environment Plan	
Summary	Routine Operations: • Routine production and operations (Lambert Deep, LDA-01; incorporation of Lambert West, LDA-02 following drilling and tie-back). • Routine inspection, monitoring, maintenance and repair (IMMR) activities. • Non-routine and unplanned activities and incidents associated with the above. Lambert West Drilling and Tie-back: • Drill one new well (LDA-02) in the Lambert West (LW) field. • Installation of a subsea distribution unit, flexible flowline and flying leads and disconnection of the existing LDA-01 well flying leads from the Lambert Deep Umbilical Termination Assembly reconnecting it to the subsea distribution unit. • Pre-commissioning and commissioning activities
Permit Area	Activities will occur predominantly within the WA-3-L and WA-16-L title areas and the Pipeline licence areas within WA-14-PL and WA-31-PL.
Location	~ 126 km north-north-west of Dampier
Approx. Water Depth (m)	~ 70 – 130 m
Schedule	Routine Operations: • Ongoing Lambert West Drilling and Tie-Back: • Drilling is currently anticipated in Q3 2024, subject to EP approval. • Subsea installation is currently anticipated to commence when the relevant wells have been drilled in Q4 2024 / Q1 2025, subject to EP approval. • Pre-commissioning and commissioning activities are currently anticipated to commence in H1 2025, subject to EP approval.
Approx. Estimated Duration	Drilling: • Activities are currently anticipated to take approximately 50 - 60 days per well to complete. Subsea installation and commissioning: • Activities are currently anticipated to have a cumulative duration of around four 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.

Exclusionary/ Cautionary Zone	Routine Operations: 215. The Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility 216. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure 217. Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure 218. Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1,500m around the subsea infrastructure 219. Exploration wells with wellheads and an area of 500 m around each wellhead. Lambert West Drilling and Tie-Back: 220. The Operational Area includes a radius of 4,500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities. 221. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	• Wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals, and explorations wells with wellhead
Vessels	• Moored MODU, DP MODU or hybrid moored/DP MODU • Primary Installation Vessel • Inspection, Monitor, Maintenance and Repair (IMMR) Vessel • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and general supply/support 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 **22 July 2023.**

Your feedback and our response will be included in our Environment Plan 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 2009* (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

Regards,

1.33.1 Email sent to 350 Australia (350A) (23 June 2023)

Dear Stakeholder

(Resending as colleague on maternity leave)
Woodside is planning to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Environment that May Be Affected (EMBA)
Following recent 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, the broadest extent of the EMBA has been determined by the highly unlikely event of a hydrocarbon release from activities within the scope the EP. The worst-case credible spill scenario for this EP is a well loss of integrity.

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.

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.

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 **22 July 2023**.

Activity: Angel Facility Operations Environment Plan

Angel Facility Operations Environment Plan	
Summary	Routine Operations: • Routine production and operations (Lambert Deep, LDA-01; incorporation of Lambert West, LDA-02 following drilling and tie-back). • Routine inspection, monitoring, maintenance and repair (IMMR) activities. • Non-routine and unplanned activities and incidents associated with the above. Lambert West Drilling and Tie-back: • Drill one new well (LDA-02) in the Lambert West (LW) field. • Installation of a subsea distribution unit, flexible flowline and flying leads and disconnection of the existing LDA-01 well flying leads from the Lambert Deep Umbilical Termination Assembly reconnecting it to the subsea distribution unit. • Pre-commissioning and commissioning activities
Permit Area	Activities will occur predominantly within the WA-3-L and WA-16-L title areas and the Pipeline licence areas within WA-14-PL and WA-31-PL.
Location	~ 126 km north-north-west of Dampier
Approx. Water Depth (m)	~ 70 – 130 m
Schedule	Routine Operations: • Ongoing Lambert West Drilling and Tie-Back: • Drilling is currently anticipated in Q3 2024, subject to EP approval. • Subsea installation is currently anticipated to commence when the relevant wells have been drilled in Q4 2024 / Q1 2025, subject to EP approval. • Pre-commissioning and commissioning activities are currently anticipated to commence in H1 2025, subject to EP approval.

Approx. Estimated Duration	Drilling: • Activities are currently anticipated to take approximately 50 - 60 days per well to complete. Subsea installation and commissioning: • Activities are currently anticipated to have a cumulative duration of around four 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.
Exclusionary/ Cautionary Zone	Routine Operations: 222. The Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility 223. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure 224. Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure 225. Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1,500m around the subsea infrastructure 226. Exploration wells with wellheads and an area of 500 m around each wellhead. Lambert West Drilling and Tie-Back: 227. The Operational Area includes a radius of 4,500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities. 228. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	• Wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals, and explorations wells with wellhead
Vessels	• Moored MODU, DP MODU or hybrid moored/DP MODU • Primary Installation Vessel • Inspection, Monitor, Maintenance and Repair (IMMR) Vessel • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and general supply/support 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 **22 July 2023.**

Your feedback and our response will be included in our Environment Plan 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 2009* (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

Regards,

1.34 Email sent to Cape Conservation Group (CCG) (22 June 2023)

Dear [redacted]

Woodside is planning to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Environment that May Be Affected (EMBA)
Following recent 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, the broadest extent of the EMBA has been determined by the highly unlikely event of a hydrocarbon release from activities within the scope the EP. The worst-case credible spill scenario for this EP is a well loss of integrity.

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.

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.

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 **22 July 2023**.

Activity: Angel Facility Operations Environment Plan

Angel Facility Operations Environment Plan	
Summary	Routine Operations: • Routine production and operations (Lambert Deep, LDA-01; incorporation of Lambert West, LDA-02 following drilling and tie-back). • Routine inspection, monitoring, maintenance and repair (IMMR) activities. • Non-routine and unplanned activities and incidents associated with the above. Lambert West Drilling and Tie-back: • Drill one new well (LDA-02) in the Lambert West (LW) field. • Installation of a subsea distribution unit, flexible flowline and flying leads and disconnection of the existing LDA-01 well flying leads from the Lambert Deep Umbilical Termination Assembly reconnecting it to the subsea distribution unit. • Pre-commissioning and commissioning activities
Permit Area	Activities will occur predominantly within the WA-3-L and WA-16-L title areas and the Pipeline licence areas within WA-14-PL and WA-31-PL.
Location	~ 126 km north-north-west of Dampier
Approx. Water Depth (m)	~ 70 – 130 m
Schedule	Routine Operations: • Ongoing

	Lambert West Drilling and Tie-Back: • Drilling is currently anticipated in Q3 2024, subject to EP approval. • Subsea installation is currently anticipated to commence when the relevant wells have been drilled in Q4 2024 / Q1 2025, subject to EP approval. • Pre-commissioning and commissioning activities are currently anticipated to commence in H1 2025, subject to EP approval.
Approx. Estimated Duration	Drilling: • Activities are currently anticipated to take approximately 50 - 60 days per well to complete. Subsea installation and commissioning: • Activities are currently anticipated to have a cumulative duration of around four 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.
Exclusionary/ Cautionary Zone	Routine Operations: 229. The Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility 230. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure 231. Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure 232. Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1,500m around the subsea infrastructure 233. Exploration wells with wellheads and an area of 500 m around each wellhead. Lambert West Drilling and Tie-Back: 234. The Operational Area includes a radius of 4,500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities. 235. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	• Wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals, and explorations wells with wellhead
Vessels	• Moored MODU, DP MODU or hybrid moored/DP MODU • Primary Installation Vessel

	• Inspection, Monitor, Maintenance and Repair (IMMR) Vessel • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and general supply/support 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 **22 July 2023.**

Your feedback and our response will be included in our Environment Plan 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 2009* (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

Regards,

1.35 Email sent to University of Western Australia (UWA) (22 June 2023)

Dear [redacted]

Woodside is planning to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Environment that May Be Affected (EMBA)
Following recent 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, the broadest extent of the EMBA has been determined by the highly unlikely event of a hydrocarbon release from activities within the scope the EP. The worst-case credible spill scenario for this EP is a well loss of integrity.

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.

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.

Woodside is seeking your advice regarding any research activities that UWA may be undertaking that may overlap with our proposed activities.

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 **22 July 2023**.

Activity: Angel Facility Operations Environment Plan

Angel Facility Operations Environment Plan	
Summary	Routine Operations: • Routine production and operations (Lambert Deep, LDA-01; incorporation of Lambert West, LDA-02 following drilling and tie-back). • Routine inspection, monitoring, maintenance and repair (IMMR) activities. • Non-routine and unplanned activities and incidents associated with the above. Lambert West Drilling and Tie-back: • Drill one new well (LDA-02) in the Lambert West (LW) field. • Installation of a subsea distribution unit, flexible flowline and flying leads and disconnection of the existing LDA-01 well flying leads from the Lambert Deep Umbilical Termination Assembly reconnecting it to the subsea distribution unit. • Pre-commissioning and commissioning activities

Permit Area	Activities will occur predominantly within the WA-3-L and WA-16-L title areas and the Pipeline licence areas within WA-14-PL and WA-31-PL.
Location	~ 126 km north-north-west of Dampier
Approx. Water Depth (m)	~ 70 – 130 m
Schedule	Routine Operations: • Ongoing Lambert West Drilling and Tie-Back: • Drilling is currently anticipated in Q3 2024, subject to EP approval. • Subsea installation is currently anticipated to commence when the relevant wells have been drilled in Q4 2024 / Q1 2025, subject to EP approval. • Pre-commissioning and commissioning activities are currently anticipated to commence in H1 2025, subject to EP approval.
Approx. Estimated Duration	Drilling: • Activities are currently anticipated to take approximately 50 - 60 days per well to complete. Subsea installation and commissioning: • Activities are currently anticipated to have a cumulative duration of around four 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.
Exclusionary/ Cautionary Zone	Routine Operations: 236. The Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility 237. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure 238. Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure 239. Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1,500m around the subsea infrastructure 240. Exploration wells with wellheads and an area of 500 m around each wellhead. Lambert West Drilling and Tie-Back: 241. The Operational Area includes a radius of 4,500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities.

	242. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	• Wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals, and explorations wells with wellhead
Vessels	• Moored MODU, DP MODU or hybrid moored/DP MODU • Primary Installation Vessel • Inspection, Monitor, Maintenance and Repair (IMMR) Vessel • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and general supply/support 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 **22 July 2023.**

Your feedback and our response will be included in our Environment Plan 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 2009* (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

Regards,

1.35.1 Email sent to University of Western Australia (UWA) (22 June 2023)

Dear [redacted]

Apologies – now with the correct information sheet attached.

Regards,

Woodside Feedback

Woodside Energy
Mia Yellagonga
Karlak, 11 Mount Street
Perth WA 6000

T: 1800 442 977
E: feedback@woodside.com.au
www.woodside.com

Australia

1.36 Email sent to Western Australian Marine Science Institution (WAMSI) (22 June 2023)

Dear [redacted]

Woodside is planning to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Environment that May Be Affected (EMBA)

Following recent 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, the broadest extent of the EMBA has been determined by the highly unlikely event of a hydrocarbon release from activities within the scope the EP. The worst-case credible spill scenario for this EP is a well loss of integrity.

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.

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.

Woodside is seeking your advice regarding any research activities that WAMSI may be undertaking that may overlap with our proposed activities.

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 **22 July 2023**.

Activity: Angel Facility Operations Environment Plan

Angel Facility Operations Environment Plan	
Summary	Routine Operations: • Routine production and operations (Lambert Deep, LDA-01; incorporation of Lambert West, LDA-02 following drilling and tie-back). • Routine inspection, monitoring, maintenance and repair (IMMR) activities. • Non-routine and unplanned activities and incidents associated with the above. Lambert West Drilling and Tie-back: • Drill one new well (LDA-02) in the Lambert West (LW) field. • Installation of a subsea distribution unit, flexible flowline and flying leads and disconnection of the existing LDA-01 well flying leads from the Lambert Deep Umbilical Termination Assembly reconnecting it to the subsea distribution unit. • Pre-commissioning and commissioning activities
Permit Area	Activities will occur predominantly within the WA-3-L and WA-16-L title areas and the Pipeline licence areas within WA-14-PL and WA-31-PL.
Location	~ 126 km north-north-west of Dampier
Approx. Water Depth (m)	~ 70 – 130 m
Schedule	Routine Operations: • Ongoing Lambert West Drilling and Tie-Back: • Drilling is currently anticipated in Q3 2024, subject to EP approval. • Subsea installation is currently anticipated to commence when the relevant wells have been drilled in Q4 2024 / Q1 2025, subject to EP approval. • Pre-commissioning and commissioning activities are currently anticipated to commence in H1 2025, subject to EP approval.

Approx. Estimated Duration	Drilling: • Activities are currently anticipated to take approximately 50 - 60 days per well to complete. Subsea installation and commissioning: • Activities are currently anticipated to have a cumulative duration of around four 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.
Exclusionary/ Cautionary Zone	Routine Operations: 243. The Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility 244. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure 245. Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure 246. Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1,500m around the subsea infrastructure 247. Exploration wells with wellheads and an area of 500 m around each wellhead. Lambert West Drilling and Tie-Back: 248. The Operational Area includes a radius of 4,500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities. 249. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	• Wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals, and explorations wells with wellhead
Vessels	• Moored MODU, DP MODU or hybrid moored/DP MODU • Primary Installation Vessel • Inspection, Monitor, Maintenance and Repair (IMMR) Vessel • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and general supply/support 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 **22 July 2023**.

Your feedback and our response will be included in our Environment Plan 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 2009* (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

Regards,

1.36.1 Email sent to Western Australian Marine Science Institution (WAMSI) (22 June 2023)

Dear [redacted]

Apologies – now with the correct information sheet attached.

Regards,

Woodside Feedback

Woodside Energy
Mia Yellagonga
Karlak, 11 Mount Street
Perth WA 6000
Australia

T: 1800 442 977
E: feedback@woodside.com.au
www.woodside.com

1.37 Email sent to Commonwealth Scientific and Industrial Research Organisation (CSIRO) (22 June 2023)

Dear [redacted]

Woodside is planning to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Environment that May Be Affected (EMBA)

Following recent 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, the broadest extent of the EMBA has been determined by the highly unlikely event of a hydrocarbon release from activities within the scope the EP. The worst-case credible spill scenario for this EP is a well loss of integrity.

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.

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.

Woodside is seeking your advice regarding any research activities that CSIRO may be undertaking that may overlap with our proposed activities.

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 **22 July 2023**.

Activity: Angel Facility Operations Environment Plan

Angel Facility Operations Environment Plan	
Summary	Routine Operations: • Routine production and operations (Lambert Deep, LDA-01; incorporation of Lambert West, LDA-02 following drilling and tie-back). • Routine inspection, monitoring, maintenance and repair (IMMR) activities.

	• Non-routine and unplanned activities and incidents associated with the above. Lambert West Drilling and Tie-back: • Drill one new well (LDA-02) in the Lambert West (LW) field. • Installation of a subsea distribution unit, flexible flowline and flying leads and disconnection of the existing LDA-01 well flying leads from the Lambert Deep Umbilical Termination Assembly reconnecting it to the subsea distribution unit. • Pre-commissioning and commissioning activities
Permit Area	Activities will occur predominantly within the WA-3-L and WA-16-L title areas and the Pipeline licence areas within WA-14-PL and WA-31-PL.
Location	~ 126 km north-north-west of Dampier
Approx. Water Depth (m)	~ 70 – 130 m
Schedule	Routine Operations: • Ongoing Lambert West Drilling and Tie-Back: • Drilling is currently anticipated in Q3 2024, subject to EP approval. • Subsea installation is currently anticipated to commence when the relevant wells have been drilled in Q4 2024 / Q1 2025, subject to EP approval. • Pre-commissioning and commissioning activities are currently anticipated to commence in H1 2025, subject to EP approval.
Approx. Estimated Duration	Drilling: • Activities are currently anticipated to take approximately 50 - 60 days per well to complete. Subsea installation and commissioning: • Activities are currently anticipated to have a cumulative duration of around four 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.
Exclusionary/ Cautionary Zone	Routine Operations: 250. The Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility 251. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure 252. Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure

	253. Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1,500m around the subsea infrastructure 254. Exploration wells with wellheads and an area of 500 m around each wellhead. Lambert West Drilling and Tie-Back: 255. The Operational Area includes a radius of 4,500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities. 256. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	• Wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals, and explorations wells with wellhead
Vessels	• Moored MODU, DP MODU or hybrid moored/DP MODU • Primary Installation Vessel • Inspection, Monitor, Maintenance and Repair (IMMR) Vessel • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and general supply/support 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 **22 July 2023**.

Your feedback and our response will be included in our Environment Plan 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 2009* (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

Regards,

1.38 Email sent to Australian Institute of Marine Science (AIMS) (22 June 2023)

Dear [redacted]

Woodside is planning to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Environment that May Be Affected (EMBA)

Following recent 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, the broadest extent of the EMBA has been determined by the highly unlikely event of a hydrocarbon release from activities within the scope the EP. The worst-case credible spill scenario for this EP is a well loss of integrity.

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.

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.

Woodside is seeking your advice regarding any research activities that AIMS may be undertaking that may overlap with our proposed activities.

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 **22 July 2023**.

Activity: Angel Facility Operations Environment Plan

Angel Facility Operations Environment Plan	
Summary	Routine Operations: • Routine production and operations (Lambert Deep, LDA-01; incorporation of Lambert West, LDA-02 following drilling and tie-back). • Routine inspection, monitoring, maintenance and repair (IMMR) activities. • Non-routine and unplanned activities and incidents associated with the above. Lambert West Drilling and Tie-back: • Drill one new well (LDA-02) in the Lambert West (LW) field. • Installation of a subsea distribution unit, flexible flowline and flying leads and disconnection of the existing LDA-01 well flying leads from the Lambert Deep Umbilical Termination Assembly reconnecting it to the subsea distribution unit. • Pre-commissioning and commissioning activities
Permit Area	Activities will occur predominantly within the WA-3-L and WA-16-L title areas and the Pipeline licence areas within WA-14-PL and WA-31-PL.
Location	~ 126 km north-north-west of Dampier
Approx. Water Depth (m)	~ 70 – 130 m
Schedule	Routine Operations: • Ongoing Lambert West Drilling and Tie-Back: • Drilling is currently anticipated in Q3 2024, subject to EP approval. • Subsea installation is currently anticipated to commence when the relevant wells have been drilled in Q4 2024 / Q1 2025, subject to EP approval. • Pre-commissioning and commissioning activities are currently anticipated to commence in H1 2025, subject to EP approval.
Approx. Estimated Duration	Drilling: • Activities are currently anticipated to take approximately 50 - 60 days per well to complete. Subsea installation and commissioning: • Activities are currently anticipated to have a cumulative duration of around four 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.
Exclusionary/ Cautionary Zone	Routine Operations: 257. The Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility 258. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure 259. Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure 260. Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1,500m around the subsea infrastructure 261. Exploration wells with wellheads and an area of 500 m around each wellhead. Lambert West Drilling and Tie-Back: 262. The Operational Area includes a radius of 4,500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities. 263. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	• Wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals, and explorations wells with wellhead
Vessels	• Moored MODU, DP MODU or hybrid moored/DP MODU • Primary Installation Vessel • Inspection, Monitor, Maintenance and Repair (IMMR) Vessel • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and general supply/support 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 **22 July 2023.**

Your feedback and our response will be included in our Environment Plan 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 2009* (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

Regards,

1.38.1 Australian Institute of Marine Science (AIMS) (22 June 2023)

Dear [redacted]

Apologies – now with the correct information sheet attached.

Regards,

Woodside Feedback

Woodside Energy
Mia Yellagonga
Karlak, 11 Mount Street
Perth WA 6000
Australia

T: 1800 442 977
E: feedback@woodside.com.au
www.woodside.com

1.39 State shipwrecks sent to Western Australian Museum (22 June 2023)

Vessel Name	When Lost	Where Lost	Latitude	Longitude
Trial	1622/05/24	Trial Rocks	-20.29	115.37
Lady Ann	18/09/1982	24 miles north of NW Cape	-21.4	114.2

1.40 State shipwrecks sent to Department of Planning, Lands and Heritage (DPLH) (22 June 2023)

Vessel Name	When Lost	Where Lost	Latitude	Longitude
Trial	1622/05/24	Trial Rocks	-20.29	115.37
Lady Ann	18/09/1982	24 miles north of NW Cape	-21.4	114.2

1.41 Commonwealth shipwrecks sent to DCCEEW (22 June 2023)

Vessel Name	Wreck Year	Where Lost	Latitude	Longitude
Olive	1893	Exmouth Gulf	-21.75	114.08
Parks Lugger		Hermite Island. Montebello Islands	-20.48	115.53
Pearl	1896	Exmouth Gulf, Meda Creek	-21.75	114.08
Vianen	1628	Barrow Island Area	-20	115.17
Wild Wave (China)	1873	Monte Bello Island	-20	115.17
Smuggler	1893	Exmouth Gulf	-21.75	114.08
Haw Kiet	2003		-18.46	117.26
Mabel	1893	Exmouth Gulf	-21.75	114.08
Marietta	1905	Barrow Island	-20	115.17
Lady Ann	1982	24 miles north of NW Cape	-21.4	114.2
Lamareaux	1893	Exmouth Gulf	-21.75	114.08
Leave	1893	Exmouth Gulf	-21.75	114.08
Agnes	1893	Exmouth Gulf	-21.75	114.08
Beatrice	1899	Off North-West Cape	-21.62	113.98
Bell	1893	Exmouth	-21.75	114.08
Elizabeth	1893	Exmouth Gulf	-21.75	114.08
Florence	1893	Exmouth Gulf	-21.75	114.08
Tanami		Trial Rocks	-20.28	115.37
Trial	1622	Trial Rocks	-20.29	115.38
Unidentified Lugger	1893	Exmouth Gulf	-21.75	114.08
Veronica	1928	Sunday Island, Exmouth Gulf	-21.68	114.38

Lily Of The Lake	1875	Exmouth Gulf	-21.75	114.08
Ruby	1893	Exmouth Gulf	-21.75	114.08
Sea Queen	1893	Exmouth Gulf	-21.75	114.08
Wild Wave	1875	Exmouth Gulf	-21.75	114.08
Gem	1893	North West Cape	-21.62	113.98
Ellen	1893	Exmouth Gulf	-21.75	114.08
Kapala	1964	Exmouth Gulf	-21.75	114.08
Curlew	1911	At Onslow, Monte Bellos Group	-20	115.17
Nellie	1893	Exmouth Gulf	-21.75	114.08
McCormack	1989	N.E. tip of Eaglehawk Island West of Dampier,	-20.14	115.95
McDermott Derrick Barge No 20	1989	N.E. tip of Eaglehawk Island, Dampier Archipelago	-20.14	115.95
Plym HMS	1952		-20.4	115.57
Tropic Queen	1975		-20.43	115.5

1.42 State shipwrecks sent to Western Australian Museum (22 June 2023)

Vessel Name	When Lost	Where Lost	Latitude	Longitude
Trial	1622/05/24	Trial Rocks	-20.29	115.37
Lady Ann	18/09/1982	24 miles north of NW Cape	-21.4	114.2

1.43 Newspaper Ads (7 June 2023)

Midwest Times

ENVIRONMENT PLANS NOTICE

Woodside Energy (Australia) Pty Ltd (ACN 006 923 870) is proposing to conduct activities in State and Commonwealth waters as described below:

Macedon Operations Commonwealth and State Environment Plans (EPs) (Macedon Joint Venture)

Activity summary:	The EPs for Macedon Operations activities in Commonwealth and State waters are being revised in accordance with the five-yearly Operations EP review cycle. The continuation of Macedon operations activities includes routine production and operations and the routine inspection, monitoring, maintenance and repair activities associated with: • four subsea wells with potential for a fifth subsea well (located in Commonwealth waters); • two non-producing wells with wellheads (located in Commonwealth waters); • section of Wet Gas Pipeline located in Commonwealth waters; • section of Wet Gas Pipeline located in State waters and onshore; • Dry Sales Gas Pipeline located onshore. Routine operational activities also include the rehabilitation and remediation of the onshore wet and dry gas pipelines. The EP also considers non-routine and unplanned activities and incidents associated with the above activities.
Location:	The Macedon gas field is located in Commonwealth waters approximately 40 km north of Exmouth and approximately 100 km west of Onslow. The Macedon Gas Plant is located onshore approximately 17 km south west of Onslow in the Pilbara region of WA. A pipeline transports gas from the field to the gas plant and from the gas plant into the Dampier to Bunbury Pipeline.
Commencement timing:	Following acceptance of EP
Estimated duration:	Five years of operations following EP acceptance

Woodside Energy Ltd (ACN 005 482 986) is proposing to conduct activities in Commonwealth waters as described below:

Angel Facility Operations Environment Plan (NWS Joint Venture)

Activity summary:	The EP is being revised to integrate drilling, subsea installation, commissioning and planned production from the Lambert West tie-back into the Angel production systems via the existing Lambert Deep subsea infrastructure. Aside from the production changes associated with Lambert West, the routine operational aspects of the EP remain the same as the existing EP and proposes to extend to the Lambert West tie-back. This includes routine production and operations and the routine inspection, monitoring, maintenance and repair activities of subsea infrastructure including a number of exploration wells not linked to the production systems.
Location:	Approximately 125 km north-west of Karratha
Commencement timing:	*Angel Operations:* Production at the Angel facility commenced in 2008 and is ongoing. *Lambert West Drilling and tie-back:* Drilling activities described in the EP are anticipated to commence around Q3 2024, subsea installation in Q4 2024, and commissioning activities in H1 2025 pending approvals, vessel availability and weather constraints.
Estimated duration:	*Angel Operations:* Five years of operations following EP acceptance *Lambert West Drilling and tie-back:* Approximately 60 days for drilling operations for the Lambert West well. Activities are planned to take place 24 hours, 7 days a week. Subsea installation activities are likely to take approximately four weeks.

Figure 1 and **Figure 2** illustrate the Operational Areas and the Environment That May Be Affected (EMBA) for Hurricane and Angel, respectively. Prediction of each EMBA is based on modelling of a composite of many different petroleum hydrocarbon spill scenarios of a highly unlikely, unplanned oil spill event could travel, based on weather and ocean conditions.

Woodside has undertaken an assessment to identify potential impacts and risks to the marine environment arising from both planned and unplanned activities. Mitigation and management measures have been developed for each of the risks and impacts identified and will be outlined in the relevant EP.

Impacts associated with Macedon Operations planned activities include the physical presence of marine vessels, vessel interaction with other marine users, seabed disturbance (such as survey equipment), noise, light, air emissions, marine discharges and onshore rehabilitation and remediation. Impacts that could occur due to an unplanned event include hydrocarbon releases (marine diesel), vessel collisions with marine fauna, additional seabed disturbance, invasive marine species, accidental loss of waste or other discharges.

Impacts associated with the Angel Operations planned activities include the physical presence of operational vessels, interaction with other marine users, seabed disturbance (such as survey equipment), noise, light, air emissions and marine discharges. Impacts directly associated with the drilling and tie-back activities include physical presence of mobile offshore Drilling Unit (MODU) and project support vessels, seabed disturbance (such as infrastructure placement), drilling and commissioning activities (such as noise, light, air emissions and marine discharges). Impacts that could occur due to an unplanned event include hydrocarbon releases (condensate or marine diesel), vessel collisions with marine fauna, additional seabed disturbance, invasive marine species, accidental loss of waste or other discharges.

Figure 1 and **Figure 2** illustrate an indicative EMBA for Macedon Operations and Angel Operations, respectively, to support persons or organisations understanding of whether their functions, interests or activities may be affected by the proposed activities, with detailed information found in Woodside's Consultation Information Sheets.

Figure 1 The indicative EMBA associated with Macedon Commonwealth and State Operations Environment Plans

Figure 2 The indicative EMBA associated with Angel Facility Operations Environment Plan

Consultation Participation and Feedback

Woodside is seeking to consult relevant persons to inform Woodside's preparation of Environment Plans (EPs) for these activities. Consultation is designed to notify and obtain input from relevant persons to assist Woodside identify measures to lessen or avoid potential adverse effects of the proposed activity on the environment.

Consultation will inform the development of each EP in accordance with environmental regulations administered by the Commonwealth regulator National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) under the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (Cth) and State regulator Department of Mines, Industry, Regulation and Safety (DMIRS) in accordance with the *Petroleum (Submerged Lands) (Environment) Regulations 2012* (WA), and the *Petroleum Pipelines (Environment) Regulations 2012* (WA) and support other regulatory submissions associated with the planned activities.

Detailed consultation information sheets are available at: **www.woodside.com/sustainability/consultation-activities**. You can also subscribe via our website to receive future information on proposed activities.

Macedon Operations Commonwealth and State Environment Plans

NOPSEMA has published a brochure entitled Consultation on offshore petroleum environment plans – Information for the Community, to help community members who may be relevant persons understand the consultation requirements and how to effectively participate in consultation, which is available at: www.nopsema.gov.a

If you would like to comment on the proposed activities outlined above, ple contact Woodside before **7 July 2023** via

E: **Feedback@woodside.com**

Toll free: **1800 442 977**

NorthWest Telegraph

northwesttelegraph.com.au

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Classifieds

9482 2300 Place an ad: regionalclassifieds@wanews.com.au or go to northwesttelegraph.com.au

PUBLIC NOTICES

Shire of EAST Pilbara
THE HEART OF THE PILBARA

Notice of 2021/22 General Meeting of Electors

7 June 2023

Notice is hereby given that the 2021/22 Annual Meeting of Electors of the Shire of East Pilbara will be held on Friday, 30 June 2023 commencing at 10.30 am at the Newman Council Chambers, corner Kalgan and Newman Drives, Newman.

The purpose of the General Electors' Meeting is to discuss the contents of the annual report for the 2021/22 financial year and then any other general business.

The agenda for the Annual Meeting of Electors will be available to the public prior to the date of the meeting at the Shire's website: **www.eastpilbara.wa.gov.au.**

All members of the community are invited to attend and participate in the Shire's 2021/22 General Meeting of Electors.

For further information, please contact 08 9175 8000.

Steven Harding
Chief Executive Officer

Town of Port Hedland

Town of Port Hedland Rating Strategy 2023/24

The Town of Port Hedland gives notice to ratepayers that it has endorsed the rating strategy for 2023/24, encompassing the below proposed differential rates and minimum payments.

Ratepayers and electors are invited to view the 2023/24 Statement of Objects and Reasons for the proposed rating changes on the Town of Port Hedland website, or at the Town of Port Hedland Civic Centre, McGregor Street, Port Hedland.

Submissions are invited prior to 5:00pm 20 June 2023. Submissions should be addressed to the Chief Executive Officer, Town of Port Hedland, PO Box 41 Port Hedland WA 6721 and be clearly marked Submission - Rating Strategy 2023/24. Alternatively, submissions can be emailed to council@porthedland.wa.gov.au

Rate Category	2022/23 Current Rate in the Dollar	2023/24 Proposed Rate in the Dollar	2023/24 Proposed Differentials	2023/24 % Change in Proportion of Revenue
	$	$	$	%
GRV Residential	0.07961	0.07961	1.000	20.11
GRV Commercial/Industrial	0.08957	0.08957	1.125	9.24
GRV In Liquidation	0.1194	0.1194	1.500	1.96
GRV Hotel/Motel	0.1194	0.1194	1.500	0.25
GRV Mining	0.19911	0.19911	2.501	68.08
GRV Other	0.1194	0.1194	1.500	0.11

Please note: The public notice in the 24th May edition of the North West Telegraph was incorrect

Town of Port Hedland

Town of Port Hedland Local Government Act 1995, Section 3.58 Disposal of Property

The Town of Port Hedland Council is proposing to dispose of the following property by way of sale to the following party in accordance with section 3.58 (3) of the Local Government Act 1995 (private treaty) on the following terms and conditions:

Lot Number	Prospective Purchaser	Offer To Purchase	Valuation
Lot 2030 Roberts Street, South Hedland, WA, 6722 and Lot 5977 Hamilton Road, South Hedland, WA, 6722	Turner River Developments Pty Ltd	$980,000.00 ex GST	$890,000.00 ex GST

Submissions are invited for Council consideration on the proposed disposal. Submissions are to be received by email to **eplanning@porthedland.wa.gov.au** or post addressed to: Chief Executive Officer, PO Box 41, Port Hedland WA 6721 before close of business **Wednesday, 14 June 2023.**

Carl Askew
Chief Executive Officer

Shire of EAST Pilbara
THE HEART OF THE PILBARA

Notice of 2021/22 Annual Report Available to the Public

7 June 2023

Pursuant to section 5.55 of the Local Government Act 1995, local public notice is hereby given that the Shire of East Pilbara 2021/22 Annual Report has been accepted by the Council and is available to access by the public at the Shire's website **www.eastpilbara.wa.gov.au** and Shire Offices in Newman and Marble Bar.

For further information, please contact 08 9175 8000.

Steven Harding
Chief Executive Officer

ENVIRONMENT PLANS NOTICE

Woodside Energy (Australia) Pty Ltd (ACN 006 923 879) is proposing to conduct activities in State and Commonwealth waters as described below:

Macedon Operations Commonwealth and State Environment Plans (EPs) (Macedon Joint Venture)

Activity summary:	The EPs for Macedon Operations activities in Commonwealth and State waters are being revised in accordance with the five-yearly Operations EP review cycle. The continuation of Macedon operations activities includes routine production and operations and the routine inspection, monitoring, maintenance and repair activities associated with: • four subsea wells with potential for a fifth subsea well (located in Commonwealth waters); • two non-producing wells with wellheads (located in Commonwealth waters); • section of Wet Gas Pipeline located in Commonwealth waters; • section of Wet Gas Pipeline located in State waters and onshore; • Dry Sales Gas Pipeline located onshore. Routine operational activities also include the rehabilitation and remediation of the onshore wet and dry gas pipelines. The EP also considers non-routine and unplanned activities and incidents associated with the above activities.
Location:	The Macedon gas field is located in Commonwealth waters approximately 40 km north of Exmouth and approximately 100 km west of Onslow. The Macedon Gas Plant is located onshore approximately 17 km south-west of Onslow in the Pilbara region of WA. A pipeline transports gas from the field to the gas plant and from the gas plant into the Dampier to Bunbury Pipeline.
Commencement timing:	Following acceptance of EP.
Estimated duration:	Five years of operations following EP acceptance.

Woodside Energy Ltd (ACN 006 482 986) is proposing to conduct activities in Commonwealth waters as described below:

Angel Facility Operations Environment Plan (WA5 Joint Venture)

Activity summary:	The EP is being revised to integrate drilling, subsea installation, commissioning and planned production from the Lambert West tie-back into the Angel production systems via the existing Lambert Shelf subsea infrastructure. Aside from the production changes associated with Lambert West, in routine operational aspects of the EP remain the same as the existing EP and proposed to extend to the Lambert West tie-back. This includes routine production and operations and the routine inspection, monitoring, maintenance and repair activities of subsea infrastructure including a number of exploration wells not linked to the production systems.
Location:	Approximately 125 km south-west of Karratha.
Commencement timing:	*Angel Operations:* Production at the Angel Facility commenced in 2018 and is ongoing. *Lambert West Drilling and tie-back:* Drilling activities associated with the EP are anticipated to commence around Q2 2024, subsea installation in Q4 2024 and commissioning activities in H1 2025, pending approvals, vessel availability and weather constraints.
Estimated duration:	*Angel Operations:* Five years of operations following EP acceptance. *Lambert West Drilling and tie-back:* Approximately 60 days for drilling operations for the Lambert West well. Activities are planned to take place 24 hours, 7 days a week. Subsea installation activities are likely to take approximately four weeks.

Figure 1 and **Figure 2** illustrate the Operational Area and the Environment That May Be Affected (EMBA) for Macedon and Angel, respectively. Definition of each EMBA is based on modelling of a composite of many different paths and furthest distance where a 95% chance of entrained oil not weathered would travel, based on historical metocean conditions.

Woodside has undertaken an assessment to identify potential impacts and risks to the marine environment arising from both planned and unplanned activities. Management and management measures have been developed for each of the risks and impacts identified and will be outlined in the relevant EP.

Impacts associated with Macedon Operations planned activities include the physical presence of marine vessels, vehicles, interaction with other marine users, seabed disturbance (such as survey equipment), noise, light, air emissions, marine discharges and decommissioning and remediation. Impacts that could occur due to an unplanned event include hydrocarbon releases (marine diesel), vessel collisions with marine fauna, additional seabed disturbance, invasive marine species, accidental loss of waste or other discharges.

Impacts associated with the Angel Operations planned activities include the physical presence of operational vessels, interaction with other marine users, seabed disturbance (such as survey equipment), noise, light, air emissions and marine discharges. Impacts directly associated with the drilling and tie-back activities include physical presence of Mobile Offshore Drilling Unit (MODU) and project support vessels, seabed disturbance (such as infrastructure placement), drilling and construction impacts (such as noise, light, air emissions and marine discharges). Impacts that could occur due to an unplanned event include hydrocarbon releases (condensates or marine diesel), vessel collisions with marine fauna, additional seabed disturbance, invasive marine species, accidental loss of waste or other discharges.

Figure 1 and **Figure 2** illustrate an indicative EMBA for Macedon Operations and Angel Operations, respectively, to support persons or organisations understanding of whether their functions, interests or activities may be affected by the proposed activities, with detailed information found in Woodside's Consultation Information Sheets.

Figure 1 The indicative EMBA associated with Macedon Commonwealth and State Operations Environment Plans

Figure 2 The indicative EMBA associated with Angel Facility Operations Environment Plan

Consultation Participation and Feedback

Woodside is seeking to consult relevant persons to inform Woodside's preparation of Environment Plans (EPs) for these activities. Consultation is designed to notify and obtain input from relevant persons to assist Woodside identify measures to lessen or avoid potential adverse effects of the proposed activity on the environment.

Consultation will inform the development of each EP in accordance with environmental regulations administered by the Commonwealth regulator National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) under the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (Cth) and State regulator Department of Mines, Industry, Regulation and Safety (DMIRS) in accordance with the *Petroleum (Submerged Lands) (Environment) Regulations 2012* (WA), and the *Petroleum Pipelines (Environment) Regulations 2012* (WA) and support other regulatory submissions associated with the planned activities.

Detailed consultation information sheets are available at: **www.woodside.com/sustainability/consultation-activities**
You can also subscribe via our website to receive future information on proposed activities.

NOPSEMA has published a brochure entitled Consultation on offshore petroleum environment plans – Information for the Community, to help community members who may be relevant persons understand the consultation requirements and how to

Macedon Operations Commonwealth and State Environment Plans

Angel Facility Operations Environment Plan

Pilbara News

Classifieds

9482 2300 Place an ad: regionalclassifieds@wanews.com.au or go to pilbaranews.com.au

PUBLIC NOTICES

Shire of Ashburton Proposal to Dispose of Property – Lease:

Portion Of Lot 550 on DP 414367 Onslow Road, Onslow

Disposal under section 358 of the Local Government Act 1995 (WA)

Notice is hereby given that the Shire of Ashburton proposes to dispose of a portion of property as follows:

- Lessee: C.D. Dodd Scrap Metal Recyclers T/A Dodd Group Pty Ltd
- Property: 4 ha (approximate) portion of Lot 550 on DP 414367 Onslow Road, Onslow (Pilbara Regional Waste Management Facility)
- Term: Seven (7) years commencing on the execution of the Lease, plus two options of five (5) years
- Rental: $100,000 + GST per annum
- Market Valuation: $101,500 + GST per annum

Written public submissions are invited on the proposed disposition and should be addressed to:

Chief Executive Officer, Shire of Ashburton, PO Box 567, Tom Price, Western Australia 6751 or mailto:soa@ashburton.wa.gov.au by 4.00pm on Wednesday 21 June 2023.

Kenn Donohoe
Chief Executive Officer

www.ashburton.wa.gov.au

ENVIRONMENT PLANS NOTICE

Woodside Energy (Australia) Pty Ltd (ACN 006 923 879) is proposing to conduct activities in State and Commonwealth waters as described below:

Macedon Operations Commonwealth and State Environment Plans (EPs) (Macedon Joint Venture)

Activity summary	The EPs for Macedon Operations activities in Commonwealth and State waters are being revised in accordance with the five-yearly Operations EP review cycle. The continuation of Macedon operations activities includes routine production and operations and the routine inspection, monitoring, maintenance and repair activities associated with: • four subsea wells with potential for a fifth subsea well (located in Commonwealth waters); • two non-producing wells with wellheads (located in Commonwealth waters); • section of Wet Gas Pipeline located in Commonwealth waters; • section of Wet Gas Pipeline located in State waters and onshore; • Dry Sales Gas Pipeline located onshore. Routine operational activities also include the rehabilitation and remediation of the onshore wet and dry gas pipelines. The EP also considers non-routine and unplanned activities and incidents associated with the above activities.
Location	The Macedon gas field is located in Commonwealth waters approximately 40 km north of Exmouth and approximately 100 km west of Onslow. The Macedon Gas Plant is located onshore approximately 17 km south west of Onslow in the Pilbara region of WA. A pipeline transports gas from the field to the gas plant and from the gas plant into the Dampier to Bunbury Pipeline.
Commencement timing	Following acceptance of EP.
Estimated duration	Five years of operations from date of EP acceptance.

Woodside Energy Ltd (ACN 008 482 986) is proposing to conduct activities in Commonwealth waters as described below:

Angel Facility Operations Environment Plan (NWS Joint Venture)

Activity summary	The EP is being revised to integrate drilling, subsea installation, commissioning and planned operations from the Lambert West tie-back into the Angel production systems via the existing Lambert Deep subsea infrastructure. Aside from the production changes associated with Lambert West, the routine operational aspects of the EP remain the same as the existing EP and proposes to accommodate the Lambert West tie-back. This includes routine production and operations and the routine inspection, monitoring, maintenance and repair activities of subsea infrastructure including a number of exploration wells not linked to the production systems.
Location	Approximately 125 km north-west of Karratha.
Commencement timing	Angel Operations: Production at the Angel Facility commenced in 2004 and is ongoing. Lambert West Drilling and tie-back: Drilling activities scheduled for the EP are anticipated to commence around Q1 2024, subsea installation in Q4 2024, and commissioning activities in H1 2025 pending approvals, vessel availability and weather constraints.
Estimated duration	Angel Operations: Five years of operations following EP acceptance. Lambert West Drilling and tie-back: Approximately 60 days for drilling operations for the Lambert West well. Activities are planned to take place 24 hours, 7 days a week. Subsea installation activities are likely to take approximately four weeks.

Figure 1 and **Figure 2** illustrate the Operational Areas and the Environment That May Be Affected (EMBA) for Macedon and Angel, respectively. Prediction of each EMBA is based on modelling of a composite of many different paths and furthest distance where a 10% chance, worst-case oil spill event could travel, based on weather and ocean conditions.

Woodside has undertaken an assessment to identify potential impacts and risks to the marine environment arising from both planned and unplanned activities. Mitigation and management measures have been developed for each of the risks and impacts identified and will be outlined in the relevant EP.

Impacts associated with Macedon Operations planned activities include the physical presence of marine vessels, vehicles, interaction with other marine users, seabed disturbance (such as survey equipment), noise, light, air emissions, marine discharges and offshore installation and remediation. Impacts that could occur due to an unplanned event include hydrocarbon releases (marine diesel), vessel collisions with marine fauna, additional seabed disturbance, invasive marine species, accidental loss of waste or other discharges.

Impacts associated with the Angel Operations planned activities include the physical presence of operational vessels, interaction with other marine users, seabed disturbance (such as survey equipment), noise, light, air emissions and marine discharges. Impacts directly associated with the drilling and tie-back activities include physical presence of Mobile Offshore Drilling Unit (MODU) and project support vessels, seabed disturbance (such as infrastructure placement), drilling and construction impacts (such as noise, light, air emissions and marine discharges). Impacts that could occur due to an unplanned event include hydrocarbon releases (condensates or marine diesel), vessel collisions with marine fauna, additional seabed disturbance, invasive marine species, accidental loss of waste or other discharges.

Figure 1 and **Figure 2** illustrate an indicative EMBA for Macedon Operations and Angel Operations, respectively, to support persons or organisations understanding of whether their functions, interests or activities may be affected by the proposed activities, with detailed information found in Woodside's Consultation Information Sheets.

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Consultation Participation and Feedback

Woodside is seeking to consult relevant persons to inform Woodside's preparation of Environment Plans (EPs) for these activities. Consultation is designed to notify and obtain input from relevant persons to assist Woodside identify measures to lessen or avoid potential adverse effects of the proposed activity on the environment.

Consultation will inform the development of each EP in accordance with environmental regulations administered by the Commonwealth regulator National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) under the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (Cth) and State regulator Department of Mines, Industry Regulation and Safety (DMIRS) in accordance with the *Petroleum (Submerged Lands) (Environment) Regulations 2012* (WA), and the *Petroleum Pipelines (Environment) Regulations 2012* (WA) and support other regulatory submissions associated with the planned activities.

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Macedon Operations Commonwealth and State Environment Plans

Angel Facility Operations Environment Plan

The West Australian

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WEDNESDAY, JUNE 7, 2023 • 51

Local Govt. Tenders

Local Govt Vacancies

Local Govt. Notices

ENVIRONMENT PLANS NOTICE

Woodside Energy (Australia) Pty Ltd (ACN 008 923 878) is proposing to conduct activities in State and Commonwealth waters as described below:

Macedon Operations Commonwealth and State Environment Plans (EPs) (Macedon Joint Venture)

Activity summary	The EPs for Macedon Operations activities in Commonwealth and State waters are being revised in accordance with the five-yearly Operations EP review cycle. The continuation of Macedon operations activities includes routine production and operations and the routine inspection, monitoring, maintenance and repair activities associated with: • four subsea wells with potential for a fifth subsea well (located in Commonwealth waters); • two non-producing wells with wellheads (located in Commonwealth waters); • section of Wet Gas Pipeline located in Commonwealth waters; • section of Wet Gas Pipeline located in State waters and onshore; • Dry Sales Gas Pipeline located onshore. Routine operational activities also include the rehabilitation and remediation of the onshore wet and dry gas pipelines. The EP also considers non-routine and unplanned activities and incidents associated with the above activities.
Location	The Macedon gas field is located in Commonwealth waters approximately 40 km north of Exmouth and approximately 100 km west of Onslow. The Macedon Gas Plant is located onshore approximately 17 km south west of Onslow in the Pilbara region of WA. A pipeline transports gas from the field to the gas plant and from the gas plant into the Dampier to Bunbury Pipeline.
Commencement timing	Following acceptance of EP
Estimated duration	Five years of operations following EP acceptance

Woodside Energy Ltd (ACN 005 482 986) is proposing to conduct activities in Commonwealth waters as described below:

Angel Facility Operations Environment Plan (NWS Joint Venture)

Activity summary	The EP is being sought to operate drilling, subsea installation, commissioning and planned production from the Lambert West tie-back into the Angel production systems via the existing Lambert Development infrastructure. Aside from the production changes associated with Lambert West, the routine operational aspects of the EP remain the same as the existing EP and proposes to extend to the Lambert West tie-back. The activities include production and operations and the routine inspection, monitoring, maintenance and repair activities of subsea infrastructure including a number of exploration wells and associated subsea components.
Location	Approximately 50 km to 81 km west of Karratha
Commencement timing	Angel Operations Production from the Angel facility commenced in 2008 and is ongoing. Lambert West Drilling and Tie-back Drilling activities described in the EP are anticipated to commence around Q3 2024, subsea installation in Q4 2024, and commissioning activities in H1 2025 pending approvals, vessel availability and weather constraints.
Estimated duration	Angel Operations Five years of operations following EP acceptance Lambert West Drilling and Tie-back Approximately 60 days for drilling operations for the Lambert West well. Activities are planned to take place 24 hours, 7 days a week. Subsea installation activities are likely to take approximately four weeks.

Figure 1 and Figure 2 illustrate the Operational Areas and the Environment That May Be Affected (EMBA) for Macedon and Angel, respectively. The prediction of each EMBA is based on modelling of a composite of many different paths and furthest distance where a conservatively, unplanned oil spill event could travel, based on weather and ocean conditions.

Woodside has undertaken an assessment to identify potential impacts and risks to the marine environment arising from both planned and unplanned activities. Mitigation and management measures have been developed for each of the risks and impacts identified and will be outlined in the relevant EP.

Impacts associated with Macedon Operations planned activities include the physical presence of marine vessels, vehicles, interaction with other marine users, seabed disturbance (such as survey equipment), noise, light, air emissions, marine discharges and onshore rehabilitation and remediation. Impacts that could occur due to an unplanned event include hydrocarbon releases (marine diesel), vessel collisions with marine fauna, additional seabed disturbance, invasive marine species, accidental loss of waste or other discharges.

Impacts associated with the Angel Operations planned activities include the physical presence of operational vessels, interaction with other marine users, seabed disturbance (such as survey equipment), noise, light, air emissions and marine discharges. Impacts directly associated with the drilling and tie-back activities include physical presence of Mobile Offshore Drilling Unit (MODU) and project support vessels, seabed disturbance (such as infrastructure placement), drilling and construction impacts (such as noise, light, air emissions and marine discharges). Impacts that could occur due to an unplanned event include hydrocarbon releases (condensates or marine diesel), vessel collisions with marine fauna, additional seabed disturbance, invasive marine species, accidental loss of waste or other discharges.

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Consultation Participation and Feedback

Woodside is seeking to consult relevant persons to inform Woodside's preparation of Environment Plans (EPs) for these activities. Consultation is designed to notify and obtain input from relevant persons to assist Woodside identify measures to lessen or avoid potential adverse effects of the proposed activity on the environment.

Consultation will inform the development of each EP in accordance with environmental regulations administered by the Commonwealth regulator National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) under the Offshore Petroleum and Greenhouse Gas Storage Act 2006 (Cth) and State regulator Department of Mines, Industry Regulation and Safety (DMIRS) in accordance with the Petroleum (Submerged Lands) (Environment) Regulations 2012 (WA) and the Petroleum Pipeline (Environment) Regulations 2012 (WA) and support other regulatory submissions associated with the planned activities.

Detailed consultation information sheets are available at: www.woodside.com/sustainability/consultation-activities. You can also subscribe via our website to receive future information on proposed activities.

NOPSEMA has published a brochure entitled 'Consultation on offshore petroleum environment plans – Information for the Community' to help community members who may be relevant persons understand the consultation requirements and how to [illegible]

Macedon Operations Commonwealth and State Environment Plans

Angel Facility Operations Environment Plan

Local Govt. Tenders

City of Melville

RFT220320 Change Room Upgrade, Melville Reserve

Offers are invited from suitably qualified and experienced contractors for the above Request for Tender.

A copy of the Request documentation must be obtained by registering your details via the City of Melville tender portal website www.tenderlink.com/melville

Offers must be submitted electronically via the City's e-tendering portal no later than 2.00pm (AWST) Thursday 6th July 2023

All enquiries should be in the first instance via the Tenderlink Forum otherwise directed to Michael Tarsite on [illegible]

Offers that are late or submitted by facsimile, email or in hard copy will not be accepted. The City reserves the right to reject any or all Offers and the lowest Offer will not necessarily be accepted. Canvassing of City of Melville Councillors or staff will disqualify Respondents from the evaluation process.

Marten Tatenson
Chief Executive Officer

CITY OF BUNBURY

Leschenault Marine Wall Renewal RFT2324/016

The City of Bunbury is seeking suitably qualified contractor to upgrade a 215m section of the Leschenault Inlet seawall adjacent to the Frank Buswell Foreshore Reserve in the 2023/2024 financial year.

The Request for Tender documents can be obtained by registering with VendorPanel www.vendorpanel.com.au. Tender responses must be submitted electronically via the City's VendorPanel system no later than 12:00 noon (AWST) Wednesday 28th June 2023.

E-mail, postal and facsimile submissions will not be accepted for evaluation. The lowest or any response will not necessarily be accepted. Canvassing of City of Bunbury Councillors or staff will disqualify tenderers from the evaluation process.

Malcolm Osborne
Chief Executive Officer

TENDERS ARE INVITED FOR THE SERVICES BELOW:

ALLIED HEALTH SERVICE PERSONNEL

(Cockburn Care - Aged & Disabled Services)

Tender No. RFT 14-2023

Deadline: 2:00pm (AWST) Tuesday, 20 June 2023

Tender Documents & Contract Requirements: Are available from the City of Cockburn's eProcurement website: https://240procurebox.aprilsoftware.com.au

Tender Enquiries: Ms Peong May Thang, Procurement Business Partner by e-mail: tenders@cockburn.wa.gov.au

Tender & Lodgement queries: Must be lodged using the Myriad Tenderlink website: https://240procurebox.aprilsoftware.com.au

All electronic submissions lists shall be clearly named with the City's Tender Number as stated above and the Tenderer's Name; and lodged by the specified time and date.

No late, telephoned, faxed, mailed, electronically mailed or hand delivered tenders will be accepted.

SHIRE of CAPEL

Tender 23-08 Engineering Technical Services – Design Support

The Shire of Capel is seeking the services of suitably qualified engineering consultancies to develop and support the design and review requirements of both Operational and Capital projects.

A copy of the tender document must be obtained by registering your details via the Shire of Capel e-tendering portal website https://portal.tenderlink.com/capel

Tender responses must be submitted electronically via the Shire of Capel e-tendering portal website no later than 2.00pm (AWST), Wednesday 05 July 2023.

Tenders submitted by facsimile or e-mail, as well as tenders submitted by hand or post will not be accepted for evaluation, the lowest or any response will not necessarily be accepted.

Canvassing of any Shire of Capel Councillors or Officers will disqualify tenderers from the evaluation process.

Gordon MacMile
CHIEF EXECUTIVE OFFICER

Shire of Wiluna

RFT No. 2022-03 Design, Supply and Installation of CCTV Surveillance System

The Shire of Wiluna is seeking to engage a suitably qualified and experienced contractor to design, supply and install a CCTV surveillance system to be deployed within the Wiluna township.

Tender documents, conditions and attachments for this tender can be downloaded from https://www.prodpanel.com.au/PublicTenders.aspx as well as the Council's website www.wiluna.wa.gov.au

Tenders will close at 2.00 pm (WST) on 28 June 2023. The lowest or any tender shall not necessarily be accepted.

CITY OF MANDURAH

Supply and Delivery of Concrete Drainage Products

Request for Tender: 08-2023

Description: The City of Mandurah invites tenders for the Supply and Delivery of Concrete Drainage Products in accordance with the tender documents.

Documentation: Downloaded via the Tenderlink website https://www.tenderlink.com/mandurah/

Further tendering information can be obtained from Eric Johnson on 08 9550 3205.

Deadline: 2pm Thursday 29 June 2023.

Lodgement: Tenders can only be submitted electronically via the Tenderlink Website.

The lowest or any tender will not necessarily be accepted. Canvassing of Elected Members and Staff shall disqualify tenderers from the tender process.

Mark R Newman
Chief Executive Officer

Local Govt Vacancies

SHIRE OF COOROW

Vacancy

Asset & Project Manager - Coorow Ultras Endurance Agored

Applications are invited for the services of a full time Asset and Project Manager with the Shire of Coorow. The position will be based in Coorow unless otherwise agreed.

The successful applicants wage level will depend on experience. In addition, the position offers attractive Superannuation benefits and a Housing Allowance for employees who provide their own accommodation. Alternatively, there may be accommodation available to rent from the Shire at a subsidised rent should housing be required.

The Asset & Project Manager is responsible for the Integrated development, implementation and maintenance of the Shire's Corporate Asset Management System and portfolio project management and support activities to contribute to the development and delivery of a range of projects in line with established objectives.

It is essential that applicants have a current WA driver's licence. A pre-placement medical and police clearance will be required by the successful applicant and a three-month probationary period will apply.

A Position Description is available from the Coorow and Leeman Administration Centres on 9952 0100 and further information is available from Ms Maxine Maxfield, Chief Executive Officer on 9952 821 100.

Applications detailing previous experience, qualifications and recent referees should be forwarded to:

CONFIDENTIAL: Asset & Project Manager
Chief Executive Officer
Shire of Coorow
PO Box 42
Coorow WA 6515

by 4pm Friday 16 June 2023

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The West Australian

Local Govt. Notices

CITY OF GOSNELLS

DISPOSITION OF PROPERTY Section 3.58(3) & (4) of the Local Government Act 1995

The City of Gosnells is proposing to dispose of Lot 97 Matson Street of the Subdivision Plan being part of Lot 1797 Matson Street, Canning River WA 6110 (Southern Metro Suburbs Area) and having a land area of 2,000 square metres to C Vines Pty Ltd as the Trustee for Vines Family Trust for the sum of $868,000.00. A recent market valuation of the land by a licensed valuer was $870,000.00. Anyone objecting to the proposal should do so in writing addressed to the Chief Executive Officer, City of Gosnells, PO Box 662, Gosnells WA 6110 before 27 June 2023.

Town of Cottesloe

PUBLIC NOTICE
Major Land Transaction Local Government Act 1995
Town of Cottesloe

State wide and local public notice is given in accordance with Section 3.59(5) of the Local Government Act 1995 that the Town of Cottesloe proposes to enter into a major land transaction (proposed transaction) by way of a lease with Olympia Hospitality Ltd (Public Hospitality Group) of the premises located at the upper level of the Building (road level at 149 Marine Parade, Cottesloe) located on Port Reserve 28798, Lot 970 on Deposited Plan 419802 being part of the land contained in Certificate of Title Volume 1402LR Folio 377 (the premises) and known as Manuella Cafe.

The Town of Cottesloe has prepared a Business Plan that includes an overall assessment of the proposed transaction. A copy of the Business Plan may be inspected or obtained from the Town of Cottesloe Administration Building, 109 Broome Street, Cottesloe or from the Town of Cottesloe's website at www.cottesloe.wa.gov.au/council/public-notices/public-notices.aspx

If any person should wish to make a submission in relation to the proposed transaction they are invited to make it in writing or by email, clearly marked "Submission - Lot 970 Marine Parade" and:

- Deliver it by hand to the Town of Cottesloe, 109 Broome Street, Cottesloe WA 6011; or
- Send it by pre-paid post to the Town of Cottesloe, PO Box, Cottesloe WA 6911; or
- Send by email to: town@cottesloe.wa.gov.au

All public submissions are to be received by the Town of Cottesloe before 4.30pm on 19 July 2023.

Matthew Scott
Chief Executive Officer

PUBLIC NOTICE

DISPOSITION OF PROPERTY
28 VINCENT STREET NORTH PERTH

In accordance with Section 3.58(3) of the Local Government Act 1995, the City of Vincent advises that it is proposing to sell 28 Sydney Street, North Perth to Jessica Leigh Hubble on the following terms:

Property: 28 (Lot 93) Sydney Street, North Perth (Lot 501 on Plan 2334) as contained within Certificate of Title Volume 1720 Folio 380.
Purchaser: Jessica Leigh Hubble
Purchase Price: $870,000
Market Valuation: $870,000

Submissions can be sent to the City of Vincent, PO Box 82, Leederville WA 6902 or emailed to mail@vincent.wa.gov.au by 4pm, 20 June 2023.

Contact the City's Corporate Strategy and Governance team on (08) 9273 6000 or email mail@vincent.wa.gov.au for further information.

PUBLIC NOTICES

Government of Western Australia
Department of Planning, Lands and Heritage

NOTICE OF INTENTION TO AMEND CLASS 'A' RESERVE 12439
BRAZIER ROAD YANCHEP – CITY OF WANNEROO
LAND ADMINISTRATION ACT 1997 (LAA)

I, Anthony Kannis, Director General, Department of Planning, Lands and Heritage under delegation of Minister for Lands, give notice pursuant to section 42(5) of the *Land Administration Act 1997* (LAA), that it is intended to act in relation to Class 'A' Reserve 12439.

It is proposed to excise a total of 780sqm of Class 'A' Reserve 12439, currently set aside for the purpose of 'Recreation' Act 43-1968' for subsequent amalgamation into adjoining Class 'C' Reserve 43792 for the purpose of 'Recreation'.

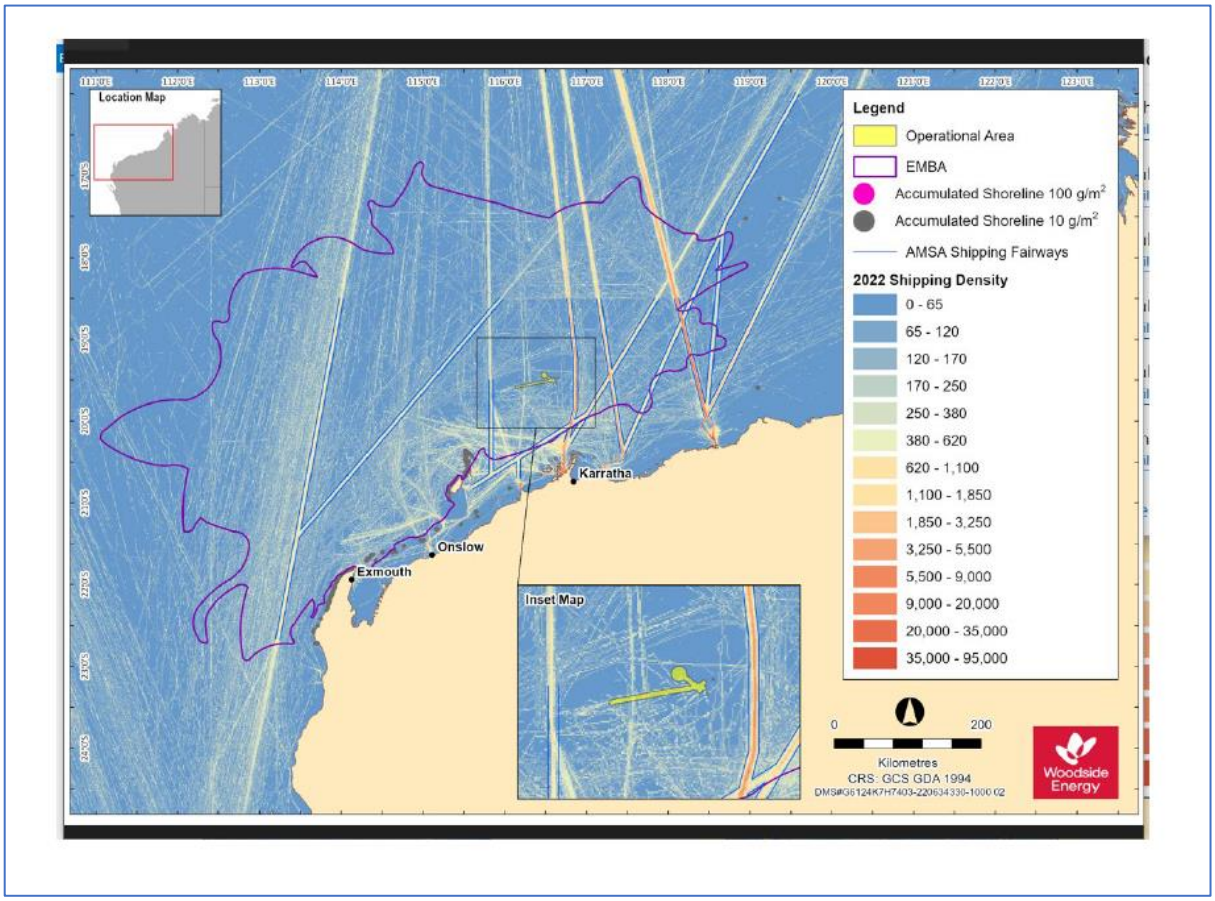
Excision of the abovementioned portion of reserve will rationalise existing boundaries to reflect existing land uses and the immediate surrounds.

Prior to proceeding with this action, you have the opportunity to provide comments on the proposal within 30 days of the publication of this notice. To enable your comments to be taken into account, or to arrange a viewing of the relevant plans, please contact Mahtab Noarsi via mahtab.noarsi@dplh.wa.[illegible] following reference numbers:

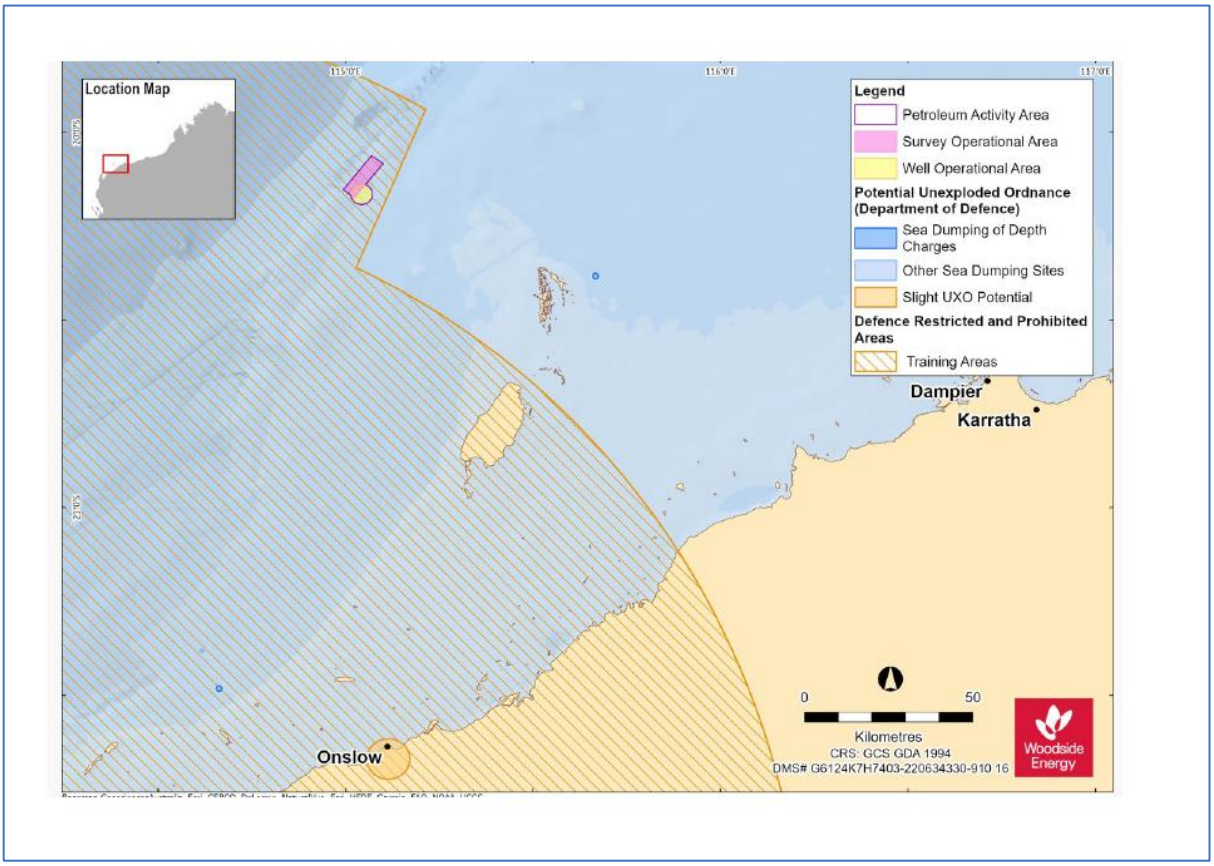
File No. 02286-1995

DEPARTM[illegible]

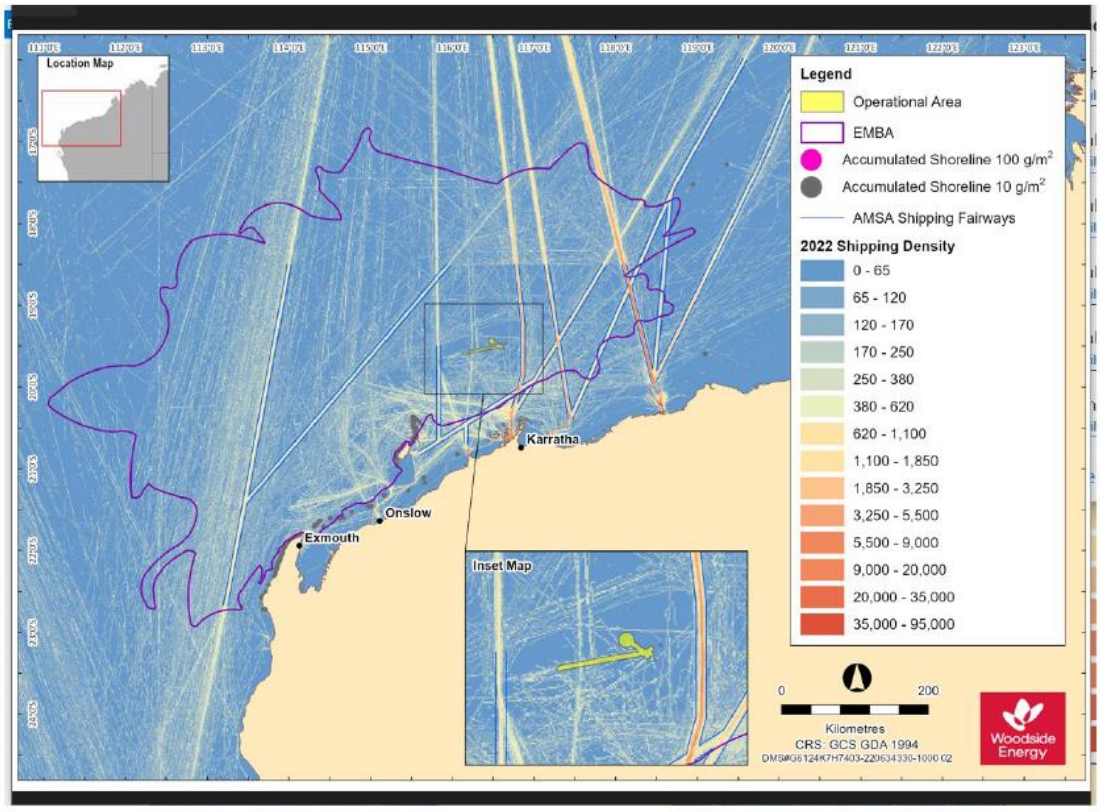
1.44 Shipping lane map and GIS Shape File sent to AMSA (22 June 2023)



1.45 Defence zone map sent to Department of Defence (DoD) (22 June 2023)



1.46 Shipping lane map and GIS Shape File sent to AHO (22 June 2023)



1.47 Email sent to Murujuga Aboriginal Corporation (MAC) (29 June 2023)

Hi [redacted]

I hope you are well. Similar to my previous email regarding Woodside's Julimar Development Project Phase 3 (JDP3) wells and subsea infrastructure, and the Goodwyn A Infill Geophysical and Geotechnical Surveys, please find attached information about an additional activity, the Angel Facility Operations. Woodside is planning to revise and resubmit the Angel Facility Operations EP to integrate drilling, subsea installation commissioning and production from the Lambert West Field, located around 126 km north-north-west of Dampier.

In preparation for this work, Woodside has undertaken an assessment to identify potential impacts and risks to the marine environment arising from both planned activities and unplanned events. Mitigation and management measures have been developed for each of the risks identified and will be outlined in the EP. I have attached summary information sheet that explain the activity we plan to undertake, and detailed consultation information sheet can be found at the link below:

- lambert-west.pdf (woodside.com)

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 the total area over which unplanned events could have environmental impacts. The EMBA is set out in the attached Summary Information Sheet and consultation information sheet. In particular, we are interested in hearing:

- how the activity could impact MAC's interests and activities and/or cultural values

- your concerns about the proposed activity and what you think we should do about those concerns
- whether there are any other individuals, groups, or organisations you think we should talk to.

If you would like to speak with us regarding this activity, please let us know by **21 July 2023** 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.

As you are aware, 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.

Please provide feedback directly to me on the details below,
to Feedback@woodside.com.au, by calling 1800 442 977, or directly to the 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 organisations who you think may be interested as required. As always Woodside would be happy to speak with MAC members, the MAC Board and office holders and other interested parties.

We look forward to hearing from you.

Kind regards

1.48 Email sent to Nganhurra Thanardi Garrbu Aboriginal Corporation (NTGAC) (19 June 2023)

Dear [redacted]

I hope this message finds you well. Further to our discussions and earlier correspondence regarding Woodside's proposed Scarborough, decommissioning, drilling, survey, and development activities, please find attached information about two additional activities:

10 Angel Facility Operations – Woodside is planning to revise and resubmit the Angel Facility Operations EP to integrate drilling, subsea installation commissioning and production from the Lambert West Field, located around 126 km north-north-west of Dampier.

11 Macedon Operations – Woodside is submitting a five yearly revision of the Macedon Operations Commonwealth and State EPs in accordance with State and Commonwealth regulations. The Macedon gas field is located approximately 40 km north of Exmouth and 100 km west of Onslow.

In preparation for this work, Woodside has undertaken an assessment to identify potential impacts and risks to the marine environment arising from both planned activities and unplanned events. Mitigation and management measures have been developed for each of the risks identified and will be outlined in the EPs.

I have attached summary information sheets that explain the activities we plan to undertake, and detailed consultation information sheets can be found at the links below:

- lambert-west.pdf (woodside.com)
- macedon.pdf (woodside.com)

Woodside is seeking to understand the nature of the interests that Nganhurra Thanardi Garrbu Aboriginal Corporation (NTGAC) and its members may have in the 'environment that may be affected' (EMBA) by these activities. 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. In particular, we are interested in hearing:

- how the activities could impact your interests and activities and/or your cultural values
- your concerns about the proposed activities and what you think we should do about those concerns
- 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 us know by **13 July 2023** 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.

Please provide feedback directly to me on the details below,
to Feedback@woodside.com.au, by calling 1800 442 977, or directly to the 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 NTGAC members and other people and organisations who you think may be interested as required. Woodside would be happy to speak with NTGAC members, the NTGAC Board and office holders and other interested parties.

We look forward to hearing from you.

As always please be in contact if you require further information and if Woodside can assist NTGAC in any way to participate in these processes.

Sincerely,

[redacted]

1.49 Email sent to Buurabalayji Thalanyji Aboriginal Corporation (BTAC) (19 June 2023)

Dear [redacted]
I hope this message finds you both well, and [redacted], thank you for your time on the phone last Friday. Further to our discussions and earlier correspondence regarding Woodside's proposed Scarborough, decommissioning, drilling, survey, and development activities, please find attached information about two additional activities:

- Angel Facility Operations – Woodside is planning to revise and resubmit the Angel Facility Operations EP to integrate drilling, subsea installation commissioning and production from the Lambert West Field, located around 126 km north-north-west of Dampier.
- Macedon Operations – Woodside is submitting a five yearly revision of the Macedon Operations Commonwealth and State EPs in accordance with State and Commonwealth regulations. The Macedon gas field is located approximately 40 km north of Exmouth and 100 km west of Onslow.

In preparation for this work, Woodside has undertaken an assessment to identify potential impacts and risks to the marine environment arising from both planned activities and unplanned events. Mitigation and management measures have been developed for each of the risks identified and will be outlined in the EPs.
I have attached summary information sheets that explain the activities we plan to undertake, and detailed consultation information sheets can be found at the links below:

- lambert-west.pdf (woodside.com)
- macedon.pdf (woodside.com)

Woodside is seeking to understand the nature of the interests that Buurabalayji Thalanyji Aboriginal Corporation (BTAC) and its members may have in the 'environment that may be affected' (EMBA) by these activities. 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. In particular, we are interested in hearing:

- how the activities could impact your interests and activities and/or your cultural values
- your concerns about the proposed activities and what you think we should do about those concerns
- 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 us know by **13 July 2023** 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.
Please provide feedback directly to me on the details below,
to Feedback@woodside.com.au, by calling 1800 442 977, or directly to the 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 pleased to speak with BTAC members, the BTAC Board and office holders and other interested parties.
We look forward to hearing from you and to continuing our work together, including on the ongoing consultation framework.
As always please be in contact if you require further information and please reach out if Woodside can assist BTAC in any way to participate in these processes.

Sincerely,
[redacted]

1.50 Email sent to Yinggarda Aboriginal Corporation (YAC) (19 June 2023)

Dear [redacted]

Firstly, thank you for your correspondence last Thursday regarding consultation about Woodside's Julimar and Goodwyn activities. I will respond separately about this with a view to seeking more time for these consultations with Yinggarda Aboriginal Corporation (YAC) on or before 6 July, that Woodside would be pleased assist with by way of funding reasonable costs.

Further my correspondence regarding Woodside's proposed Scarborough, decommissioning, drilling, survey, and development activities, please find attached information about two additional activities:

- Angel Facility Operations – Woodside is planning to revise and resubmit the Angel Facility Operations EP to integrate drilling, subsea installation commissioning and production from the Lambert West Field, located around 126 km north-north-west of Dampier.
- Macedon Operations – Woodside is submitting a five yearly revision of the Macedon Operations Commonwealth and State EPs in accordance with State and Commonwealth regulations. The Macedon gas field is located approximately 40 km north of Exmouth and 100 km west of Onslow.

In preparation for this work, Woodside has undertaken an assessment to identify potential impacts and risks to the marine environment arising from both planned activities and unplanned events. Mitigation and management measures have been developed for each of the risks identified and will be outlined in the EPs.

I have attached summary information sheets that explain the activities we plan to undertake, and detailed consultation information sheets can be found at the links below:

- lambert-west.pdf (woodside.com)
- macedon.pdf (woodside.com)

Woodside is seeking to understand the nature of the interests that YAC and its members may have in the 'environment that may be affected' (EMBA) by these activities. 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. In particular, we are interested in hearing:

- how the activities could impact your interests and activities and/or your cultural values
- your concerns about the proposed activities and what you think we should do about those concerns
- 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 us know by **13 July 2023** 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.

Please provide feedback directly to me on the details below,
to Feedback@woodside.com.au, by calling 1800 442 977, or directly to the 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 YAC members and other people and organisations who you think may be interested as required. Woodside would be happy to speak with YAC members, the YAC Board and office holders and other interested parties.
We look forward to hearing from you.
As always please be in contact if you require further information and if Woodside can assist YAC in any way to participate in these processes.

Sincerely,
[redacted]

1.51 Email sent to Kariyarra Aboriginal Corporation (20 June 2023)

Dear [redacted]

Further to [redacted] correspondence (18-May-23) with you regarding Woodside's Julimar Development Project Phase 3 (JDP3) wells and subsea infrastructure and the Goodwyn A Infill Geophysical and Geotechnical Surveys, please find attached information about an additional activity:

- Angel Facility Operations – Woodside is planning to revise and resubmit the Angel Facility Operations EP to integrate drilling, subsea installation commissioning and production from the Lambert West Field, located around 126 km north-north-west of Dampier.

In preparation for this work, Woodside has undertaken an assessment to identify potential impacts and risks to the marine environment arising from both planned activities and unplanned events. Mitigation and management measures have been developed for each of the risks identified and will be outlined in the EP.
I have attached summary information sheet that explain the activity we plan to undertake, and detailed consultation information sheet can be found at the link below:

- lambert-west.pdf (woodside.com)

Woodside is seeking to understand the nature of the interests that Kariyarra Aboriginal Corporation (KAC) and its members may have in the 'environment that may be affected' (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 Sheet and consultation information sheet. In particular, we are interested in hearing:

- how the activity could impact your interests and activities and/or your cultural values
- your concerns about the proposed activity and what you think we should do about those concerns
- 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 us know by **21 July 2023** 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.
Please provide feedback directly to me on the details below,
to Feedback@woodside.com.au, by calling 1800 442 977, or directly to the 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 KAC members and other people and organisations who you think may be interested as required. Woodside

would be happy to speak with KAC members, the KAC Board and office holders and other interested parties.
We look forward to hearing from you.
As always, please be in contact if you require further information and if Woodside can assist KAC in any way to participate in these processes.

P.S. [redacted] is currently on leave and I am filling in for [redacted].

Regards
[redacted]

1.52 Email sent to Wirrawandi Aboriginal Corporation (WAC) (20 June 2023)

Dear [redacted]
Further to [redacted] correspondence (18-May-23) with you regarding Woodside's Julimar Development Project Phase 3 (JDP3) wells and subsea infrastructure, please find attached information about two additional activities:

- Angel Facility Operations – Woodside is planning to revise and resubmit the Angel Facility Operations EP to integrate drilling, subsea installation commissioning and production from the Lambert West Field, located around 126 km north-north-west of Dampier.
- Macedon Operations – Woodside is submitting a five yearly revision of the Macedon Operations Commonwealth and State EPs in accordance with State and Commonwealth regulations. The Macedon gas field is located approximately 40 km north of Exmouth and 100 km west of Onslow.

In preparation for this work, Woodside has undertaken an assessment to identify potential impacts and risks to the marine environment arising from both planned activities and unplanned events. Mitigation and management measures have been developed for each of the risks identified and will be outlined in the EPs.
I have attached summary information sheets that explain the activities we plan to undertake, and detailed consultation information sheets can be found at the links below:

- lambert-west.pdf (woodside.com)
- macedon.pdf (woodside.com)

Woodside is seeking to understand the nature of the interests that WAC and its members may have in the 'environment that may be affected' (EMBA) by these activities. 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. In particular, we are interested in hearing:

- how the activities could impact your interests and activities and/or your cultural values
- your concerns about the proposed activities and what you think we should do about those concerns
- 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 us know by **21 July 2023** 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.
Please provide feedback directly to me on the details below,
to Feedback@woodside.com.au, by calling 1800 442 977, or directly to the 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 WAC members, the WAC Board and office holders and other interested parties.
We look forward to hearing from you.
As always, please be in contact if you require further information and if Woodside can assist WAC in any way to participate in these processes.

P.S. [redacted] is currently on leave and I am filling in for [redacted]

Regards
[redacted]

1.53 Email sent to Robe River Kuruma Aboriginal Corporation (20 June 2023)

Dear [redacted]

Further to [redacted] correspondence (18-May-23) with you regarding Woodside's Julimar Development Project Phase 3 (JDP3) wells and subsea infrastructure and the Goodwyn A Infill Geophysical and Geotechnical Surveys, please find attached information about two additional activities:

- Angel Facility Operations – Woodside is planning to revise and resubmit the Angel Facility Operations EP to integrate drilling, subsea installation commissioning and production from the Lambert West Field, located around 126 km north-north-west of Dampier.
- Macedon Operations – Woodside is submitting a five yearly revision of the Macedon Operations Commonwealth and State EPs in accordance with State and Commonwealth regulations. The Macedon gas field is located approximately 40 km north of Exmouth and 100 km west of Onslow.

In preparation for this work, Woodside has undertaken an assessment to identify potential impacts and risks to the marine environment arising from both planned activities and unplanned events. Mitigation and management measures have been developed for each of the risks identified and will be outlined in the EPs.
I have attached summary information sheets that explain the activities we plan to undertake, and detailed consultation information sheets can be found at the links below:

- lambert-west.pdf (woodside.com)
- macedon.pdf (woodside.com)

Woodside is seeking to understand the nature of the interests that Robe River Kuruma Aboriginal Corporation (RRKAC) and its members may have in the 'environment that may be affected' (EMBA) by these activities. 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. In particular, we are interested in hearing:

- how the activities could impact your interests and activities and/or your cultural values
- your concerns about the proposed activities and what you think we should do about those concerns
- 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 us know by **21 July 2023** 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.
Please provide feedback directly to me on the details below,
to Feedback@woodside.com.au, by calling 1800 442 977, or directly to the 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 RRKAC members and other people and organisations who you think may be interested as required. Woodside would be happy to speak with RRKAC members, the RRKAC Board and office holders and other interested parties.
We look forward to hearing from you.
As always, please be in contact if you require further information and if Woodside can assist RRKAC in any way to participate in these processes.

P.S. [redacted] is currently on leave and I am filling in for [redacted].

Regards
[redacted]

1.54 Email sent to Ngarluma Aboriginal Corporation (NAC) (20 June 2023)

Dear [redacted]

Further to [redacted] correspondence (18-May-23) with you regarding Woodside's Julimar Development Project Phase 3 (JDP3) wells and subsea infrastructure and the Goodwyn A Infill Geophysical and Geotechnical Surveys, please find attached information about an additional activity:

- Angel Facility Operations – Woodside is planning to revise and resubmit the Angel Facility Operations EP to integrate drilling, subsea installation commissioning and production from the Lambert West Field, located around 126 km north-north-west of Dampier.

In preparation for this work, Woodside has undertaken an assessment to identify potential impacts and risks to the marine environment arising from both planned activities and unplanned events. Mitigation and management measures have been developed for each of the risks identified and will be outlined in the EP.
I have attached summary information sheet that explain the activity we plan to undertake, and detailed consultation information sheet can be found at the link below:

- lambert-west.pdf (woodside.com)

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 the total area over which unplanned events could have environmental impacts. The EMBA is set out in the attached Summary Information Sheet and consultation information sheet. In particular, we are interested in hearing:

- how the activity could impact your interests and activities and/or your cultural values
- your concerns about the proposed activity and what you think we should do about those concerns
- 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 us know by **21 July 2023** 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.
Please provide feedback directly to me on the details below,
to Feedback@woodside.com.au, by calling 1800 442 977, or directly to the 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 as required. Woodside would be happy to speak with NAC members, the NAC Board and office holders and other interested parties.
We look forward to hearing from you.
As always, please be in contact if you require further information and if Woodside can assist NAC in any way to participate in these processes.

P.S. [redacted] is currently on leave and I am filling in for [redacted]

Regards
[redacted]

1.55 Email sent to Yindjibarndi Aboriginal Corporation (20 June 2023)

Dear [redacted]

Further to [redacted] correspondence (18-May-23) with you regarding Woodside's Julimar Development Project Phase 3 (JDP3) wells and subsea infrastructure and the Goodwyn A Infill Geophysical and Geotechnical Surveys, please find attached information about an additional activity:

- Angel Facility Operations – Woodside is planning to revise and resubmit the Angel Facility Operations EP to integrate drilling, subsea installation commissioning and production from the Lambert West Field, located around 126 km north-north-west of Dampier.

In preparation for this work, Woodside has undertaken an assessment to identify potential impacts and risks to the marine environment arising from both planned activities and unplanned events. Mitigation and management measures have been developed for each of the risks identified and will be outlined in the EP.
I have attached summary information sheet that explain the activity we plan to undertake, and detailed consultation information sheet can be found at the link below:

- lambert-west.pdf (woodside.com)

Woodside is seeking to understand the nature of the interests that Yindjibarndi Aboriginal Corporation (YAC) and its members may have in the 'environment that may be affected' (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 Sheet and consultation information sheet. In particular, we are interested in hearing:

- how the activity could impact your interests and activities and/or your cultural values
- your concerns about the proposed activity and what you think we should do about those concerns
- 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 us know by **21 July 2023** 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.
Please provide feedback directly to me on the details below,
to Feedback@woodside.com.au, by calling 1800 442 977, or directly to the 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 YAC members and other people and organisations who you think may be interested as required. Woodside would be happy to speak with YAC members, the YAC Board and office holders and other interested parties.
We look forward to hearing from you.
As always, please be in contact if you require further information and if Woodside can assist YAC in any way to participate in these processes.

P.S. [redacted] is currently on leave and I am filling in for [redacted].

Regards

1.56 Email sent to Wanparta Aboriginal Corporation (20 June 2023)

Dear [redacted]

Further to [redacted] correspondence (18-May-23) with you regarding Woodside's Julimar Development Project Phase 3 (JDP3) wells and subsea infrastructure, please find attached information about an additional activity:

- Angel Facility Operations – Woodside is planning to revise and resubmit the Angel Facility Operations EP to integrate drilling, subsea installation commissioning and production from the Lambert West Field, located around 126 km north-north-west of Dampier.

In preparation for this work, Woodside has undertaken an assessment to identify potential impacts and risks to the marine environment arising from both planned activities and unplanned events. Mitigation and management measures have been developed for each of the risks identified and will be outlined in the EP.
I have attached summary information sheets that explain the activities we plan to undertake, and detailed consultation information sheets can be found at the links below:

- lambert-west.pdf (woodside.com)

Woodside is seeking to understand the nature of the interests that Wanparta Aboriginal Corporation (Wanparta) and its members may have in the 'environment that may be affected' (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. In particular, we are interested in hearing:

- how the activity could impact your interests and activities and/or your cultural values
- your concerns about the proposed activity and what you think we should do about those concerns
- 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 us know by **21 July 2023** 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.
Please provide feedback directly to me on the details below,
to Feedback@woodside.com.au, by calling 1800 442 977, or directly to the 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 members and other people and organisations who you think may be interested as required. Woodside would be happy to speak with Wanparta members,
the Wanparta Board and office holders and other interested parties.
We look forward to hearing from you.
As always, please be in contact if you require further information and if Woodside can assist Wanparta in any way to participate in these processes.

P.S. [redacted] is currently on leave and I am filling in for [redacted].

Regards
[redacted]

1.57 Email sent to Yamatji Marlpa Aboriginal Corporation (YMAC) (19 June 2023)

Dear [redacted],
I hope this message finds you well. Further to our discussions and earlier correspondence regarding Woodside's proposed Scarborough, decommissioning, drilling, survey, and development activities, please find attached information about two additional activities:

- Angel Facility Operations – Woodside is planning to revise and resubmit the Angel Facility Operations EP to integrate drilling, subsea installation commissioning and production from the Lambert West Field, located around 126 km north-north-west of Dampier.
- Macedon Operations – Woodside is submitting a five yearly revision of the Macedon Operations Commonwealth and State EPs in accordance with State and Commonwealth regulations. The Macedon gas field is located approximately 40 km north of Exmouth and 100 km west of Onslow.

In preparation for this work, Woodside has undertaken an assessment to identify potential impacts and risks to the marine environment arising from both planned activities and unplanned events. Mitigation and management measures have been developed for each of the risks identified and will be outlined in the EPs.
I have attached summary information sheets that explain the activities we plan to undertake, and detailed consultation information sheets can be found at the links below:

- lambert-west.pdf (woodside.com)
- macedon.pdf (woodside.com)

Woodside is seeking to understand the nature of the interests that Nganhurra Thanardi Garrbu Aboriginal Corporation (NTGAC) and its members may have in the 'environment that may be affected' (EMBA) by these activities. 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. In particular, we are interested in hearing:

- how the activities could impact your interests and activities and/or your cultural values

- your concerns about the proposed activities and what you think we should do about those concerns
- 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 us know by **13 July 2023** 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.

Please provide feedback directly to me on the details below,
to Feedback@woodside.com.au, by calling 1800 442 977, or directly to the 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 NTGAC members and other people and organisations who you think may be interested as required. Woodside would be happy to speak with NTGAC members, the NTGAC Board and office holders and other interested parties.

We look forward to hearing from you.

As always please be in contact if you require further information and if Woodside can assist NTGAC in any way to participate in these processes.

Sincerely,
[redacted]

1.58 Email sent to Ngarluma Yindjibarndi Foundation Ltd (NYFL) (29 June 2023)

Hi [redacted]

I realise we are in the midst of coordinating a consultation meeting, however sending through details of an additional activity.

Further to correspondence regarding Woodside's Julimar Development Project Phase 3 (JDP3) wells and subsea infrastructure and the Goodwyn A Infill Geophysical and Geotechnical Surveys, please find attached information about an additional activity:

- Angel Facility Operations – Woodside is planning to revise and resubmit the Angel Facility Operations EP to integrate drilling, subsea installation commissioning and production from the Lambert West Field, located around 126 km north-north-west of Dampier.

In preparation for this work, Woodside has undertaken an assessment to identify potential impacts and risks to the marine environment arising from both planned activities and unplanned events. Mitigation and management measures have been developed for each of the risks identified and will be outlined in the EP.

I have attached summary information sheet that explain the activity we plan to undertake, and detailed consultation information sheet can be found at the link below:

- lambert-west.pdf (woodside.com)

Woodside is seeking to understand the nature of the interests that Ngarluma Yindjibarndi Foundation Ltd (NYFL) and its members may have in the 'environment that may be affected' (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 Sheet and consultation information sheet. In particular, we are interested in hearing:

- how the activity could impact your interests and activities and/or your cultural values
- your concerns about the proposed activity and what you think we should do about those concerns
- 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 us know by **29 July 2023** 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.

Please provide feedback directly to me on the details below,
to Feedback@woodside.com.au, by calling 1800 442 977, or directly to the 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 NYFL members and other people and organisations who you think may be interested as required. Woodside would be happy to speak with NYFL members, the NYFL Board and office holders and other interested parties.

We look forward to hearing from you.

As always, please be in contact if you require further information and if Woodside can assist NYFL in any way to participate in these processes.

P.S. [redacted] is currently on leave and I am filling in for [redacted]

Regards
[redacted]

2. Additional Consultation

2.1 Email sent to Australian Border Force (ABF), Department of Industry, Science and Resources (DISR), Department of Transport (DoT), Australian Petroleum Production and Exploration Association (APPEA), Department of Biodiversity, Conservation and Attractions (DBCA), Department of Mines, Industry Regulation and Safety (DMIRS), Protect Ningaloo (10 July 2023)

Dear Stakeholder

Woodside previously consulted you (email below) on its plans to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

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.
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.
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 **22 July 2023**.

Regards,

Woodside Feedback

2.2 Email sent to Ningaloo Coast World Heritage Advisory Committee (NCWHAC) (10 July 2023)

Dear [redacted]

Woodside previously consulted you (email below) on its plans to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir

(Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

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.
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.
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 **22 July 2023**.

2.3 Email sent to Western Gas, Exxon Mobil Australia Resources Company, Shell Australia, BP Developments Australia, Carnarvon Energy, PE Wheatstone, Kyushu Electric Wheatstone, Eni Australia, Vermillion Oil & Gas Australia, Finder Energy No 16, Jadestone, KUFPEC, Santos NA Energy Holdings / Santos Ltd / 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, Longreach Capital Investments / Beagle No. 1 Pty Ltd, INPEX Alpha, JX Nippon O&G Exploration (Australia), OPIC Australia, Dorado Petroleum (10 July 2023)

Dear Titleholder

Woodside previously consulted you (email below) on its plans to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

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.
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.
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 **22 July 2023**.

Regards,

2.4 Email sent to Chevron Australia Osaka Gas Gorgon, Tokyo Gas Gorgon, JERA Gorgon (10 July 2023)

Dear Chevron

Woodside previously consulted you (email below) on its plans to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

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.
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.
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 **22 July 2023**.

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.

Regards,

2.5 Email sent to Pilbara Trawl Fishery, Pilbara Trap Fishery and Pilbara Line Fishery (10 July 2023)

Dear Fishery Stakeholder

Woodside previously consulted you (email below) on its plans to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Exclusionary / Cautionary Zones

For the routine operation of the Angel Facility, the Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure.

For the Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure. For the Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1500m around the subsea infrastructure. The Exploration wells with wellheads and an area of 500 m around each wellhead.

For the Lambert West Drilling and Tie-Back the Operational Area includes a radius of 4500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities with a temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
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.
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.
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 **22 July 2023**.

Regards,

2.6 Email sent to Western Australian Fishing Industry Council (WAFIC) (10 July 2023)

Dear [redacted]

Woodside previously consulted you (email below) on its plans to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the

subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Exclusionary / Cautionary Zones

For the routine operation of the Angel Facility, the Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure.

For the Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure. For the Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1500m around the subsea infrastructure. The Exploration wells with wellheads and an area of 500 m around each wellhead.

For the Lambert West Drilling and Tie-Back the Operational Area includes a radius of 4500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities with a temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.

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.

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.

We have identified potential impacts to active commercial fishers and the environment, which are summarised below. We have endeavoured to reduce these risks to an as low as reasonably practicable level.

Fisheries have been identified as being relevant based on fishing licence overlap, assessment of government fishing effort data (including Fishcube and AFMA) from recent years, fishing methods and water depth.

Woodside acknowledges WAFIC's consultation guidance and has applied this by consulting fisheries that are assessed as having a potential for interaction in the Operational Area directly and consulting fisheries assessed as having a potential for interaction in the EMBA via WAFIC.

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 **22 July 2023**.

Regards,

2.7 Email sent to North West Slope and Trawl Fishery, Western Deepwater Trawl Fishery, Commonwealth Fisheries Association (CFA) (10 July 2023)

Dear Fishery Stakeholder

Woodside previously consulted you (email below) on its plans to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Exclusionary / Cautionary Zones

For the routine operation of the Angel Facility, the Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on

the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure.

For the Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure. For the Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1500m around the subsea infrastructure. The Exploration wells with wellheads and an area of 500 m around each wellhead.

For the Lambert West Drilling and Tie-Back the Operational Area includes a radius of 4500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities with a temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.

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.
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.
We have identified potential impacts to active commercial fishers and the environment, which are summarised below. We have endeavoured to reduce these risks to an as low as reasonably practicable level.

Fisheries have been identified as being relevant based on fishing licence overlap, assessment of government fishing effort data (including Fishcube and AFMA) from recent years, fishing methods and water depth.

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 **22 July 2023**.

Regards,

2.8 Letter sent to Marine Aquarium Managed Fishery, Mackerel Managed Fishery (Area 2), Pilbara Crab Managed Fishery, West Coast Deep Sea Crustacean Managed Fishery, Specimen Shell Managed Fishery, Onslow Prawn Managed

Fishery, Western Australian Sea Cucumber Managed Fishery, Exmouth Gulf Prawn Managed Fishery, Nickol Bay Prawn Managed Fishery (11 July 2023)

Please direct all responses/queries to:
Woodside Feedback
T: 1800 442 977
E: Feedback@woodside.com.au

Woodside Energy Group Ltd
ACN 004 898 962
Mia Yellagonga
11 Mount Street
Perth WA 6000
Australia
T: +61 8 9348 4000
www.woodside.com

11 July 2023

[redacted]

Dear Stakeholder

ANGEL FACILITY OPERATIONS ENVIRONMENT PLAN

Woodside previously consulted you (correspondence dated 22 June 2023) regarding its plans to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Woodside is writing to you to follow up on feedback with respect to the proposed activities. You were previously sent a Consultation Information Sheet (also available on our website woodside.com), which provides additional background on the proposed activities, including summaries of potential key impacts and risks, and associated management measures.

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.
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 **22 July 2023**.

Your feedback and our response will be included in our Environment Plan 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 2009* (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

Regards,

Woodside Feedback

Woodside Energy
Mia Yellagonga
Karlak, 11 Mount Street
Perth WA 6000
Australia

T: 1800 442 977
E: feedback@woodside.com.au
www.woodside.com

2.9 Letter sent to Letter sent to Broome Recreational Marine Users, Gascoyne Recreational Marine Users and Pilbara/Kimberley Recreational Marine Users (11 July 2023)

Please direct all responses/queries to:
Woodside Feedback
T: 1800 442 977
E: Feedback@woodside.com.au

Woodside Energy Group Ltd
ACN 004 898 962
Mia Yellagonga
11 Mount Street
Perth WA 6000
Australia
T: +61 8 9348 4000
www.woodside.com

11 July 2023

[redacted]

Dear Stakeholder

ANGEL FACILITY OPERATIONS ENVIRONMENT PLAN

Woodside previously consulted you (correspondence dated 22 June 2023) regarding its plans to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Woodside is writing to you to follow up on feedback with respect to the proposed activities. You were previously sent a Consultation Information Sheet (also available on our website woodside.com), which provides additional background on the proposed activities, including summaries of potential key impacts and risks, and associated management measures.

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.
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 **22 July 2023**.

Your feedback and our response will be included in our Environment Plan 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 2009* (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

Regards,

Woodside Feedback

Woodside Energy
Mia Yellagonga
Karlak, 11 Mount Street
Perth WA 6000
Australia

T: 1800 442 977
E: feedback@woodside.com.au
www.woodside.com

Page 2 of 2

2.10 Email sent to Australian Conservation Foundation (ACF), Australian Marine Conservation Society (AMCS), Conservation Council of Western Australia (CCWA), Greenpeace Australia Pacific (GAP), Sea Shepherd Australia (SSA), and 350 Australia (350A) (10 July 2023)

Dear Stakeholder

Woodside previously consulted you (email below) on its plans to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

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.
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.
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 **22 July 2023**.

Regards,

2.11 Email sent to Port Hedland Chamber of Commerce and Industry (10 July 2023)

Dear Port Hedland Chamber of Commerce and Industry

Woodside previously consulted you (email below) on its plans to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

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.
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.
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 **22 July 2023**.

Regards,

2.12 Email sent to Western Australian Museum (10 July 2023)

Dear Western Australian Museum

Woodside previously consulted you (email below) on its plans to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

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.
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.
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 **22 July 2023**.

Regards,

2.13 Email sent to Town of Port Hedland (10 July 2023)

Dear Town of Port Hedland

Woodside previously consulted you (email below) on its plans to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

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.
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.
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 **22 July 2023**.

Regards,

2.14 Email sent to WAMSI (10 July 2023)

Dear [redacted]

Woodside previously consulted you (email below) on its plans to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

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.
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.
Woodside is seeking your advice regarding any research activities that WAMSI may be undertaking that may overlap with our proposed activities.

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 **22 July 2023**.

Regards,

2.15 Email sent to CSIRO (10 July 2023)

Dear [redacted]

Woodside previously consulted you (email below) on its plans to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

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.
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.

Woodside is seeking your advice regarding any research activities that CSIRO may be undertaking that may overlap with our proposed activities.

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 **22 July 2023**.

Regards,

2.16 Email sent to Director of National Parks (10 July 2023)

Dear Director of National Parks

Woodside previously consulted you (email below) on its plans to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L,Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Australian Marine Parks (AMPs)

We note Australian Government Guidance on consultation activities and confirm that:

- The proposed activities are outside the boundaries of a proclaimed Australian Marine Parks, with the Angel Facility located approximately 55km north east of the Commonwealth boundary of the Montebello Islands Australian Marine Park,

approximately 277 km north east of the Gascoyne Australian Marine Park and approximately 183 km south east of the Agro Rowley Terrace Australian Marine Park.

- We have assessed potential risks to Australian Marine Parks (AMPs) in the development of the proposed Environment Plan and believe that there are no credible risks as part of planned activities that have potential to impact the values of the Marine Parks.
- The worst-case credible spill scenario assessed in this EP is the remote likelihood event of a loss of well integrity. 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:
    - Agro-Rowley Terrace (Multiple Use Zone VI)
    - Gascoyne (Multiple Use Zone VI)
    - Montebello (Multiple Use Zone VI)
    - Ningaloo (Recreational Use Zone IV)
- 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 the Marine Park.

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.

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.

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 **22 July 2023**.

Regards,

2.17 Email sent to DCCEEW (10 July 2023)

Dear DCCEEW

Woodside previously consulted you (email below) on its plans to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing

Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

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.
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.
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 **22 July 2023**.

Regards,

2.18 Email sent to Department of Defence (DoD) (11 July 2023)

Dear Department of Defence

Woodside previously consulted you (email below) on its plans to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing

Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

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.
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.
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 **22 July 2023**.

2.19 Email sent to DAFF – Fisheries and Biosecurity (11 July 2023)

Dear DAFF – Fisheries and Biosecurity

Woodside previously consulted you (email below) on its plans to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

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.

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.

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 **22 July 2023.**

Regards,

2.20 Email sent to Exmouth Recreational Marine Users, Karratha Recreational Marine Users, Recfishwest, Marine Tourism Association, WA Game Fishing Association (10 July 2023)

Dear Stakeholder

Woodside previously consulted you (email below) on its plans to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

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.
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.
We have identified potential impacts to active commercial fishers and the environment, which are summarised below. We have endeavoured to reduce these risks to an as low as reasonably practicable level.

Fisheries have been identified as being relevant based on fishing licence overlap, assessment of government fishing effort data (including Fishcube and AFMA) from recent years, fishing methods and water depth.

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 **22 July2023**.

Regards,

2.21 Email sent to Exmouth Community Liaison Group (11 July 2023)

Dear Exmouth Community Liaison Group

Woodside previously consulted you (email below) on its plans to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and

Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

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.
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.
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 **23 July 2023**.

Regards,

2.22 Email sent to Broome Chamber of Commerce (10 July 2023)

Dear Broome Chamber of Commerce

Woodside previously consulted you (email below) on its plans to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and

Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

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.
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.
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 **22 July 2023**.

Regards,

2.23 Email sent to Onslow Chamber of Commerce and Industry (11 July 2023)

Dear [redacted]

Woodside previously consulted you (email below) on its plans to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and

Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Environment that May Be Affected (EMBA)

Following recent 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, the broadest extent of the EMBA has been determined by the highly unlikely event of a hydrocarbon release from activities within the scope the EP. The worst-case credible spill scenario for this EP is a well loss of integrity.

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.
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.
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 **22 July 2023**.

Regards,

2.24 Email sent to City of Karratha (12 July 2023)

Dear [redacted]

Woodside previously consulted you (email below) on its plans to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

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.
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.
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 **22 July 2023**.

Regards,

2.25 Email sent to Karratha Community Liaison Group (12 July 2023)

Dear Karratha Community Liaison Group

Woodside previously consulted you (email below) on its plans to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

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.
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.
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 **22 July 2023**.

Regards,

2.26 Email sent to Shire of Exmouth (11 July 2023)

Dear [redacted]

Woodside previously consulted you (email below) on its plans to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

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.
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.
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 **23 July 2023**.

Regards,

2.27 Email sent to Shire of Ashburton (11 July 2023)

Dear [redacted]

Woodside previously consulted you (email below) on its plans to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

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.
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.
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 **22 July 2023**.

Regards,

2.28 Email sent to Cape Conservation Group (CCG) (10 July 2023)

Dear [redacted]

Woodside previously consulted you (email below) on its plans to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

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.

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.

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 **23 July 2023**.

Regards,

2.29 Email sent to Australian Institute of Marine Science (AIMS) (10 July 2023)

Dear [redacted]

Woodside previously consulted you (email below) on its plans to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

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.
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.
Woodside is seeking your advice regarding any research activities that AIMS may be undertaking that may overlap with our proposed activities.

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 **22 July 2023**.

Kind regards

2.30 Email sent to University of Western Australia (UWA) (10 July 2023)

Dear [redacted]

Woodside previously consulted you (email below) on its plans to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

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.
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.
Woodside is seeking your advice regarding any research activities that UWA may be undertaking that may overlap with our proposed activities.

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 **22 July 2023**.

Regards,

2.31 Email sent to AMSA – Marine Pollution (22 August 2023)

Dear [redacted]

Woodside previously consulted you (email below) on its plans to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Environment that May Be Affected (EMBA)

Following recent 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, the broadest extent of the EMBA has been determined by the highly unlikely event of a hydrocarbon release from

activities within the scope the EP. The worst-case credible spill scenario for this EP is a well loss of integrity.

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. **A shipping lane map is also attached.** You can also subscribe to receive updates on our consultation activities by subscribing here.

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.

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**.**

Kind regards

2.32 Email sent to Save our Songlines (SOS) (28 September 2023)

Dear [redacted] and Save Our Songlines

Woodside is planning to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Environment that May Be Affected (EMBA)
Following recent 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, the broadest extent of the EMBA has been determined by the highly unlikely event of a hydrocarbon release from activities within the scope the EP. The worst-case credible spill scenario for this EP is a well loss of integrity.
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.
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.
Woodside is consulting with your organisation on this activity as it has previously self-identified and requested to consult on Woodside's Scarborough EPs.

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 **28 October 2023**.

Activity: Angel Facility Operations Environment Plan

Angel Facility Operations Environment Plan	
Summary	Routine Operations: • Routine production and operations (Lambert Deep, LDA-01; incorporation of Lambert West, LDA-02 following drilling and tie-back). • Routine inspection, monitoring, maintenance and repair (IMMR) activities. • Non-routine and unplanned activities and incidents associated with the above. Lambert West Drilling and Tie-back: • Drill one new well (LDA-02) in the Lambert West (LW) field. • Installation of a subsea distribution unit, flexible flowline and flying leads and disconnection of the existing LDA-01 well flying leads from the Lambert Deep Umbilical Termination Assembly reconnecting it to the subsea distribution unit. • Pre-commissioning and commissioning activities
Permit Area	Activities will occur predominantly within the WA-3-L and WA-16-L title areas and the Pipeline licence areas within WA-14-PL and WA-31-PL.
Location	~ 126 km north-north-west of Dampier

Approx. Water Depth (m)	~ 70 – 130 m
Schedule	Routine Operations: • Ongoing Lambert West Drilling and Tie-Back: • Drilling is currently anticipated in Q3 2024, subject to EP approval. • Subsea installation is currently anticipated to commence when the relevant wells have been drilled in Q4 2024 / Q1 2025, subject to EP approval. • Pre-commissioning and commissioning activities are currently anticipated to commence in H1 2025, subject to EP approval.
Approx. Estimated Duration	Drilling: • Activities are currently anticipated to take approximately 50 - 60 days per well to complete. Subsea installation and commissioning: • Activities are currently anticipated to have a cumulative duration of around four 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.
Exclusionary/ Cautionary Zone	Routine Operations: 264. The Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility 265. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure 266. Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure 267. Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1,500m around the subsea infrastructure 268. Exploration wells with wellheads and an area of 500 m around each wellhead. Lambert West Drilling and Tie-Back: 269. The Operational Area includes a radius of 4,500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities. 270. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.

Infrastructure	• Wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals, and explorations wells with wellhead
Vessels	• Moored MODU, DP MODU or hybrid moored/DP MODU • Primary Installation Vessel • Inspection, Monitor, Maintenance and Repair (IMMR) Vessel • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and general supply/support 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 **27 October 2023.**

Your feedback and our response will be included in our Environment Plan 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 2009* (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 your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

Regards,

2.33 Email sent to Friends of Australian Rock Art (FARA) (11 September 2023)

Dear [redacted]

Woodside is planning to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Environment that May Be Affected (EMBA)

Following recent 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, the broadest extent of the EMBA has been determined by the highly unlikely event of a hydrocarbon release from activities within the scope the EP. The worst-case credible spill scenario for this EP is a well loss of integrity.

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.

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.

Woodside is consulting with your organisation on this activity as it has previously declared an interest in our activities and how they may affect the Burrup Hub environment.

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 **11 October 2023**.

Activity: Angel Facility Operations Environment Plan

Angel Facility Operations Environment Plan	
Summary	Routine Operations: • Routine production and operations (Lambert Deep, LDA-01; incorporation of Lambert West, LDA-02 following drilling and tie-back). • Routine inspection, monitoring, maintenance and repair (IMMR) activities.

	• Non-routine and unplanned activities and incidents associated with the above. Lambert West Drilling and Tie-back: • Drill one new well (LDA-02) in the Lambert West (LW) field. • Installation of a subsea distribution unit, flexible flowline and flying leads and disconnection of the existing LDA-01 well flying leads from the Lambert Deep Umbilical Termination Assembly reconnecting it to the subsea distribution unit. • Pre-commissioning and commissioning activities
Permit Area	Activities will occur predominantly within the WA-3-L and WA-16-L title areas and the Pipeline licence areas within WA-14-PL and WA-31-PL.
Location	~ 126 km north-north-west of Dampier
Approx. Water Depth (m)	~ 70 – 130 m
Schedule	Routine Operations: • Ongoing Lambert West Drilling and Tie-Back: • Drilling is currently anticipated in Q3 2024, subject to EP approval. • Subsea installation is currently anticipated to commence when the relevant wells have been drilled in Q4 2024 / Q1 2025, subject to EP approval. • Pre-commissioning and commissioning activities are currently anticipated to commence in H1 2025, subject to EP approval.
Approx. Estimated Duration	Drilling: • Activities are currently anticipated to take approximately 50 - 60 days per well to complete. Subsea installation and commissioning: • Activities are currently anticipated to have a cumulative duration of around four 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.
Exclusionary/ Cautionary Zone	Routine Operations: 271. The Operational area comprises of the riser platform and the area within a 500 m Petroleum Safety Zone (PSZ) around the facility 272. The export pipeline from Angel (WA-14-PL) up to the connection to the barred tee (WA-1-PL) on the NRC 1TL tie-in assembly and an area encompassing 1500 m either side of the WA-14-PL pipeline infrastructure 273. Angel subsea infrastructure, including Angel production (AP) wells AP-2, AP-3 and AP- 4, flowlines, umbilicals and an area within 1500 m around the subsea infrastructure

	274. Lambert Deep subsea infrastructure including well LDA-01, flowline (WA-31-PL), umbilicals and an area within 1,500m around the subsea infrastructure 275. Exploration wells with wellheads and an area of 500 m around each wellhead. Lambert West Drilling and Tie-Back: 276. The Operational Area includes a radius of 4,500 m from the Lambert Deep Manifold to allow vessels to undertake drilling activities. 277. Temporary 500 m safety exclusion zone around vessels conducting drilling and installation activities to manage vessel movements.
Infrastructure	• Wells, Xmas trees, manifolds, flowlines/pipelines and umbilicals, and explorations wells with wellhead
Vessels	• Moored MODU, DP MODU or hybrid moored/DP MODU • Primary Installation Vessel • Inspection, Monitor, Maintenance and Repair (IMMR) Vessel • Support vessels including heavy lift vessel(s) (HLVs), multi-service construction vessel(s), anchor handling vessel(s) and general supply/support 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 **11 October 2023.**

Your feedback and our response will be included in our Environment Plan 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 2009* (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 your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the Environment Plan in order for this information to remain confidential to NOPSEMA.

Regards,

2.34 Email sent to Save our Songlines (SOS) (17 October 2023)

Dear [redacted] and Save Our Songlines,

Woodside previously consulted you (email below) on its plans to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed

platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

Environment that May Be Affected (EMBA)

Following recent 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, the broadest extent of the EMBA has been determined by the highly unlikely event of a hydrocarbon release from activities within the scope the EP. The worst-case credible spill scenario for this EP is a well loss of integrity.

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.

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.
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 **28 October 2023**.

Regards,

2.35 Email sent to Friends of Australian Rock Art (FARA) (11 October 2023)

Dear [redacted]

Woodside previously consulted you (email below) on its plans to submit a revision of the Angel Facility Operations Environment Plan (EP) in Production Licence WA-3-L, Pipeline Licence WA-14-PL and Permit Area WA-16-L, approximately 126 km north-west of Dampier, Western Australia. The EP currently covers operations of a fixed platform (Angel) and subsea infrastructure connected to the Angel and Lambert Deep reservoirs.

The EP is being revised and resubmitted to integrate drilling, subsea installation, commissioning (drilling and tie-back) and production from the Lambert West reservoir (Lambert West tie-back) into the existing Angel production systems. The Lambert Deep and Lambert West Fields are located in Commonwealth waters around 15 km north-west of the Angel Platform in Permit Area WA-16-L.

Drilling activities

- Woodside plans to drill one new well in the Lambert West field (LDA-02), install an associated wellhead and Xmas tree. LDA-02 will be connected to the existing Lambert Deep two-slot production manifold using a ~8 to 10-inch internal diameter (ID) flexible well jumper. The well will be located at approximately 130 m water depth.

Subsea installation and commissioning activities

- Woodside also plans to install a subsea distribution unit (SDU) and flying leads at ~130 m water depth to provide connections to and control of key infrastructure in the subsea system; disconnect the existing Lambert Deep (LDA-01) well flying leads from existing Lambert Deep umbilical termination assembly (UTA) and reconnect it to the subsea distribution unit. The LDA-01 well is located at approximately 130 m water depth.

- Proposed activities also include pre-commissioning and cold-commissioning activities, 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.

- Well start-up and commissioning (initial start-up) of the Lambert West well (LDA-02) 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.

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Following recent 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, the broadest extent of the EMBA has been determined by the highly unlikely event of a hydrocarbon release from activities within the scope the EP. The worst-case credible spill scenario for this EP is a well loss of integrity.
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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.
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 **28 October 2023**.

Regards,

2.36 Geotargeted social media campaigns (May – November 2023)

Facebook Campaign – May - November 2023

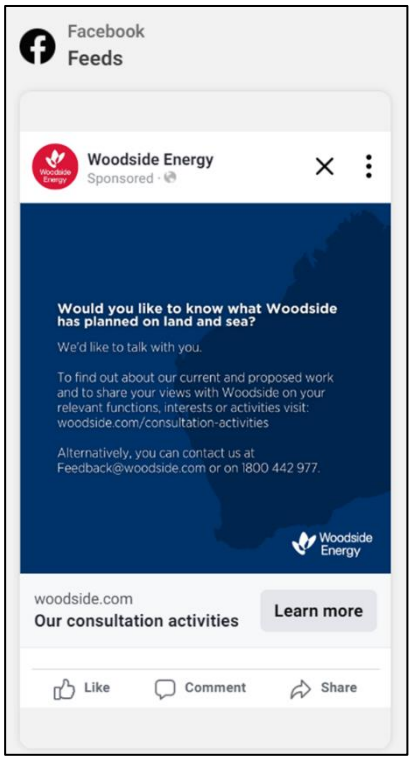
A Facebook information campaign was targeted along the coastline from Geraldton to Derby to ensure it reached all communities adjacent to the EMBA. Geotargeting locations are distributed along the coast, with 80 km radiuses around towns, cities and shires. Geotargeting points were also included for spaces between towns, cities and shires to ensure no areas were missed – you'll see below there are latitude and longitude references for those locations.

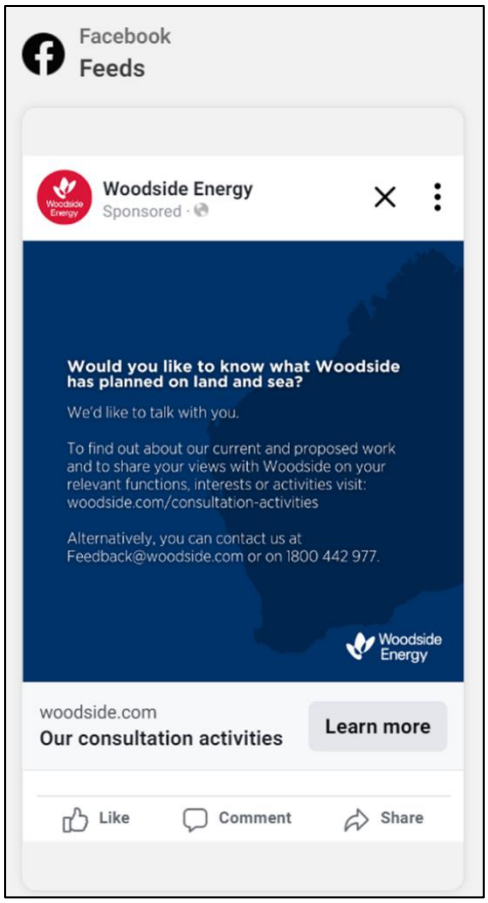
As at Wednesday, 1 November 2023
Ad reach: 106,480 users
Impressions: 972,443 views
Clicks through to *Consultation Information* page: 4,218 link clicks

Geotargeting locations:

- Broome (+80 km)
- Carnarvon (+80 km)

- Denham (+80 km)
- Exmouth (+80 km)
- Geraldton (+80 km)
- Onslow (+80 km)
- Port Hedland (+80 km)
- Karratha (+80 km)
- Latitude -17 Longitude 122.65 Dampier Peninsula (+80 km)
- Latitude -22.75 Longitude 114.10 Exmouth Gulf (+80 km)
- Latitude -18.96 Longitude 121.94 Gingerah (+80 km)
- Latitude -27.85 Longitude 114.25 Kalbarri National Park (+80 km)
- Latitude -21.32 Longitude 116.03 Mardie (+80 km)
- Pardoo (+80 km)
- Latitude -20.94 Longitude 117.83 Sherlock (+80 km)
- Latitude -26.96 Longitude 113.95 Tamala (+80 km)
- Latitude -19.88 Longitude 121.15 Telfer (+80 km)
- Latitude -17.52 Longitude 123.56 Willare (+80 km)
- Latitude -22.43 Longitude 114.93 Yannarie (+80 km)



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TIMOR-
LESTE
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AUSTRALIA
Perth


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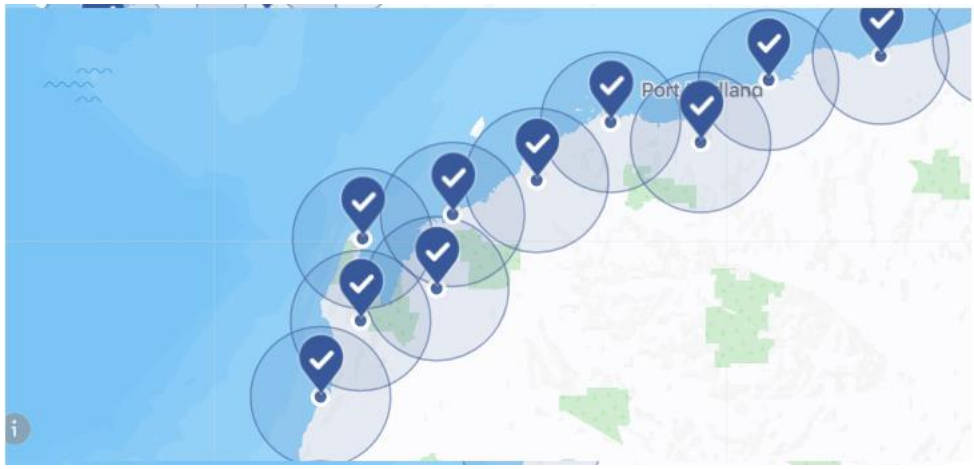

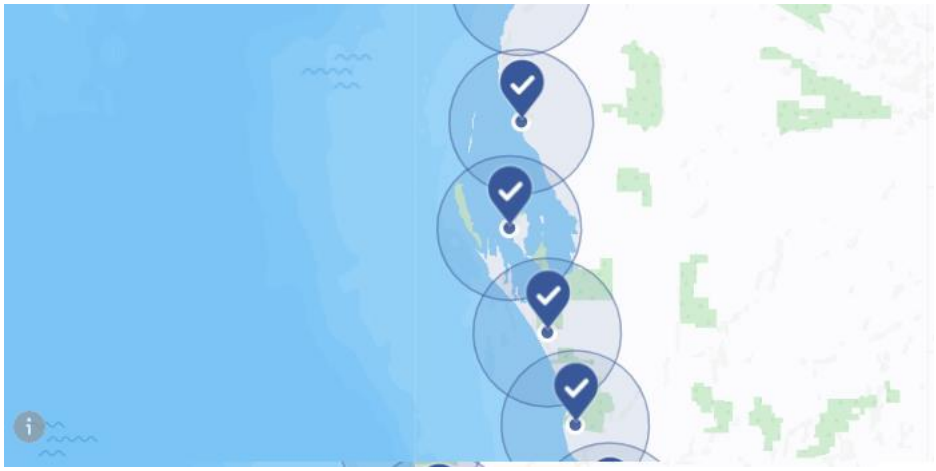

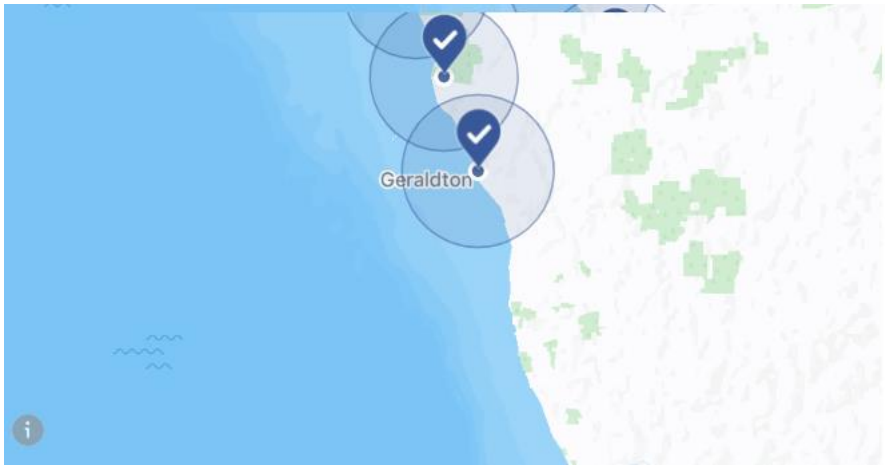

Facebook Campaign – June 2023

A Facebook information campaign was targeted along the coastline from Geraldton to Derby to ensure it reached all communities adjacent to the EMBA. Geotargeting locations are distributed along the coast, with 80 km radiuses around towns, cities and shires. Geotargeting points were also included for spaces between towns, cities

and shires to ensure no areas were missed – you'll see below there are latitude and longitude references for those locations.

As at 11.30am 30 June 2023
Reach: 41,118
Impressions: 285,366
Link clicks: 1,236
Geotargeting locations:

- Broome (+80 km)
- Carnarvon (+80 km)
- Denham (+80 km)
- Exmouth (+80 km)
- Geraldton (+80 km)
- Onslow (+80 km)
- Port Hedland (+80 km)
- Karratha (+80 km)
- Latitude -17 Longitude 122.65 Dampier Peninsula (+80 km)
- Latitude -22.75 Longitude 114.10 Exmouth Gulf (+80 km)
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- Latitude -17.52 Longitude 123.56 Willare (+80 km)
- Latitude -22.43 Longitude 114.93 Yannarie (+80 km)


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Would you like to know what Woodside has planned on land and sea?
We'd like to talk with you.
To find out about our current and proposed work and to share your views with Woodside on your relevant location, activities or interests visit: woodside.com/consultation-activities.
Alternatively, you can contact us at Feedback@woodside.com.au or on 1800 442 977.
Woodside Energy
Learn more


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Would you like to know what Woodside has planned on land and sea?
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Woodside Energy
woodside.com
Woodside's consultation activities
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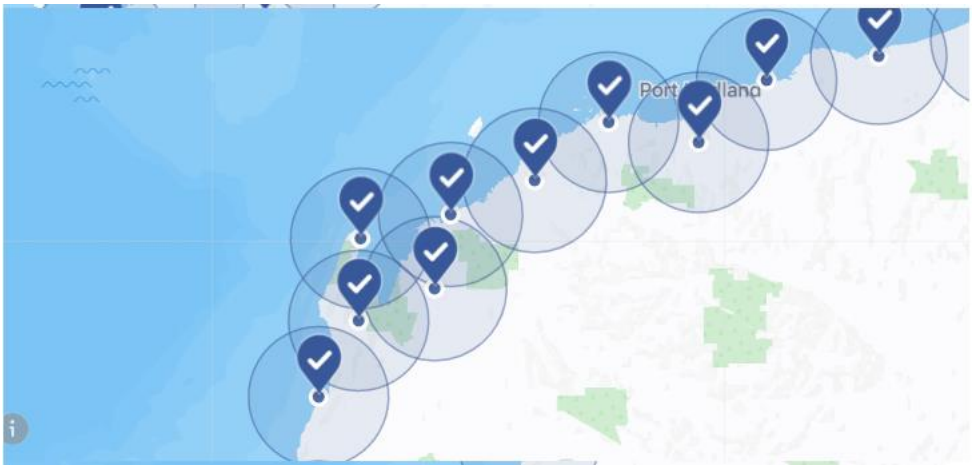
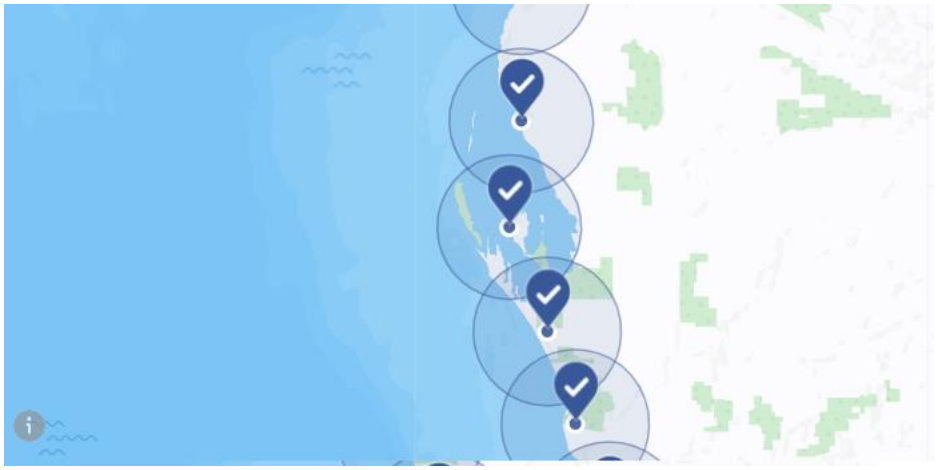
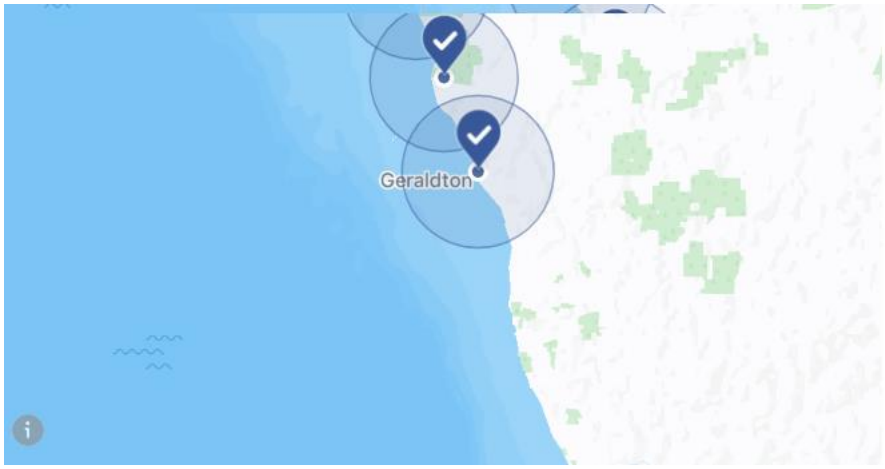
Coral
Sea
AUSTRALIA
Perth
Sydney
Melbourne
Tasma
Sea


AUSTRALIA
Perth


Broome







Facebook Campaign – June 2023

A Facebook information campaign was targeted along the coastline from Geraldton to Derby to ensure it reached all communities adjacent to the EMBA. Geotargeting locations are distributed along the coast, with 80 km radiuses around towns, cities and shires. Geotargeting points were also included for spaces between towns, cities and shires to ensure no areas were missed – you'll see below there are latitude and longitude references for those locations.

As at 11.30am 30 June 2023
Reach: 41,118
Impressions: 285,366
Link clicks: 1,236
Geotargeting locations:

- Broome (+80 km)
- Carnarvon (+80 km)
- Denham (+80 km)
- Exmouth (+80 km)
- Geraldton (+80 km)
- Onslow (+80 km)
- Port Hedland (+80 km)
- Karratha (+80 km)
- Latitude -17 Longitude 122.65 Dampier Peninsula (+80 km)
- Latitude -22.75 Longitude 114.10 Exmouth Gulf (+80 km)
- Latitude -18.96 Longitude 121.94 Gingerah (+80 km)
- Latitude -27.85 Longitude 114.25 Kalbarri National Park (+80 km)
- Latitude -21.32 Longitude 116.03 Mardie (+80 km)
- Pardoo (+80 km)
- Latitude -20.94 Longitude 117.83 Sherlock (+80 km)
- Latitude -26.96 Longitude 113.95 Tamala (+80 km)
- Latitude -19.88 Longitude 121.15 Telfer (+80 km)
- Latitude -17.52 Longitude 123.56 Willare (+80 km)
- Latitude -22.43 Longitude 114.93 Yannarie (+80 km)


Woodside Energy
Sponsored
Would you like to know what Woodside has planned on land and sea?
We'd like to talk with you.
To find out about our current and proposed work and to share your views with Woodside on your relevant location, activities or interests visit: woodside.com/consultation-activities.
Alternatively, you can contact us at Feedback@woodside.com.au or on 1800 442 977.
Woodside Energy
Learn more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Would you like to know what Woodside has planned on land and sea?
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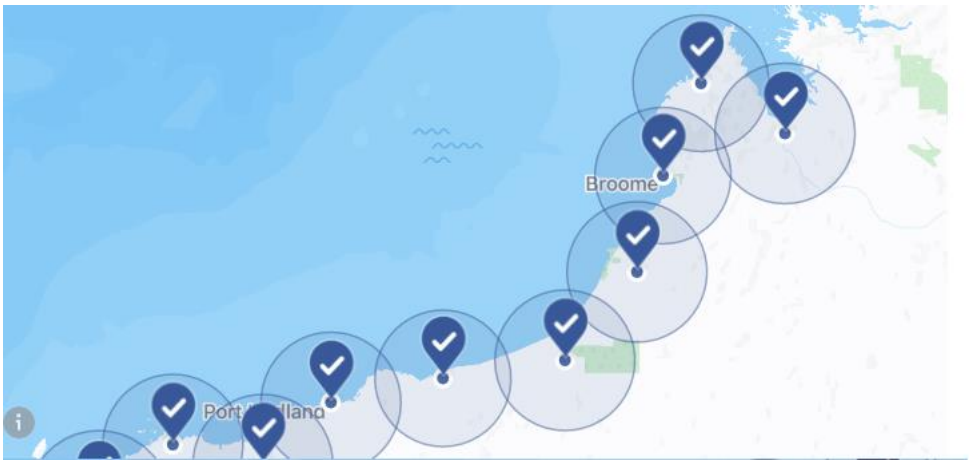
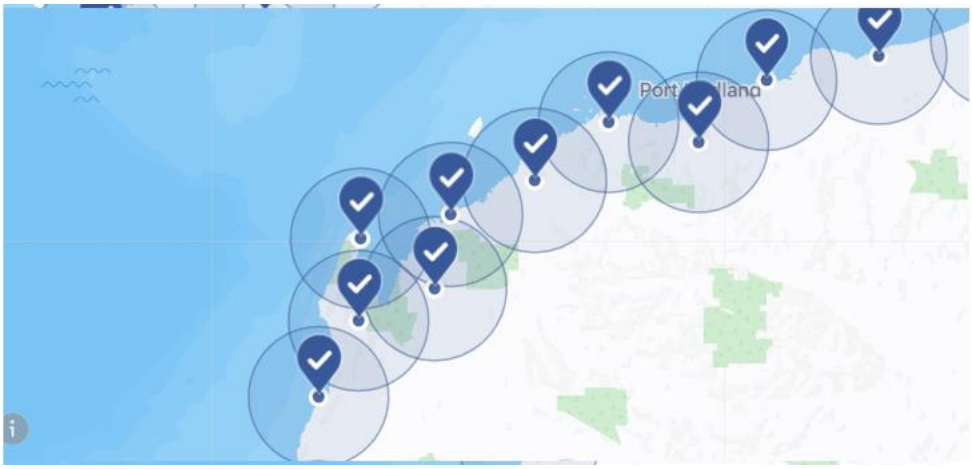
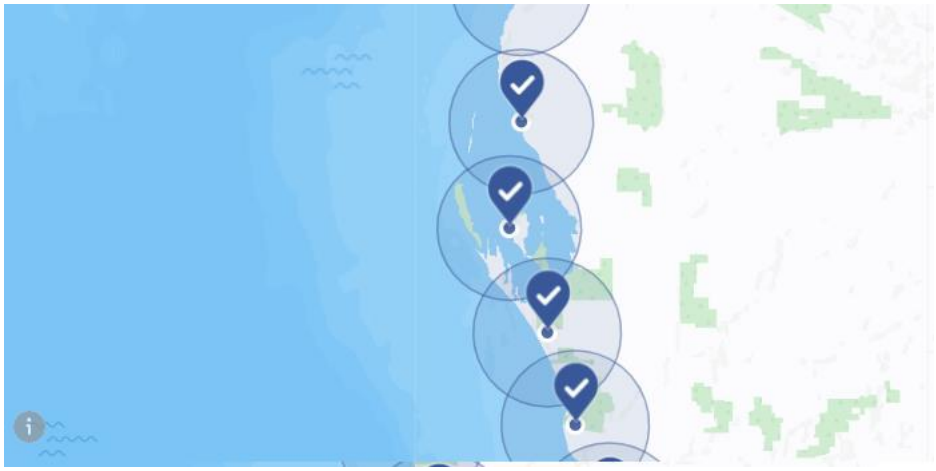
Alternatively, you can contact us at Feedback@woodside.com.au or on 1800 442 977.
Woodside Energy
woodside.com
Woodside's consultation activities
Learn more

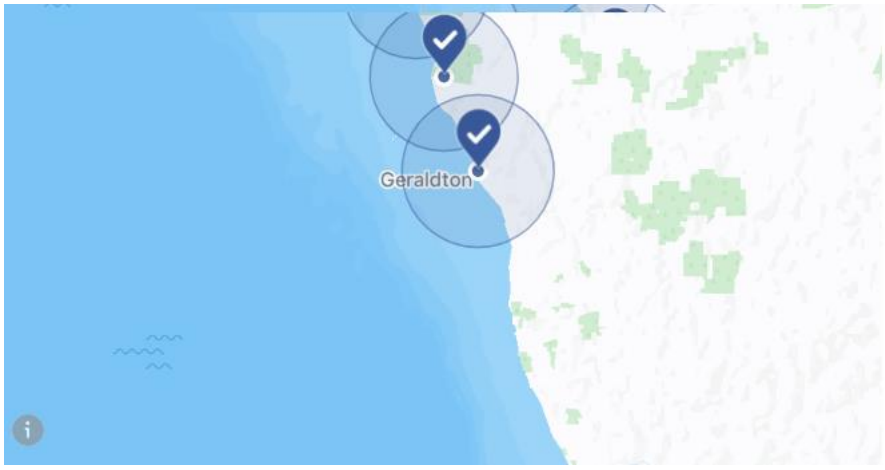

Jakarta
TIMOR-
LESTE
GUINEA
SOLOMON
IS.
Coral
Sea
AUSTRALIA
Perth
Sydney
Melbourne
Tasma
Sea


AUSTRALIA
Perth


Broome

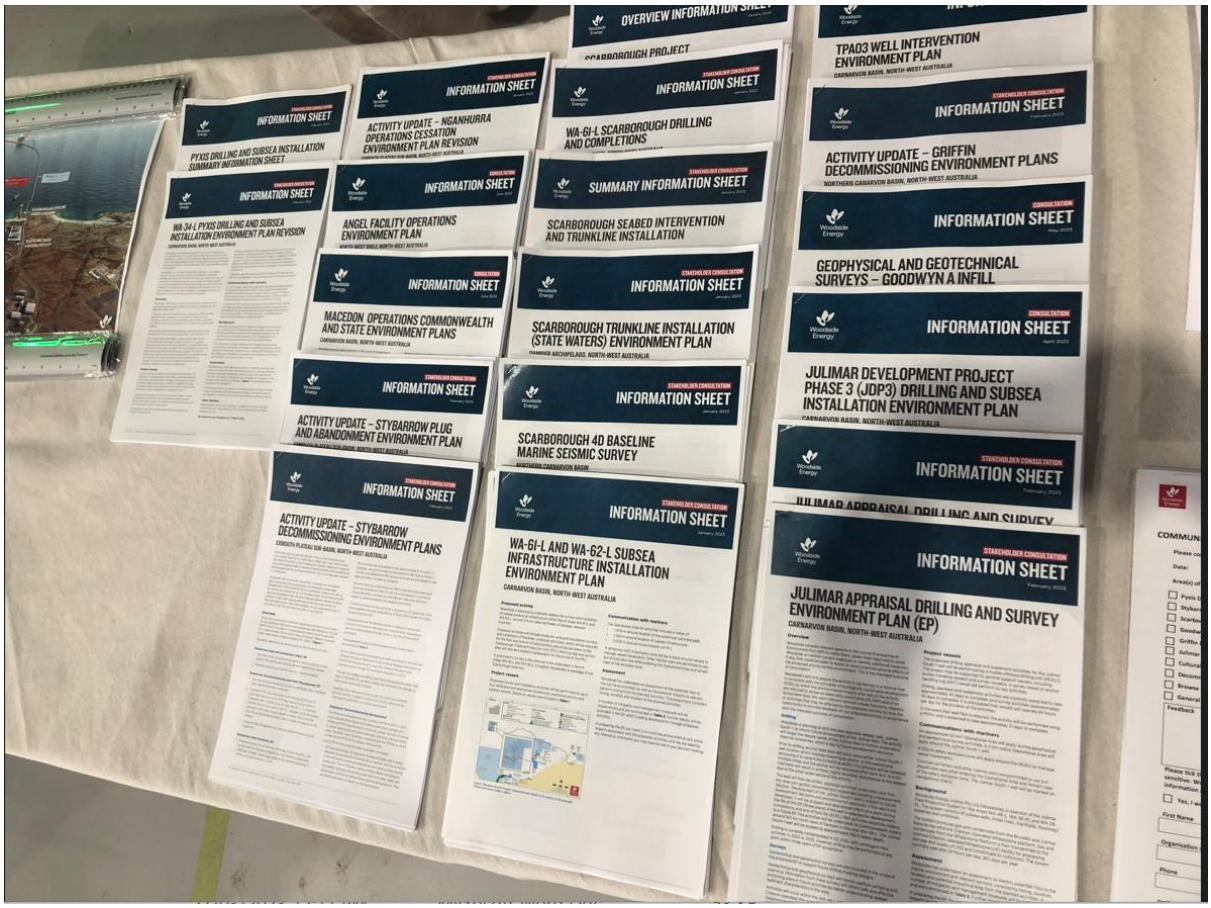




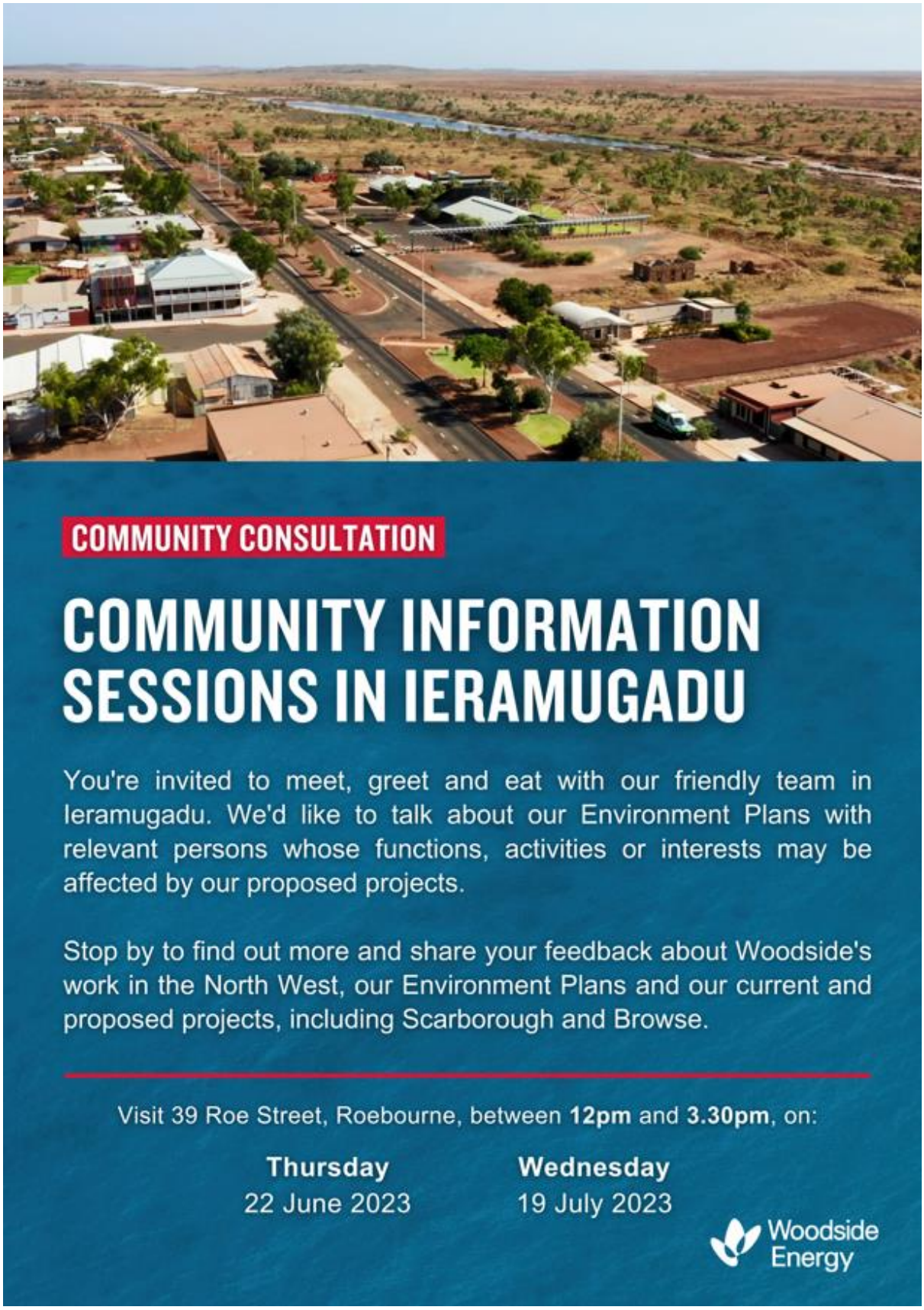


2.37 Community Information Sessions (June - August 2023)

2.37.1 Exmouth Community Information Session (17 June 2023)


OVERVIEW INFORMATION SHEET
TPA03 WELL INTERVENTION ENVIRONMENT PLAN
INFORMATION SHEET
PYXIS DRILLING AND SUBSEA INSTALLATION SUMMARY INFORMATION SHEET
ACTIVITY UPDATE – NGANHURRA OPERATIONS CESSATION ENVIRONMENT PLAN REVISION
WA-6I-L SCARBOROUGH DRILLING AND COMPLETIONS
ACTIVITY UPDATE – GRIFFIN DECOMMISSIONING ENVIRONMENT PLANS
NORTHERN CARNARVON BASIN, NORTH-WEST AUSTRALIA
WA-34-L PYXIS DRILLING AND SUBSEA INSTALLATION ENVIRONMENT PLAN REVISION
ANGEL FACILITY OPERATIONS ENVIRONMENT PLAN
SUMMARY INFORMATION SHEET
SCARBOROUGH SEABED INTERVENTION AND TRUNKLINE INSTALLATION
GEOPHYSICAL AND GEOTECHNICAL SURVEYS – GOODWYN A INFILL
MACEDON OPERATIONS COMMONWEALTH AND STATE ENVIRONMENT PLANS
SCARBOROUGH TRUNKLINE INSTALLATION (STATE WATERS) ENVIRONMENT PLAN
JULIMAR DEVELOPMENT PROJECT PHASE 3 (JDP3) DRILLING AND SUBSEA INSTALLATION ENVIRONMENT PLAN
ACTIVITY UPDATE – STYBARROW PLUG AND ABANDONMENT ENVIRONMENT PLAN
SCARBOROUGH 4D BASELINE MARINE SEISMIC SURVEY
ACTIVITY UPDATE – STYBARROW DECOMMISSIONING ENVIRONMENT PLANS
WA-6I-L AND WA-62-L SUBSEA INFRASTRUCTURE INSTALLATION ENVIRONMENT PLAN
CARNARVON BASIN, NORTH-WEST AUSTRALIA
JULIMAR APPRAISAL DRILLING AND SURVEY ENVIRONMENT PLAN (EP)
CARNARVON BASIN, NORTH-WEST AUSTRALIA

2.37.2 Roebourne Community Information Session (22 June 2023 and 19 July 2023)



3. Karratha Community Information Sessions (28 and 29 June 2023)

2.37.3 Newspaper advertisement – Pilbara News (28 June 2023)

Pilbara NEWS
Wednesday, June 28, 2023
pilbaranews.com.au

Rio reaches $1b Range milestone


Rio Tinto iron ore chief executive Simon Trott and China Baowu vice-president Hou Angui.

CHEYANNE ENCISO

Rio Tinto has spent $1 billion with WA businesses as it progresses the development of its Western Range joint venture with China Baowu Steel Group.

Simon Trott, iron ore chief executive of Rio Tinto, said the $1b spend marked a considerable milestone.

"Rio Tinto spends billions of dollars with local suppliers across Western Australia and the Pilbara every year, helping support thriving communities across the State by providing local jobs for local people," he said.

The 25 million tonnes-a-year Western Range project will help sustain production of Rio's flagship Pilbara blend product from its existing Paraburdoo mining hub as the Eastern Range project depletes. China Baowu said it was pleased to see the Western Range project progressing smoothly.

Premier Roger Cook said significant projects such as the Western Range reinforced WA as an attractive and secure destination for business and investment.

"I want to commend Rio Tinto and Baowu on this latest project milestone and acknowledge their efforts in investing in WA to ensure WA businesses and workers benefit most," he said.

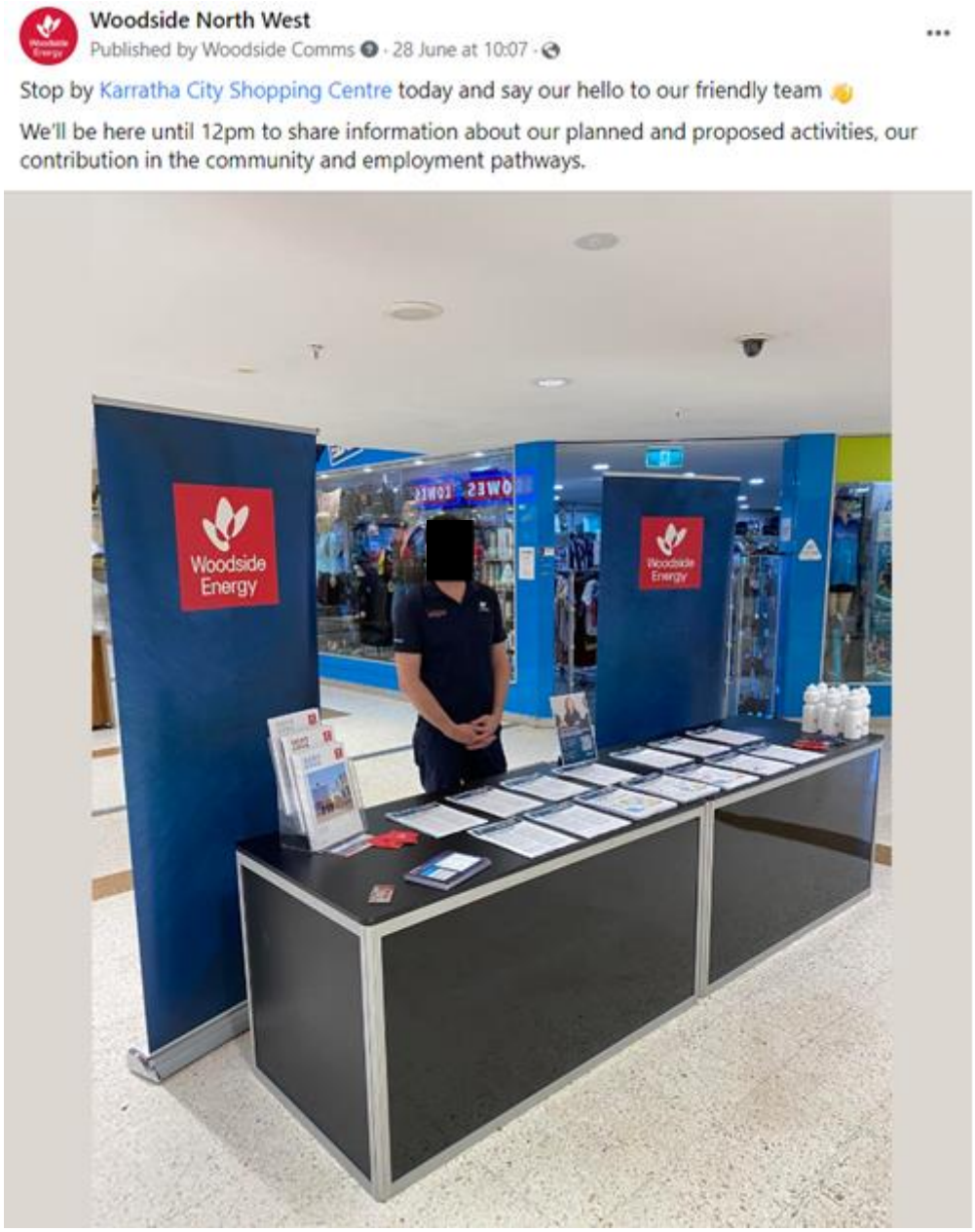
Rio in March reported it had spent $8.6b with more than 2400 WA and Indigenous businesses in 2022 as part of its local buying program.

The figure included $618m with Pilbara-based businesses, $504m with Indigenous companies across WA, and $439m with businesses run by traditional owners.

2.37.4 Facebook post (28 June 2023)

On 28 June 2023, Woodside posted a story on its Woodside North West Facebook account, sharing details of its shopping centre stand where Consultation Information Sheets regarding is planned and proposed activities were available, including the activities proposed under this EP.

Platform/channel: Woodside North West (Facebook)
Date: 28 June 2023
Reach: 1,464 viewers
Impressions: 1,464 views



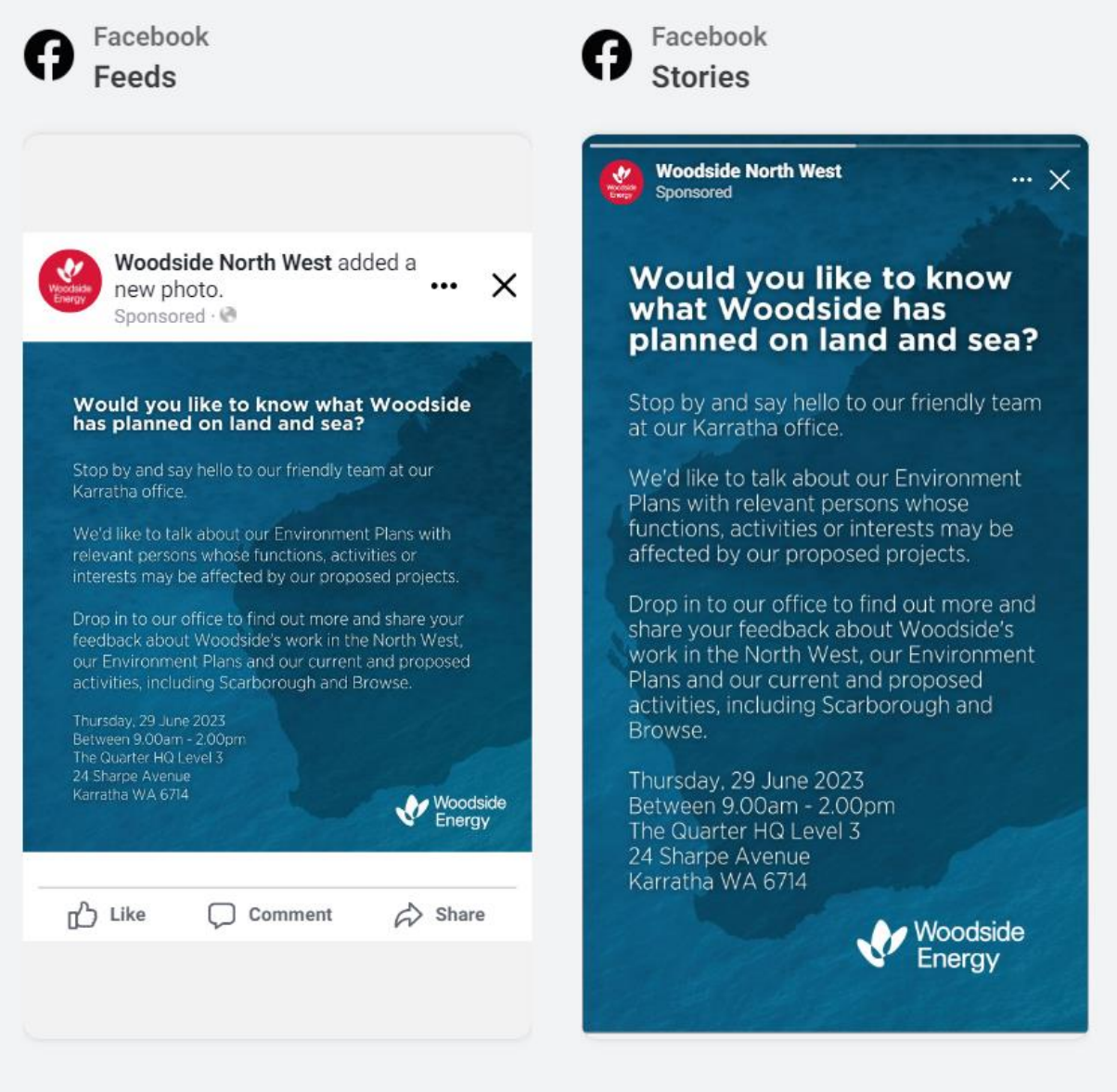
2.37.5 Geotargeted Social Media Campaign (29 June 2023)

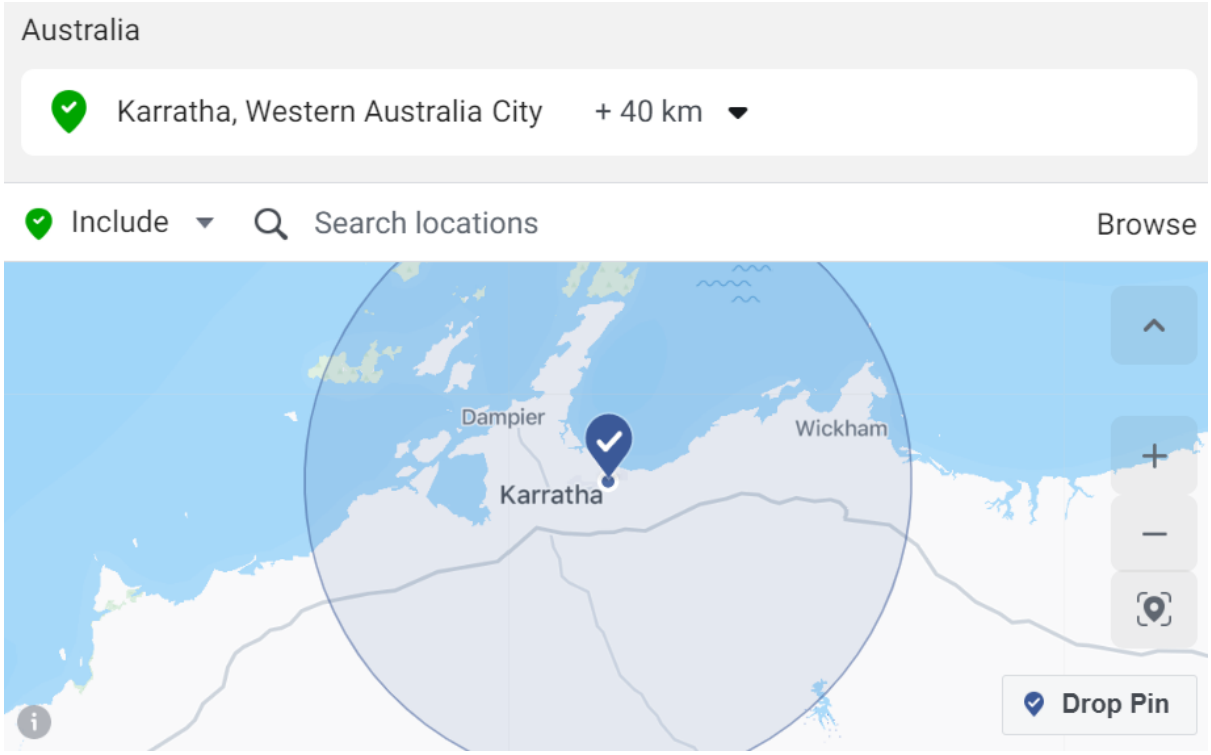
On 29 June 2023, Woodside held a drop-in session at its Karratha town office. The drop-in session was hosted by one of Woodside's Senior Environmental Advisers and was open for

all community members to receive information regarding Woodside's Environment Plans and proposed and planned activities.

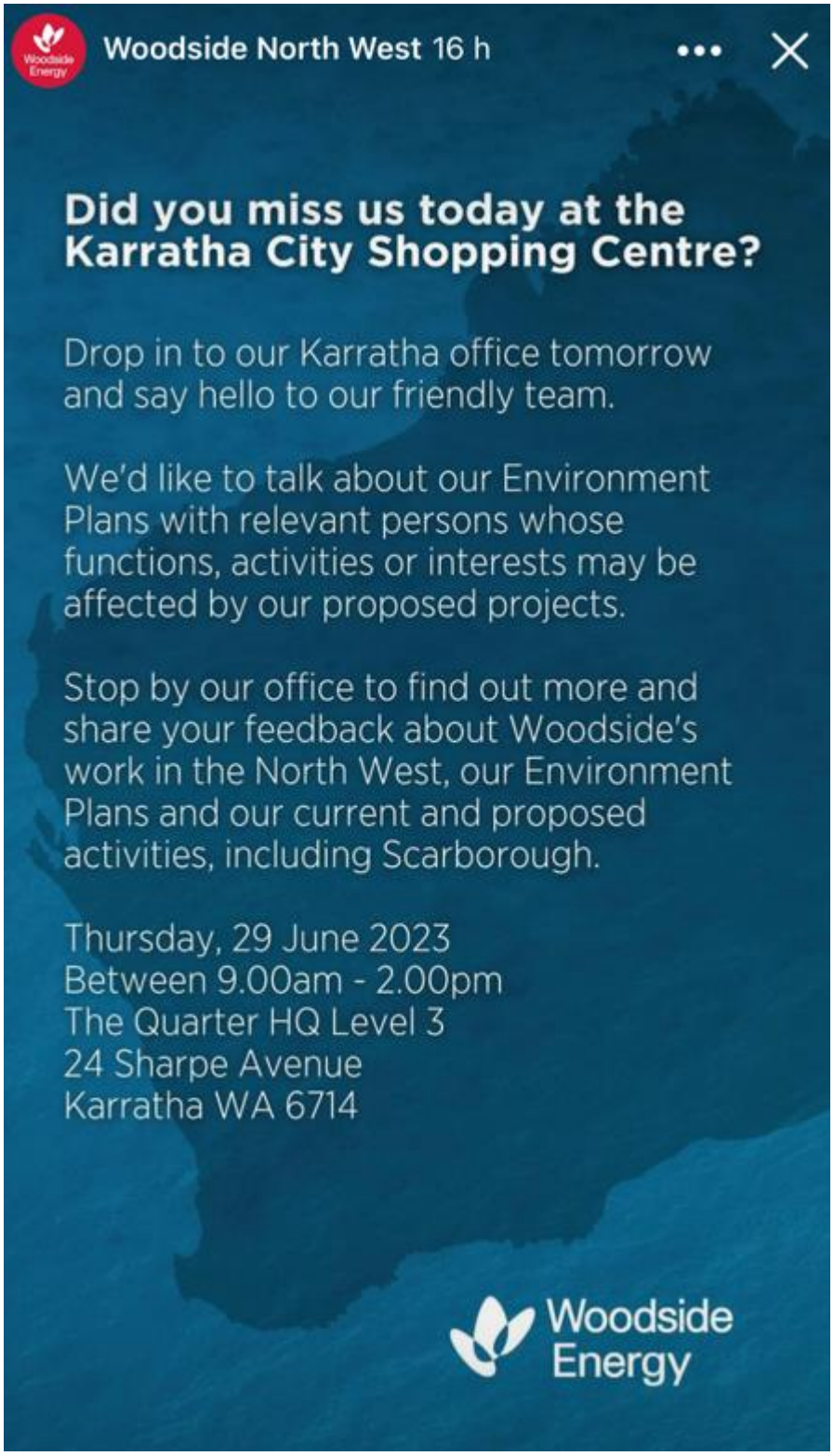
Dates: 26 June 2023 – 29 June 2023
Geotargeting: 40km radius around Karratha
Reach: 19,240 viewers
Impressions: 22,931 views

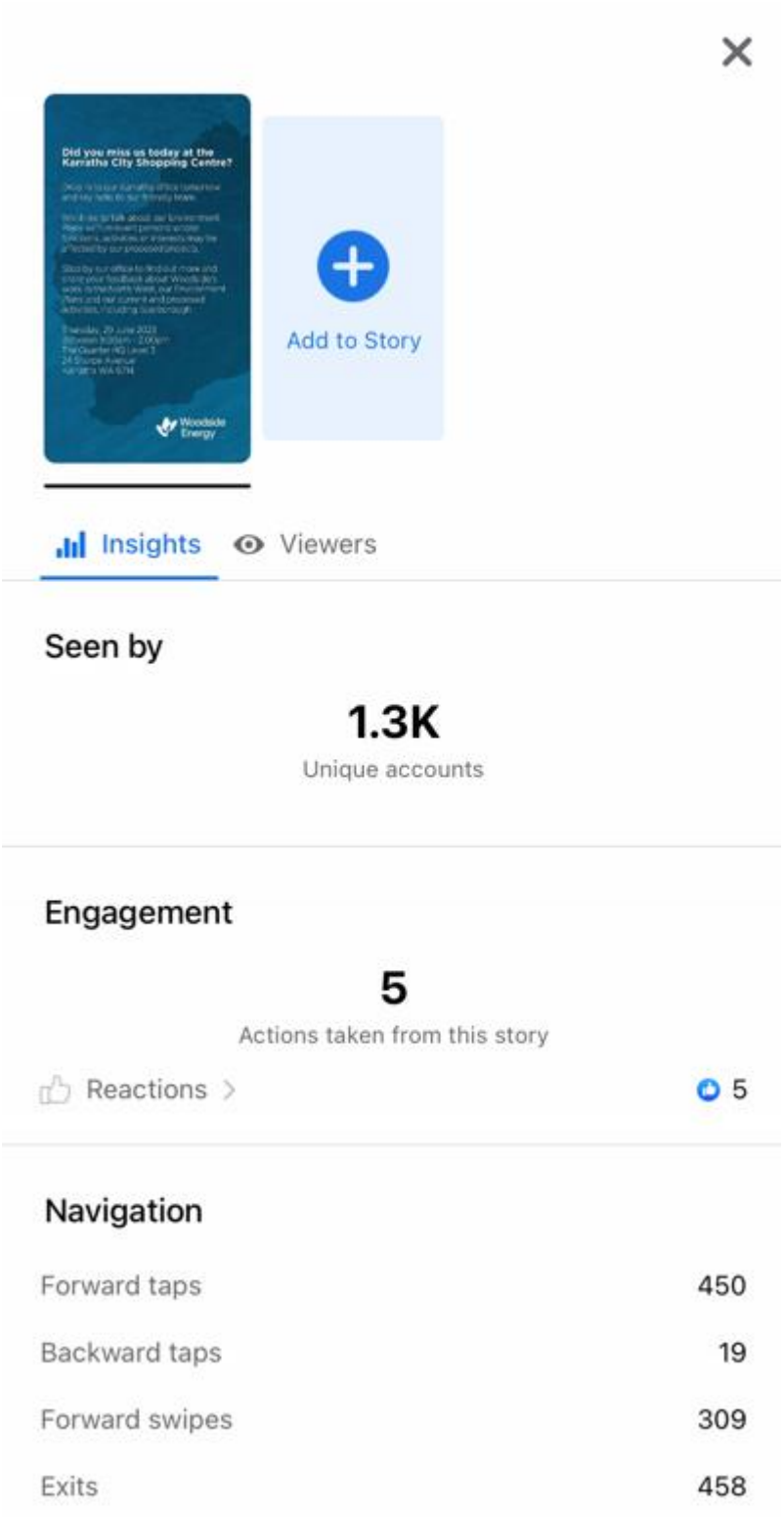
Campaign name	Ad set name	Delivery	Reach	Impressions	Frequency	Attribution setting	Results
EP Drop in session - KTA	All	Recently completed Campaign	19,240	22,931	1.19	7-day click or 1-day view	19,240 Reach

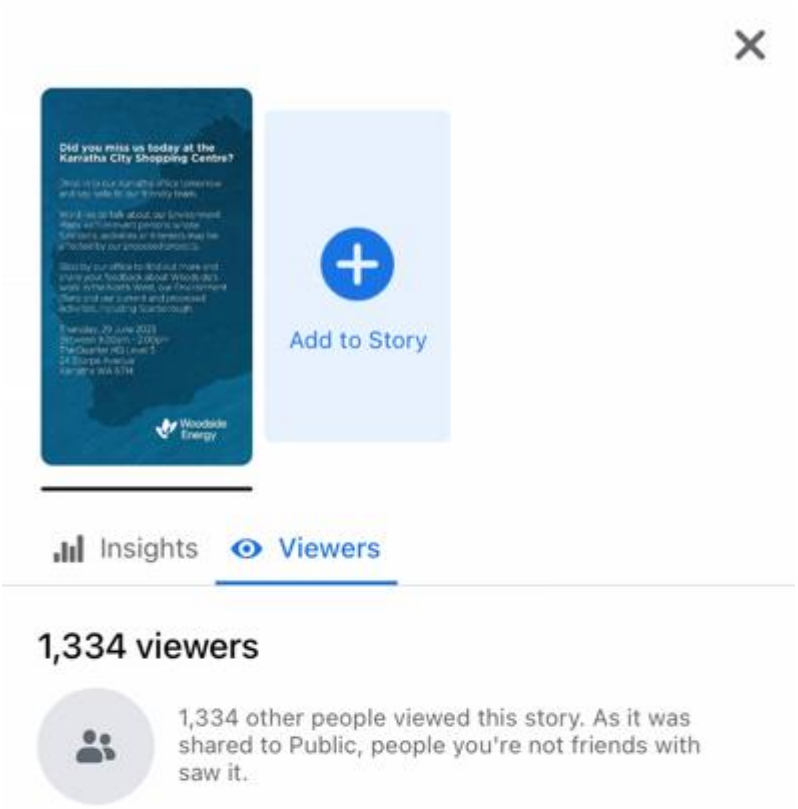




On 28 June 2023, Woodside posted a story on its Woodside North West Facebook account, sharing details of its drop-in session.
Reach: 1,366 viewers
Impressions: 22,931 views
Geotargeting: 40 km radius around Karratha


Woodside North West 16 h
Did you miss us today at the Karratha City Shopping Centre?
Drop in to our Karratha office tomorrow and say hello to our friendly team.
We'd like to talk about our Environment Plans with relevant persons whose functions, activities or interests may be affected by our proposed projects.
Stop by our office to find out more and share your feedback about Woodside's work in the North West, our Environment Plans and our current and proposed activities, including Scarborough.
Thursday, 29 June 2023
Between 9.00am - 2.00pm
The Quarter HQ Level 3
24 Sharpe Avenue
Karratha WA 6714
Woodside Energy


Did you miss us today at the Karratha City Shopping Centre?
Add to Story
Insights
Viewers
Seen by
1.3K
Unique accounts
Engagement
5
Actions taken from this story
Reactions
5
Navigation
Forward taps 450
Backward taps 19
Forward swipes 309
Exits 458


Did you miss us today at the Karratha City Shopping Centre?
Add to Story
Insights
Viewers
1,334 viewers
1,334 other people viewed this story. As it was shared to Public, people you're not friends with saw it.

2.37.6 Presentation to Karratha Community Liaison Group (29 June 2023)

ENVIRONMENT PLAN CONSULTATION

- Changes to Commonwealth Environment Plan (EP) consultation requirements.
- Woodside is now consulting based on the **environment that may be affected (EMBA)** by a proposed petroleum activity rather than within the Operational Area.
- The EMBA is the largest spatial extent where unplanned events, no matter how unlikely, could potentially have an environmental consequence.
- Any person or organisation who does not wish to continue to receive EP consultation materials where they have only been assessed as 'relevant' for unplanned events in the EMBA, under the EP consultation requirements, please advise us in writing and we will not send further information.
- However, you should be aware that this request will need to be recorded in our EP documents and will be publicly available.
- We will be holding a drop-in session after this meeting for anyone in community who would like to know more about any of our EPs.

29 | Karratha Community Liaison Group | June 2023

ENVIRONMENT PLAN CONSULTATION

Consultation with Karratha CLG

Previously consulted

- Ngarnhurra RTM Decommissioning
- Griffin Field Decommissioning
- Stybarrow Field Decommissioning
- Scarborough Activities
- Pluto Well (WA-34-L)
- Julimar Appraisal Well
- TPA03 Well Intervention
- JDP3
- NWS Geotech/Geophys Survey
- Angel Operations

Lookahead for 2023[1,2]

- Macedon Commonwealth and State Operations
- NWS / Julimar wellhead decommissioning
- Browse State wellhead decommissioning
- Ngujima-Yin Floating Production Storage and Offloading Facility Operations
- Pyrenees Facility Operations
- Scarborough Operations
- Scarborough State Trunklines
- NRC Operations
- Vincent Phase V Drilling
- Macedon Infill Drilling

[1] Subject to planning and scheduling.
[2] Woodside will assess the relevance of Karratha CLG during the development of each environment plan.

PART OF A BETTER FUTURE Woodside Energy

30 | Karratha Community Liaison Group | June 2023

2.37.7 Roebourne Community Information Session (19 July 2023)

Posters at Woodside's Roebourne Office:

Karratha FeNaCING Festival – 5 and 6 August 2023

Pilbara News Advertisement – 2 August 2023

PROVIDE YOUR FEEDBACK AT FeNaCING FESTIVAL

Are you interested in what Woodside has planned on land and sea?

Join our friendly team at FeNaCING Festival and find out more about our Environment Plans and projects, including Scarborough and Browse.

We look forward to sharing information about our current and proposed activities and providing the opportunity to discuss your relevant functions, activities or interests and receive your input.

Follow us @woodsidenorthwest
www.woodside.com

Woodside Energy

Melski's murals brought to life

DANIEL SPENCE

The artist was brought to the school to create murals.

Tambrey Primary School has successfully brought renowned artist Mel McVee, popularly known as Melski, and her sister Tash to create three vibrant murals around the school premises.

With funding support from corporate entities like Woodside, FMG, and Pilbara Real Estate, as well as community contributions from Jetwave Marine, Santos, Yara, and QUBE Energy, the school raised more than $20,000 to bring this art project to life.

Home to nearly 700 students, with a third of them having Indigenous backgrounds, school Deputy Principal Toni Whitbread and visual arts specialist Felicity Collins said the mission of the project was to celebrate diversity and create a sense of belonging by reflecting students' culture through artwork.

The school's mission was to celebrate diversity and create a profound sense of belonging by reflecting the students' culture through artwork.

What particularly attracted the school to Mel's artwork was its unique paint-by-numbers style, which allowed students to actively participate in the mural creation process.

Eager to engage the entire school community, the school declared a special "paint week," during which more than 650 students enthusiastically joined hands to contribute to the murals.

Throughout the week, students not only participated in the creation of the murals but also enjoyed immersive art sessions in the park, indulging in painting, drawing, collaging, and chalk drawings under the enchanting winter weather.

The entire experience served to nurture the students' creativity and appreciation for art, leaving a lasting impact on their artistic aspirations.

Ms Collins said she was thrilled to see the whole school coming together for a week of collaborative art.

"We were delighted to see students immersed in a week of collaborative art," she said.

"Students not only contributed to the creation of the mural but also with their involvement in the immersive art in the park session — which included painting, drawing collaging and chalk drawings — while all outside soaking up the winter weather."

this is your chance to make a change

Chevron's Community Spirit Fund is offering up to **$15,000** towards local projects.

Beyond supplying affordable, reliable, ever-cleaner energy — we believe we have an important role to play in helping local communities build a vibrant and prosperous future.

We do this by investing in programs which contribute to areas of health and wellbeing, education, environment and building thriving communities.

We're calling for applications for the Chevron Community Spirit Fund, offering donations of up to $15,000 to not-for-profit organisations operating in the following Northwest locations:

- **Carnarvon**
- **Coral Bay**
- **Dampier**
- **Denham**
- **Exmouth**
- **Karratha**
- **Onslow**
- **Port Hedland**
- **Roebourne**
- **Shark Bay**

Applications are open now until 13 August 2023.
To apply, head to **australia.chevron.com**

the human energy company

Story on the Woodside North West Facebook Page – 2 August 2023

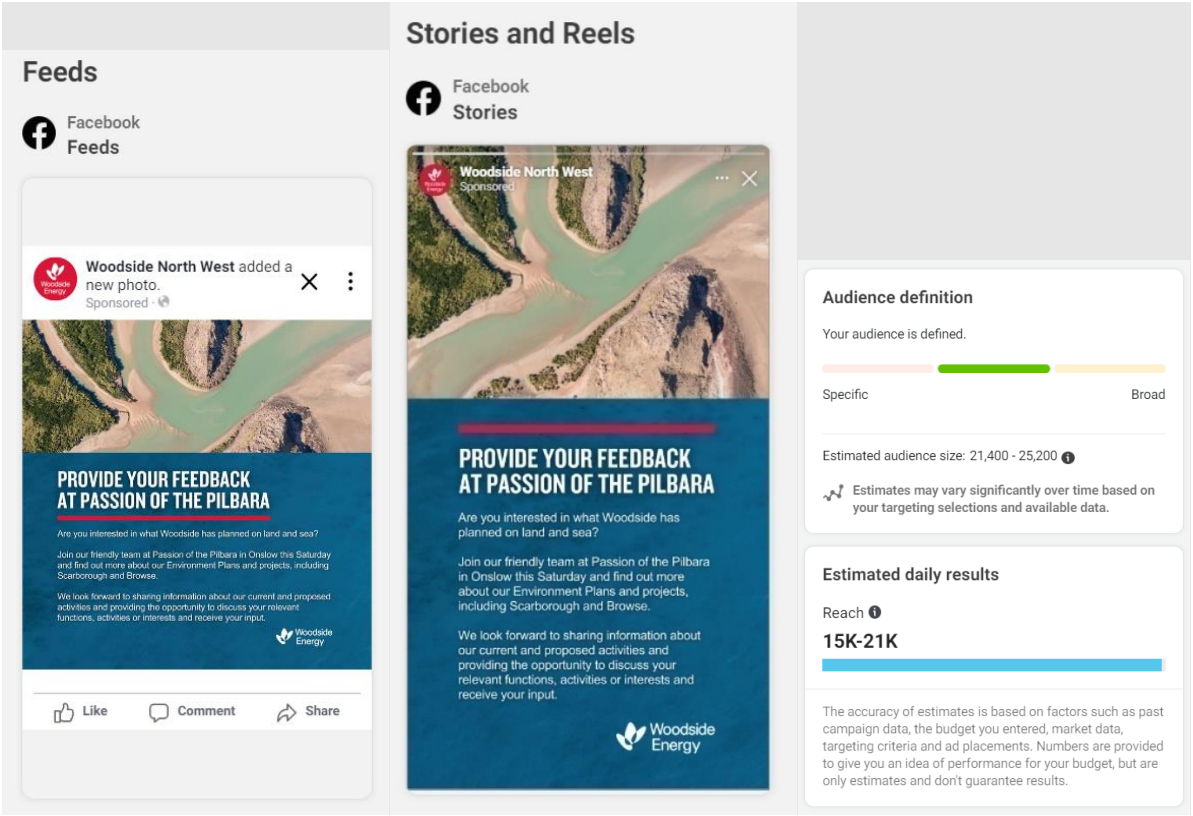
Environment Plan Banner

2.37.9 Passion of the Pilbara, Onslow (18 August 2023)

17 August 2023 – Passion of the Pilbara Facebook Post

17 August 2023 – Woodside North West Facebook Page

Woodside Facebook Post and Story – 17 August 2023



Woodside Marquee

Woodside Information Sheets

2.38 Community Information Sessions (September 2023)

2.38.1 Pilbara News Advertisement – 13 September 2023

Pilbara NEWS
Wednesday, September 13, 2023
pilbaranews.com.au

Mayor runs again as candidates put forward pitches

City of Karratha Mayor Peter Long. Picture: Tom Zaunmayr

DANIEL SPENCE

Nominations have closed for the 2023 Karratha mayoral and councillor elections, with the list of candidates running to be the city's next mayor being released.

Peter Long — who has been in the position since 2011 — will be running again and said, if re-elected, he would continue to provide Karratha with intelligent, safe and inclusive leadership.

"I am a full-time mayor, always able to receive you and your ideas," he said. "I love the Pilbara and our community."

Regional Development Australia Pilbara chief executive and former local government minister Tony Simpson is also running for mayor.

His vision is to join forces with State and Federal entities to progress childcare, health and housing solutions.

"I would work to draw major brand investments in retail and leisure to provide more options for residents. Identify land for a foreshore entertainment hub and infuse Karratha with festivals and quality entertainment," he said.

Brenton Johannsen — who ran for the seat of Durack at the recent Federal election under One Nation — said he would donate the entire mayoral allowance to charity.

"I will be a committed full-time mayor, my goal is to visit all businesses and resident groups on a regular basis to touch base and discuss any new issues," he said.

Mr Johannsen said his aims would be neighbourhood safety, more opportunities for locals, ratepayer discounts for local facilities, moving airport smokers' areas, and eco-friendly weed management.

As a sitting councillor, radio announcer, parent and former local business owner mayoral candidate Pablo Miller said he had got to know the people of Karratha.

"As your mayor, I will continue to not only listen but be a strong advocate for our community," he said. Mr Johannsen said he was interested in expanding opportunities for young people and families, growing local and cultural tourism, supporting businesses and bolstering mental health services.

The owner of the North West Brewing Co Daniel Scott has a vision as mayor to grow Karratha's economy.

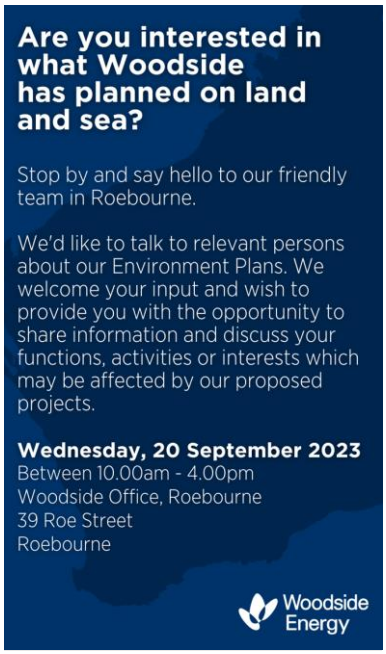
His plan is to create an education and sporting precinct between the TAFE and St Luke's College, with accommodation for secondary and tertiary students.

His plans also include a new home for the Pilbara Universities Centre, and a sporting hub for rugby, soccer, hockey and gymnastics.

Those running for council include Daniel Scott, Kieran Dart, Wayne Mothershaw, Mr Johannsen, Sarah Roots, George Levissianos, Bradley Davey, Mr Simpson, James Corea, Joseph Almonte and Geoff Harris.

Elections will be held for the four vacancies on October 21st.

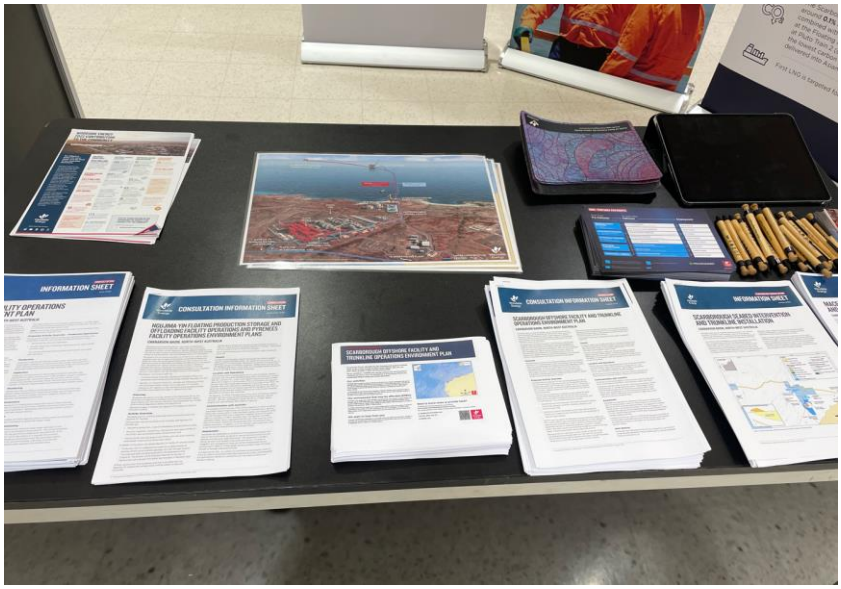
2.38.2 Social Media – 6 - 16 September 2023



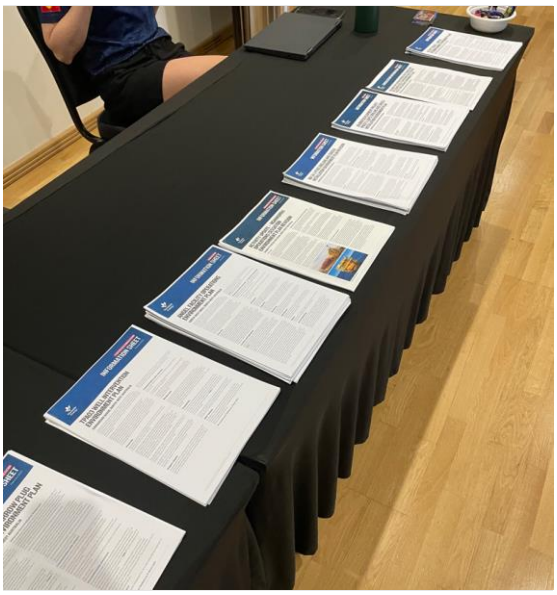
Social media reach:

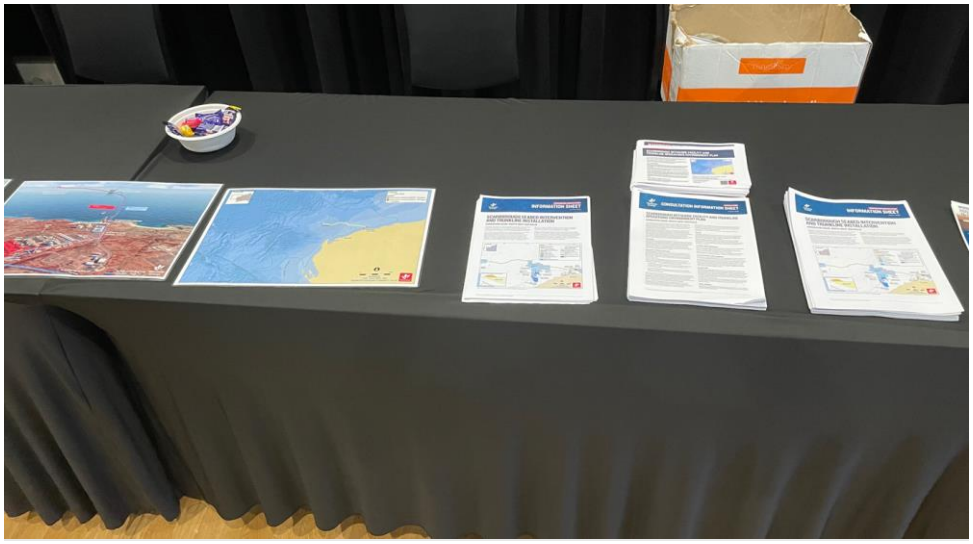
Location	Reach
Karratha	22,095
Port Hedland	26, 487
Roebourne	22,134

2.38.3 Karratha Shopping Centre – 18 September 2023

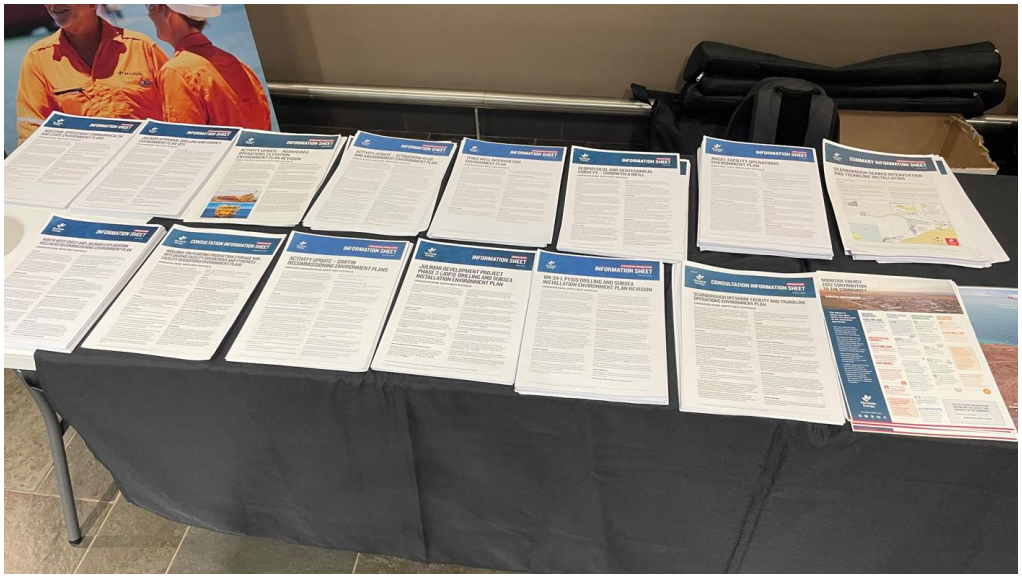


2.38.4 Red Earth Arts Precinct – 18 September 2023

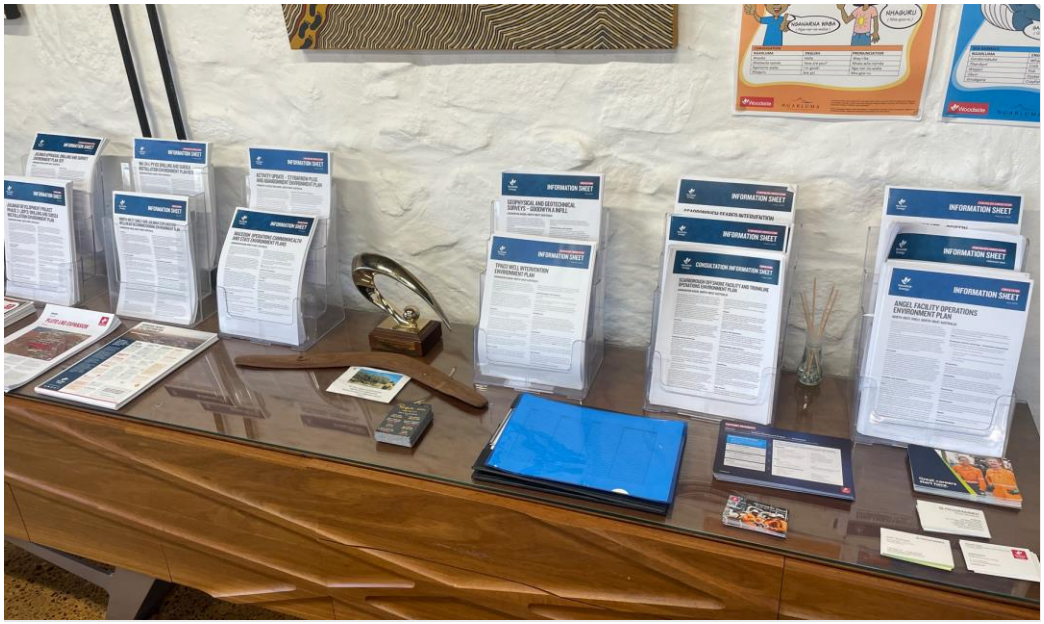




2.38.5 South Hedland Square – 19 September 2023



2.38.6 Roebourne – Woodside Office – 20 September 2023



2.39 Karratha Community Liaison Group Meeting (29 September 2023)

CONSULTATION

Previously consulted

- Griffin Field Decommissioning
- Stybarrow Field Decommissioning
- Scarborough Activities (Drilling and Completions and Seabed Intervention and Trunkline Installation)
- Pluto Well (WA-34-L)
- Julimar Appraisal Well
- TPA03 Well Intervention
- JDP3 Subsea Tieback
- Goodwyn A Geotech/Geophys Survey
- Angel Operations
- Macedon (State) Operations
- NWS and Julimar Wellheads

Currently consulting

- Ngujima-Yin Floating Production Storage and Offloading Facility Operations
- Pyrenees Facility Operations
- Scarborough Offshore Facility and Trunkline Operations EP

Scan the QR code or visit woodside.com/consultation-activities to access our consultation information.

Woodside Energy

LOCAL ENGAGEMENT SESSIONS

- We consult 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 may be taken to lessen or avoid potential adverse effects of the proposed activity on the environment.
- This month we held sessions for local community members to seek information about our EPs, to discuss functions, activities of interest that by be affected by our proposed projects and to provide an opportunity for feedback.
- Locations included the Karratha Shopping Centre, Red Earth Arts Precinct, Woodside's Roebourne Office
- Sessions were advertised to build community awareness and interest.

Advertisement - Pilbara News, 13 September 2023

Facebook advertisements

Woodside Energy

2.40 Community Information Sessions (October 2023)

2.40.1 Pilbara News Advertisement – 4 October 2023

Pilbara NEWS
Wednesday, October 4, 2023
pilbaranews.com.au

MinRes in $24m deal with local company

DANIEL SPENCE

Local Pilbara Indigenous-owned business Djeloanna Pty Ltd has been awarded a $24 million contract by Mineral Resources as part of the company's flagship Onslow Iron project.

It is the largest contract MinRes has ever signed with an Indigenous-owned business, as well as the first contract awarded to Djeloanna Pty Ltd, which is a Robe River Kuruma business. The Robe River Kuruma people are the traditional owners of the land on which the Ken's Bore mine site is located.

The four-year contract is for exploration earthworks at Ken's Bore mine site, east of Onslow, including constructing access tracks, building drill pads, road maintenance and general earthworks.

Djeloanna Pty Ltd will employ about 10 people as part of the contract including a project manager, mechanics, operators and administration staff.

MinRes managing director Chris Ellison and Djeloanna business owner Bevan Wally. Picture: Russell James

Djeloanna Pty Ltd owner Bevan Wally, who grew up on country, said: "The support provided by MinRes has given us the confidence and capacity to help establish and grow our business. MinRes have shown us action and given us commitments. It's unreal for them to invest and give us a go."

MinRes managing director Chris Ellison said that the company was proud to partner with businesses such as Djeloanna that had such a strong connection to country.

"Providing practical guidance and support, such as guaranteeing finance for equipment and plant, helps to build local capability and ensure Indigenous-owned businesses share in our success," he said.

At the contract signing ceremony in Perth, Mr Wally presented traditional gifts to Mr Ellison, including boomerangs, a shield and a long stick.

Schools to get a staff cash boost

DANIEL SPENCE

Pilbara schools will benefit from a multi-million-dollar cash injection from the State Government to recruit and retain staff.

Education Minister Tony Buti said the success of last year's temporary Regional Attraction and Incentive Package meant an additional 18 schools would benefit from $16.49 million worth of incentive packages.

Schools in the Pilbara who will receive a boost include Broome Senior High School, Carnarvon Community College, Karratha Senior High School, Hedland Senior High School, Tom Price Senior High School and Newman Senior High School.

The incentive helps rural schools to attract and recruit teachers and retain staff and school administrators at schools by providing additional financial incentives.

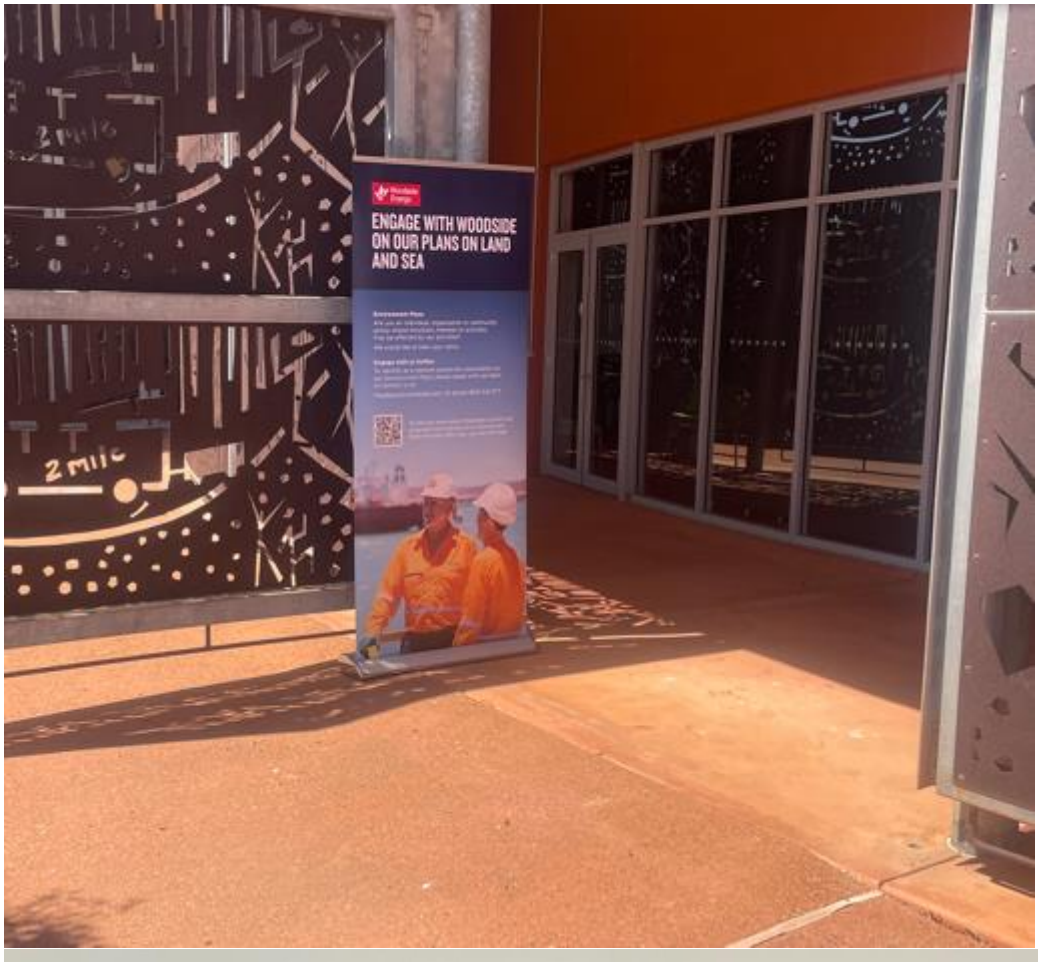
Staff members will receive between $5000 and $17,000 for working in rural and remote public schools for the 2024 school year.

The incentives will be paid in two instalments: the first at the start of the 2024 school year, the balance paid at the end of the 2024 school year.

Dr Buti said schools in regional and remote areas faced additional challenges when recruiting and retaining teachers.

"This significant investment will bring greater continuity for regional and remote students, their families, and the whole community," he said. The temporary Regional Attraction and Retention Incentive was initially allocated to 48 regional and remote schools.

2.40.2 Banners and consultation sheets – 16 October 2023



2.40.3 Pilbara News Advertisement – 11 October 2023

Pilbara NEWS
Wednesday, October 11, 2023
pilbaranews.com.au

Animal flight policy criticised

CAIN ANDREWS

A prominent pet adoption agency has slammed Qantas' animal flight policy claiming it will lead to the unnecessary deaths of hundreds of animals.

Over the past year, animal adoption agency Saving Animals From Euthanasia's regional branches in Broome, Newman, Hedland and Karratha collectively rescued 1826 animals with 62.8 per cent or 958 of them requiring air transport to get to their new homes.

But with Qantas now enforcing a "no-fly" policy for animals when temperatures are forecast to reach more than 35C SAFE founder Sue Hedley said rescue animals that required air transport might have to be destroyed.

"It is crucial to recognise that this policy alteration could have dire consequences for these animals. If they are unable to reach their destination and find new homes, they may tragically face euthanasia as an alternative," she said.

Ms Hedley said SAFE had engaged with Qantas to try to find alternative solutions such as waivers or only allowing animals on early morning flights on days over 35C but was knocked back by the company.

"In over 20 years of operation, SAFE has never had a death during transportation from regional areas to Perth, no matter the temperature," she said.

"Unfortunately, we have been advised that the policy will remain and that no exceptions will be made.

Sue Hedley & Salem. Pic: Helen Osler

"We firmly believe that the risks associated with this policy extend far beyond those related to flying on a day when temperatures may reach 35C later in the day."

A Karratha woman, who only wishes to be identified as Simone, was told her two dogs would not be allowed to catch a Qantas flight on October 5 because of the policy.

According to Simone, at the last minute she was told her dogs could not catch the flight despite being told the night before her dog would be able to fly.

"It's ridiculous we're here with our dogs everything's packed, and we're going away as well.

"With the way things are in Karratha with the shortage of space available there's no one to look after our pets," she said

"It's not just inconvenient, it's unethical as they're not even adhering to their own policy.

Simone's dogs faced being bumped off a Qantas flight because of the airline's heat policy.

"I get it's about animal safety but what is ridiculous is that the policy clearly states 35C and above and it (was) only 23C."

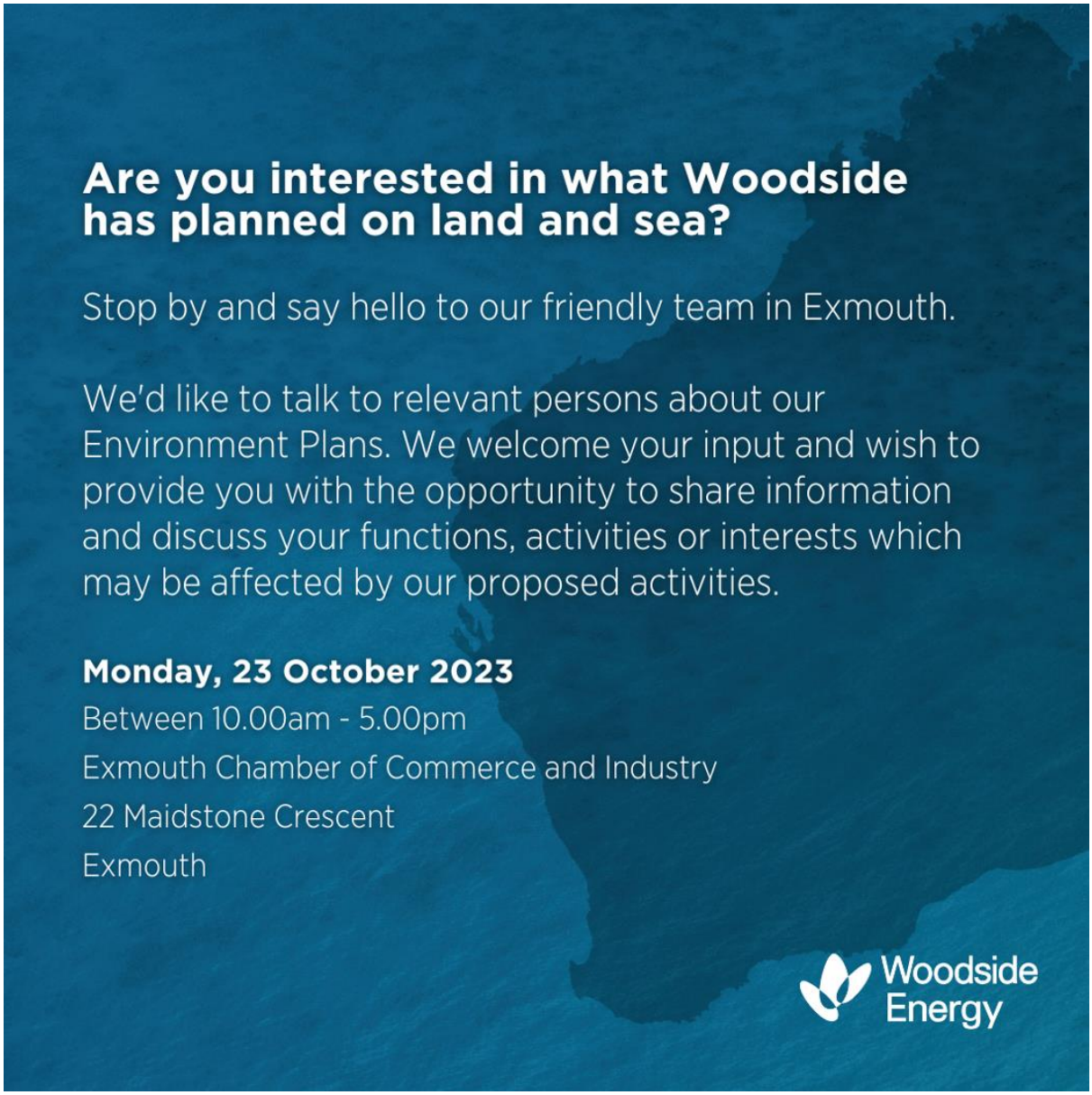
Qantas eventually made an exception for Simone and her dogs on the day, however, she claims she was told by those at the airport to not tell Ms Hedley about the incident.

Last year, temperatures in Karratha exceeded 35C on 108 days, with a consecutive period of 42 days over 35C between February 12 and March 26.

Responding to questions about the policy, a Qantas spokesperson said the policy was set by the International Pet and Animal Association and the International Air Transport Association."Qantas takes the safety and welfare of pets and animals who travel with us extremely seriously," the spokesperson said.

"This is why we don't transport pets when temperatures exceed 35C or fall below 5C, due to the stress and anxiety this could cause."

2.40.4 Social media tile and story – 2 – 9 October 2023


Are you interested in what Woodside has planned on land and sea?
Stop by and say hello to our friendly team in Exmouth.
We'd like to talk to relevant persons about our Environment Plans. 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 activities.
Monday, 23 October 2023
Between 10.00am - 5.00pm
Exmouth Chamber of Commerce and Industry
22 Maidstone Crescent
Exmouth
Woodside Energy


Are you interested in what Woodside has planned on land and sea?
Stop by and say hello to our friendly team in Exmouth.
We'd like to talk to relevant persons about our Environment Plans. 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 activities.
Monday, 23 October 2023
Between 10.00am - 5.00pm
Exmouth Chamber of Commerce and Industry
22 Maidstone Crescent
Exmouth
Woodside Energy

APPENDIX G: ANGEL OPERATIONS OIL POLLUTION FIRST STRIKE PLAN

Angel Operations – Oil Pollution First Strike Plan

Corporate HSE

Hydrocarbon Spill Preparedness

January 2024
Revision 11b

TABLE OF CONTENTS

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) Incident Commander
	State waters	1	Woodside	CIMT IC
		2/3	Department of Transport (DoT)	DoT Incident Controller
	Within port limits	1	Woodside	CIMT IC
		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/PORT WATERS

As detailed in the table above, in the event of a hydrocarbon spill (hereafter 'spill') where Woodside Energy 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 F – Woodside Liaison Officer Resources to DoT.

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:

[redacted]

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:

[redacted] 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/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 Angel 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 full detailed pre-operational NEBA see the Angel 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)	CIMT IC	[redacted]	Verbally notify WCC of event and estimated volume and hydrocarbon type.	Verbal	
Within 2 hours	Woodside Site Rep (WSR), Corporate Incident Management Team Incident Commander (CIMT IC) or Delegate	National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA[1])	Incident notification office	[redacted]	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).	[redacted]	
Within 3 days	WSR, CIMT IC 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 [redacted] NOPTA [redacted] DEMIRS [redacted]	[redacted]	
As soon as practicable	CIMT IC or Delegate	Woodside	Environment Unit Leader	As per roster	Verbally notify Environment Unit Leader 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 IC or Delegate	WA Department of Transport	DoT Maritime Environmental Emergency Response Unit (MEER) Duty Officer	[redacted]	Verbally notify DoT MEER Duty Officer that a spill has occurred and, if required, request use of equipment stored in [Karratha/Fremantle/]. 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 WEL IMT.	[redacted]	
As soon as practicable	CIMT IC or Delegate	Department of Climate Change, Energy, the Environment and Water (DCCEEW) Director of National Parks	Marine Park Compliance Duty Officer	[redacted]	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,	CIMT IC or Delegate	WA Department of Biodiversity, Conservation and Attractions (DBCA)	Duty Officer	[redacted]	Phone call notification	Verbal	

[1] Notification to NOPSEMA must be from a Woodside Representative.

Conservation and Attractions							
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 and 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 Angel 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 additional 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 Angel 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 Act, part II, section 11(1)	Vessel Master	Australian Maritime Safety Authority (AMSA)	Response Coordination Centre (RCC)	[redacted]	Verbally notify AMSA RCC of the hydrocarbon spill. Follow up with a written Marine Pollution Report (POLREP) as soon as practicable following verbal notification.	[redacted]	
ADDITIONAL LEVEL 2/3 NOTIFICATIONS							
As soon as practicable	CIMT IC or Delegate	Australian Marine Oil Spill Centre (AMOSC)	AMOSC Duty Manager	[redacted]	Notify AMOSC that a spill has occurred and follow-up with an email from the **CIMT IC/ CIMT Deputy 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.	[redacted]	
As soon as practicable	CIMT IC or Delegate	Oil Spill Response Limited (OSRL)	OSRL Duty Manager	[redacted]	Contact OSRL Duty Manager and request assistance from technical advisor in Perth. Send the completed notification form to OSRL as soon as practicable.	[redacted]	
					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.	[redacted]	
As soon as practicable if extra personnel are required for incident support	CIMT IC or Delegate	Marine Spill Response Corporation (MSRC)	MSRC Response Manager	[redacted]	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
	MDO	Cond. (AP3)	Cond. (LD)					
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	**DAY 1:** For manned facility/vessel, tracking buoy deployed within 2 hours. **DAY 2:** 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	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	**DAY 1:** 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 to download immediately and follow steps*
	Yes	Yes	Yes	ALL	Send Oil Spill Trajectory Modelling (OSTM) form ([redacted]) to RPS Response [redacted]).	Situation	**DAY 1:** 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 [redacted]	Logistics – Aviation	**DAY 1:** 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 to download immediately 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: [redacted] • OSRL Duty Manager: [redacted] • KSAT: [redacted] • Others identified by CIMT	Situation	**DAY 1:** 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	**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)	Yes	Yes	Yes	ALL	Consider the need to mobilise resources to undertake pre-emptive assessment of sensitive receptors at risk (OM04).	Planning or Environment	**10 DAYS PRIOR TO CONTACT:** 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)	Yes	Yes	Yes	ALL	Consider the need to mobilise resources to undertake shoreline assessment surveys (OM05).	Planning or Environment	**10 DAYS PRIOR TO CONTACT:** 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	No	N/A				

Technique	Spill type			Level	Pre- Identified Tactics	Responsible	ALARP Commitment Summary	Link to Operational Plans for notification numbers and actions
	MDO	Cond. (AP3)	Cond. (LD)					
					This response strategy is not recommended as there is limited to no surface expression above threshold. and where present, it is only present in the first 48 hours. The addition of dispersant is not considered to have a net environmental benefit, particularly given the low persistent fraction (0.9%).			
Containment and recovery	**No**	**No**	**No**	**N/A**	This technique is not recommended for marine diesel or the condensate scenarios as modelling predicts that floating oil will not reach minimum response thresholds (>50 g/m^2) for feasible containment and recovery at any RPA. Containment and Recovery of Condensate poses a safety risk due to low flash points. Corralling low flash point substances should be avoided, therefore this response technique is not considered feasible.			
Mechanical dispersion	**No**	**No**	**No**	**N/A**	This response strategy is not recommended.			
In-situ burning	**No**	**No**	**No**	**N/A**	This response strategy is not recommended.			
Shoreline protection and deflection	**No**	**Yes**	**Yes**	All	Equipment from Woodside, AMOSC and AMSA Western Australian Stockpiles mobilised. Consideration of mobilisation of interstate/international shoreline protection equipment (i.e. OSRL).	Operations and Planning	**5 DAYS PRIOR TO CONTACT:** In liaison with WA DoT (for Level 2/3 incidents), mobilise and deploy 1 shoreline clean-up operation to each site where operational monitoring predicts an accumulation 5 days prior to impact. Equipment mobilised from closest stockpile 5 days prior to predicted impact. Supplementary equipment mobilised from State, AMOSC, AMSA stockpiles 5 days prior to predicted impact.	Protection and Deflection Operational Plan *Logistics to download immediately and follow steps*
Shoreline clean-up	**No**	**Yes**	**Yes**	All	Equipment from Woodside, 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	**5 DAYS PRIOR TO CONTACT:** Equipment mobilised from closest stockpile 5 days prior to predicted impact. Supplementary equipment mobilised from State, AMOSC, AMSA stockpiles 5 days prior to predicted impact.	Shoreline Clean-up Operational Plan *Logistics to download immediately 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		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**	**Yes**	**Yes**	**L2/3**	Debris clearance equipment to be mobilised prior to deployment of capping stack (if feasible).	Source Control	**DAY 2:** Remotely Operated Vehicle (ROV) on Mobile Offshore Drilling Unit (MODU) ready for deployment within 48 hours.	• Source Control Emergency Response Planning Guideline • Activity Source Control Emergency Response Plan
Subsea Dispersant	**N/A**	**No**	**No**	**N/A**	Minimum water depth for feasible use of subsea dispersant is acknowledged to be 100 m:			

Technique	Spill type			Level	Pre- Identified Tactics	Responsible	ALARP Commitment Summary	Link to Operational Plans for notification numbers and actions
	MDO	Cond. (AP3)	Cond. (LD)					
					- AP3 well is ~79 m - LDA02 well is ~130 m but LOWC is not predicted to result in floating or shoreline contact at response thresholds therefore subsea dispersant has been assessed as unlikely to provide a net environmental benefit. - Subsea dispersant is not applicable for flowline/ riser releases			
Capping Stack	N/A	Potentially	Yes	L2/3	Capping stack deployment is not considered feasible for all conditions due to the shallow water depths i.e. <100 m water depth. For the wells in the Angel and Lambert Deep fields, 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) and will be assessed on a case-by-case basis. Capping stack is not applicable for flowline/ riser releases.	Source Control	**DAY 1:** Identify source control vessel availability within 24 hours. Capping stack on suitable vessel mobilised to site within 16 days.	
Relief Well	N/A	Yes	Yes	L2/3	Undertake tactics per Source Control Emergency Response Plan (SCERP).	Source Control	**DAY 1:** Identify source control vessel availability within 24 hours. ROV on MODU ready for deployment within 48 hours. MODU mobilised to location	

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.

Table 3-1: Receptors for Priority Protection with Potential Impact within 48 Hours

Receptor	Distance and Direction from Operational Area (km)	Minimum time to shoreline contact (above 100g/m^2) in days	Maximum shoreline accumulation (above 100g/m^2) in m^3	Tactical Response Plans
Open ocean	Up to 8 km from the 17.6 km^2	0	N/A	NA – open ocean

Hydrocarbon spill modelling results for scenario MEE-01-02A indicate the sensitive receptors listed below have the potential to be contacted by hydrocarbons beyond 48 hours of a spill:

- Southern Pilbara Islands – Peak Island: 3 m^3 on day 23.4
- Muiron Islands/ Muiron Islands MMA: 46 m^3 on day 64.1
- Sunday Island: 3 m^3 on day 75.4

Tactical Response plans for these locations can be accessed via the Oil Spill Portal - Tactical Response Plans and include the details of potential forward operating bases and staging areas.

Oil Spill Trajectory Modelling specific to the spill event will be required to determine the regional sensitive receptors to be contacted beyond 48 hours of a spill.

Figure 3-1 illustrates the location of regional sensitive receptors in relation to the Angel Operations Petroleum Activities 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 Angel Operations Petroleum Activities Area.

Table 3-2: Assets in the vicinity of the Angel Operations Petroleum Activities Area

Asset	Distance and Direction from Operational Area	Operator
North Rankin Complex	0 km	Woodside
Okha	5 km south	Woodside
Goodwyn Alpha	22 km west	Woodside
Reindeer	50 km south-east	Santos

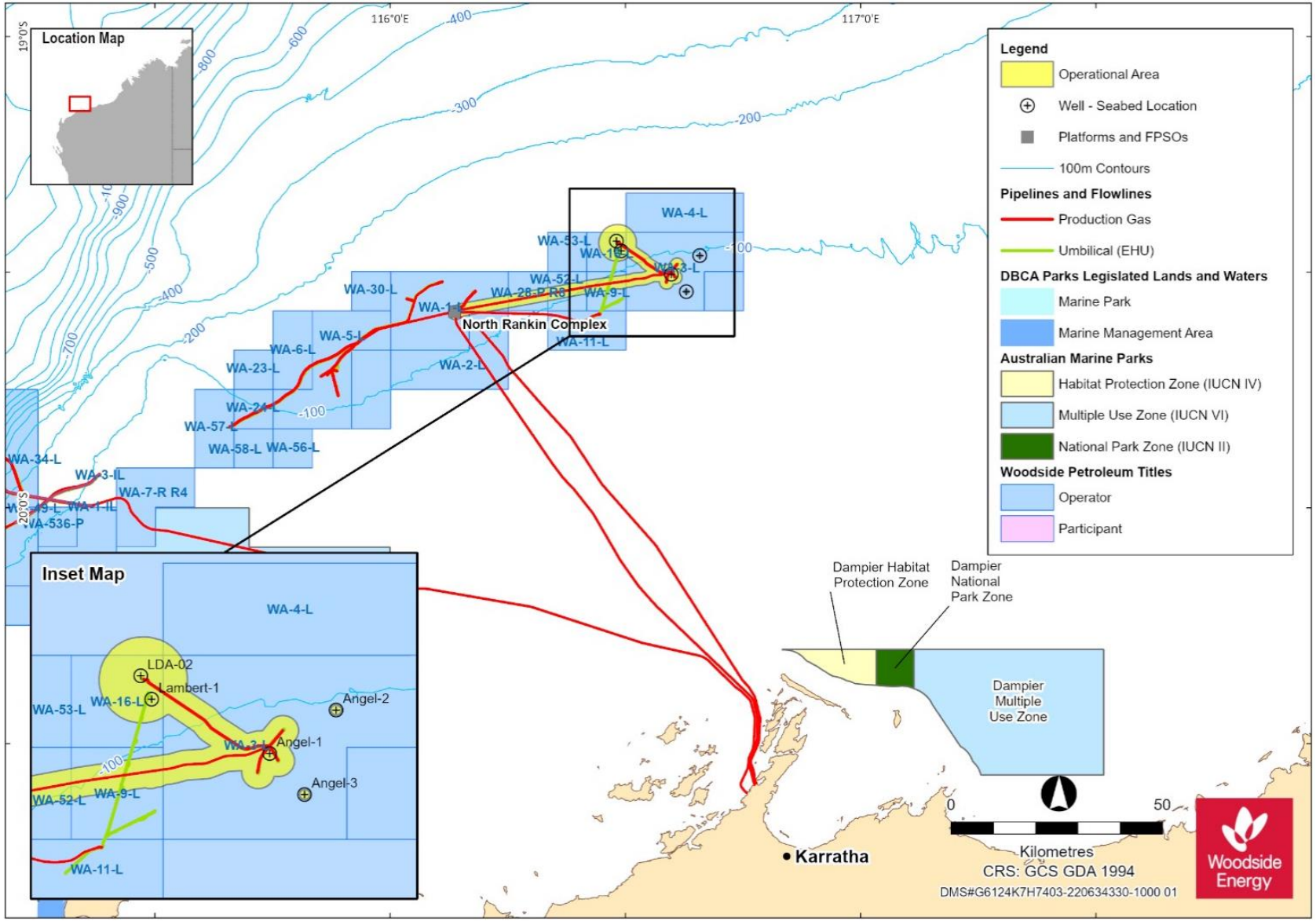


Figure 3-1**: Location of activity**

4. DISPERSANT APPLICATION

Dispersant is not considered an appropriate response strategy for this activity as described in the *Angel 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]
MEE-01-02A (WCCS): Hydrocarbon release caused by loss of well containment	*Angel Condensate*	107,779 m^3	3.8 % (4096 m^3)	12 hours (BP < 180 °C)	67%	*NWS Condensate*
				24 hours (180 °C < BP < 265 °C)	23.8%	
				Several days (265 °C < BP < 380 °C)	5.4%	
MEE-02-03A: Hydrocarbon release caused by riser loss of containment subsea	*Lambert Deep Rich Fluid*	6100 m^3	0.9 % (54.9 m^3)	12 hours (BP < 180 °C)	52.9%	*NWS Condensate*
				24 hours (180 °C < BP < 265 °C)	41.8%	
				Several days (265 °C < BP < 380 °C)	4.3%	
MEE-02-03B: Hydrocarbon release caused by riser loss of containment at surface	*Lambert Deep Rich Fluid*	5600 m^3	0.9 % (50.4 m^3)	12 hours (BP < 180 °C)	52.9%	*NWS Condensate*
				24 hours (180 °C < BP < 265 °C)	41.8%	
				Several days (265 °C < BP < 380 °C)	4.3%	
MEE-04: Hydrocarbon release due to vessel collision (instantaneous surface release)	*Marine diesel*	105 m^3	5 % (5.25 m^3)	12 hours (BP < 180 °C)	6%	*Diesel Fuel Oil – Southern USA 1 (API 37.2°)*
				24 hours (180 °C < BP < 265 °C)	34.6%	
				Several days (265 °C < BP < 380 °C)	54.4%	
Credible Scenario-01: Hydrocarbon release caused by loss of well control (LDA02)	*Lambert Deep Condensate*	31,185 m^3	9.9 % (3087 m^3)	12 hours (BP < 180 °C)	41.8%	*NWS Condensate*
				24 hours (180 °C < BP < 265 °C)	24.6%	
				Several days (265 °C < BP < 380 °C)	23.8%	

[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	[redacted]
2	NOPSEMA Incident Report Form	[redacted]
3	Marine Pollution Report (POLREP – AMSA)	[redacted]
4	AMOSC Service Contract	[redacted]
5	Marine Pollution Report (POLREP – DoT)	[redacted]
6a	OSRL Initial Notification Form	[redacted]
6b	OSRL Mobilisation Activation Form	[redacted]
7	RPS Response Oil Spill Trajectory Modelling Request	[redacted]
8	Aerial Surveillance Observer Log	[redacted]
9	Tracking buoy deployment instructions	[redacted]

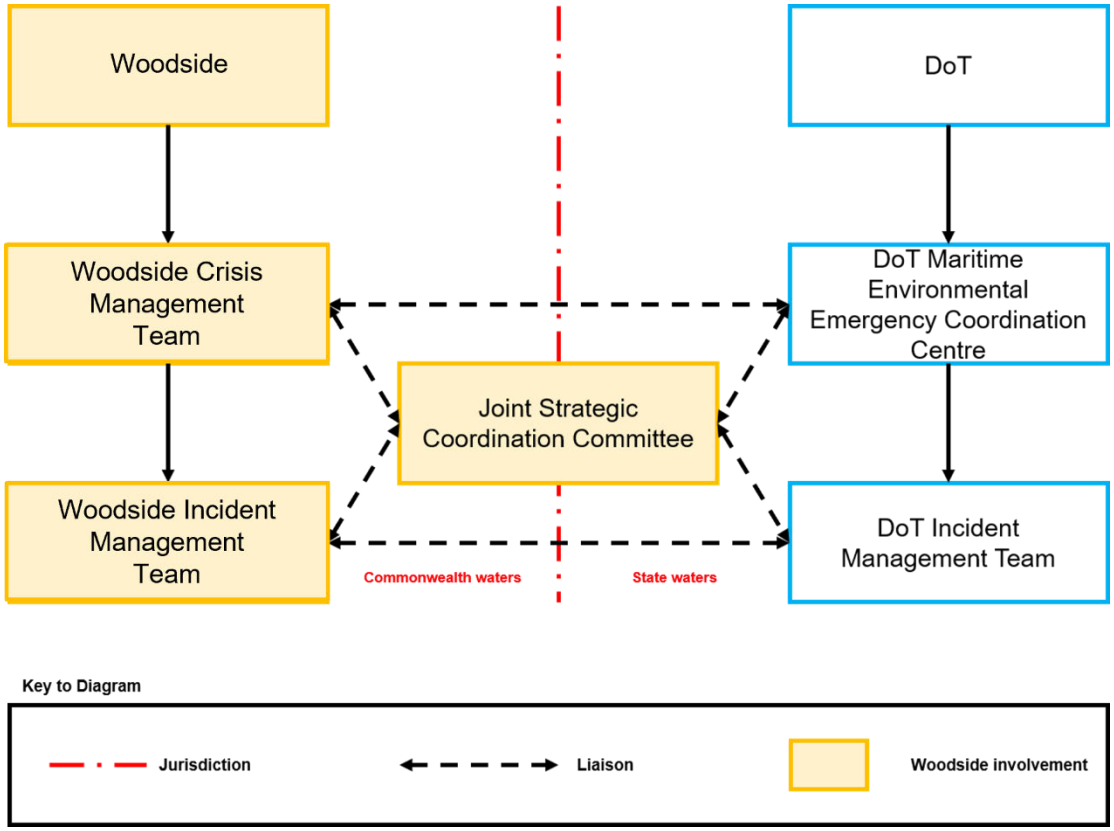
FORM 1 – RECORD OF INITIAL VERBAL NOTIFICATION TO NOPSEMA

NOPSEMA phone:		
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	[redacted]	
NOPTA	[redacted]	
DEMIRS	[redacted]	

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]



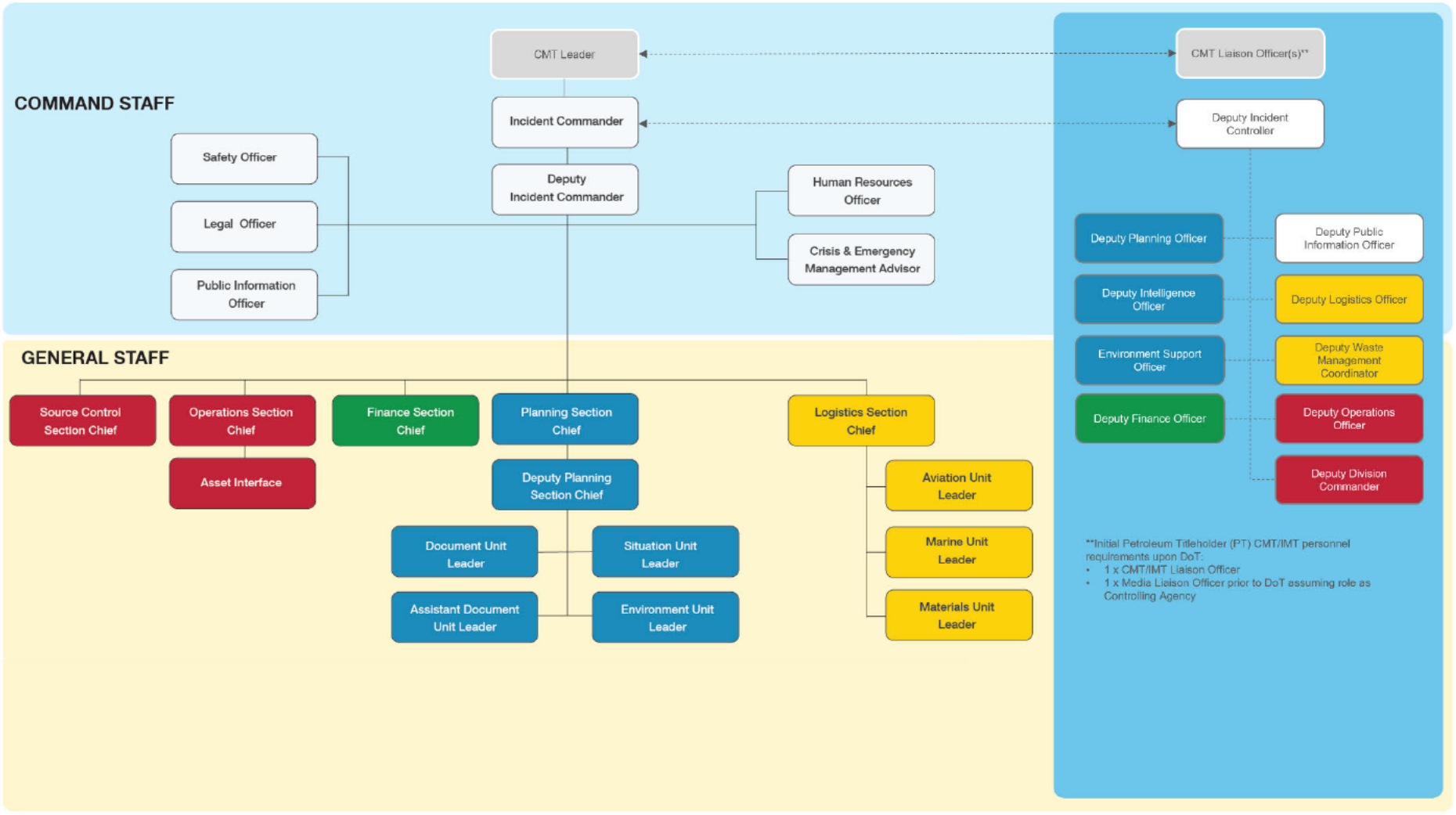
The Control Agency for a hydrocarbon spill in Commonwealth waters resulting from an offshore petroleum activity is Woodside (the Petroleum Titleholder).

The Control Agency/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 ICC as soon as possible after the formal request has been made by the State Marine Pollution Coordinator (SMPC), and no later than 8am on the day following the request being formally made. 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 personnel[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.	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* [redacted]

Area	Role	Woodside personnel[4]	Key Duties	#
			• 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.	
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.	1

Area	Role	Woodside personnel[4]	Key Duties	#
			• 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.	
DoT IMT Logistics	Deputy Logistic 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.	1

Area	Role	Woodside personnel[4]	Key Duties	#
			• Identify efficiencies and assist to resolve potential conflicts around resource allocation and simultaneous operations of PT and DoT response efforts.	
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. • 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.	1
			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 PT. • Facilitate the provision technical advice from DoT to the Petroleum Titleholder Incident Controller as required.	1
Woodside CIMT 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 H: LAMBERT WEST DRILLING OIL POLLUTION FIRST STRIKE PLAN

Lambert West Drilling – Oil Pollution First Strike Plan

Corporate HSE

Hydrocarbon Spill Preparedness

January 2024
Revision 0a

TABLE OF CONTENTS

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) Incident Commander (IC)
	State waters	1	Woodside	CIMT IC
		2/3	Department of Transport (DoT)	DoT Incident Controller
	Within port limits	1	Woodside	CIMT IC
		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

As detailed in the table above, in the event of a hydrocarbon spill (hereafter 'spill') where Woodside Energy 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 (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:

[redacted]

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:

[redacted] 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/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 this activity, please refer to the related Angel Operations pre-operational Net Environmental Benefit Analysis (NEBA).	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 this activity, please refer to the related Angel Operations pre-operational Net Environmental Benefit Analysis (NEBA).

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

In the event of an incident impacting live well infrastructure, also activate Angel Operations Oil Pollution First Strike Plan

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)	CIMT IC	[redacted]	Verbally notify WCC of event and estimated volume and hydrocarbon type.	Verbal	
Within 2 hours	Woodside Site Rep (WSR), CIMT IC or Delegate	National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA[1])	Incident notification office	[redacted]	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 National Offshore Petroleum Titles Authority (NOPTA) and Department of Energy, Mines Industry Regulation and Safety (DEMIRS)).	[redacted]	
Within 3 days	WSR, CIMT IC 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 [redacted] NOPTA [redacted] DEMIRS [redacted]	[redacted]	
As soon as practicable	CIMT IC or Delegate	Woodside	Environment Unit Leader	As per roster	Verbally notify Environment Unit Leader 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 IC or Delegate	WA Department of Transport (DoT)	DoT Maritime Environmental Emergency Response Unit (MEER) Duty Officer	[redacted]	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 Marine Pollution Report (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 CIMT.	[redacted]	
As soon as practicable	CIMT IC or Delegate	Department of Climate Change, Energy, the Environment and Water (DCCEEW) Director of National Parks	Marine Park Compliance Duty Officer	[redacted]	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	CIMT IC or Delegate	WA Department of Biodiversity, Conservation	Duty Officer	[redacted]	Phone call notification	Verbal	

[1] Notification to NOPSEMA must be from a Woodside Representative.

by WA Department of Biodiversity, Conservation and Attractions		and Attractions (DBCA)					
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 and tourism operators may be affected, Woodside would, at the relevant time, engage with these parties as appropriate. 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 additional cultural authorities may be affected, Woodside would, at the relevant time, engage with these parties as appropriate. 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 Act, part II, section 11(1)	Vessel Master	Australian Maritime Safety Authority (AMSA)	Response Coordination Centre (RCC)	[redacted]	Verbally notify AMSA RCC of the hydrocarbon spill. Follow up with a written POLREP as soon as practicable following verbal notification.	[redacted]	
ADDITIONAL LEVEL 2/3 NOTIFICATIONS							
As soon as practicable	CIMT IC or Delegate	Australian Marine Oil Spill Centre (AMOSC)	AMOSC Duty Manager	[redacted]	Notify AMOSC that a spill has occurred and follow-up with an email from the **CIMT IC/ CIMT Deputy IC/ Crisis Management Team (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.	[redacted]	
As soon as practicable	CIMT IC or Delegate	Oil Spill Response Limited (OSRL)	OSRL Duty Manager	[redacted]	Contact OSRL Duty Manager and request assistance from technical advisor in Perth. Send the completed notification form to OSRL as soon as practicable.	[redacted]	
					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.	[redacted]	
As soon as practicable if extra personnel are required for incident support	CIMT IC or Delegate	Marine Spill Response Corporation (MSRC)	MSRC Response Manager	[redacted]	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
	MDO	Cond.					
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	**DAY 1:** For manned facility/vessel, tracking buoy deployed within 2 hours. **DAY 2:** 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 [redacted]
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	**DAY 1:** 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 to download immediately and follow steps*
	Yes	Yes	ALL	Send Oil Spill Trajectory Modelling (OSTM) form ([redacted] to RPS Response ([redacted]).	Situation	**DAY 1:** 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 [redacted]	Logistics – Aviation	**DAY 1:** 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 to download immediately 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: [redacted] • OSRL Duty Manager: [redacted] • KSAT: [redacted] • Others identified by CIMT	Situation	**DAY 1:** 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)	Yes	Yes	ALL	Consider the need to mobilise resources to undertake pre-emptive assessment of sensitive receptors at risk (OM04).	Planning or Environment	**DAY 2:** 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)	Yes	Yes	ALL	Consider the need to mobilise resources to undertake shoreline assessment surveys (OM05).	Planning or Environment	**DAY 2:** 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 Lambert Deep condensate or marine diesel oil (MDO) as there is limited to 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 Lambert Deep condensate or marine diesel as there			

Technique	Spill type		Level	Pre- Identified Tactics	Responsible	ALARP Commitment Summary	Link to Operational Plans for notification numbers and actions
	MDO	Cond.					
				is limited to no surface expression predicted above response threshold (>50 g/m^2). Containment and Recovery of Condensate poses a significant safety risk and low flash points. Corralling low 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 Lambert Deep condensate or marine diesel as there is no surface expression predicted above threshold at any RPA.			
Shoreline clean-up	No	No	N/A	This response strategy is not recommended for Lambert Deep condensate or marine diesel as there is no shoreline accumulation predicted above threshold 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	No	Yes	L2/3	Debris clearance equipment to be mobilised prior to deployment of capping stack (if feasible).	Source Control	**DAY 2:** Remotely Operated Vehicle (ROV) on Mobile Offshore Drilling Unit (MODU) ready for deployment within 48 hours	• Source Control Emergency Response Planning Guideline • Activity Source Control Emergency Response Plan
Subsea Dispersant	No	No	N/A	This response strategy is not recommended. Whilst the Lambert West (LDA02) well is in water depths of 130 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 until at least day 33 (below response threshold – 10 g/m^2). The use of subsea dispersant would therefore increase dispersed/ entrained hydrocarbon levels and exposure of subsea biota to potentially higher toxicity substances without providing a net environmental benefit.			
Capping Stack	No	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	**DAY 1:** Identify source control vessel availability within 24 hours. Capping stack on suitable vessel mobilised to site within 16 days.	
Relief Well	No	Yes	L2/3	Undertake tactics per Source Control Emergency Response Plan (SCERP).	Source Control	**DAY 1:** Identify source control vessel availability within 24 hours. ROV on MODU ready for deployment within 48 hours. MODU mobilised to location	

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.

Table 3-1: Receptors for priority protection with potential impact within 48 Hours

Receptor	Distance and Direction from Operational Area (km)	Minimum time to shoreline contact (above 100g/m^2) in days	Maximum shoreline accumulation (above 100g/m^2) in m^3	Tactical Response Plans
Open ocean	Contact at 10 g/m^2 predicted up to 10 km west (condensate) and 65 km south-west (marine diesel) from Operational Area	N/A – Open ocean	N/A – Open ocean	N/A – Open ocean

Hydrocarbon spill modelling results indicate that no sensitive receptors have the potential to be contacted by hydrocarbons at or above shoreline impact or response thresholds (>100 g/m^2) for the duration of the spill for either scenario.

Oil Spill Trajectory Modelling specific to the spill event will be required to determine the regional sensitive receptors to be contacted beyond 48 hours of a spill.

If required, Tactical Response Plans can be accessed via the Oil Spill Portal - Tactical Response Plans and include the details of potential forward operating bases and staging 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 Lambert West Drilling Operational Area.

Table 3-2: Assets in the vicinity of the Lambert West Drilling Operational Area

Asset	Distance and Direction from Operational Area	Operator
North Rankin Complex	0 km	Woodside
Okha	5 km south	Woodside
Goodwyn Alpha	22 km west	Woodside
Reindeer	50 km south-east	Santos

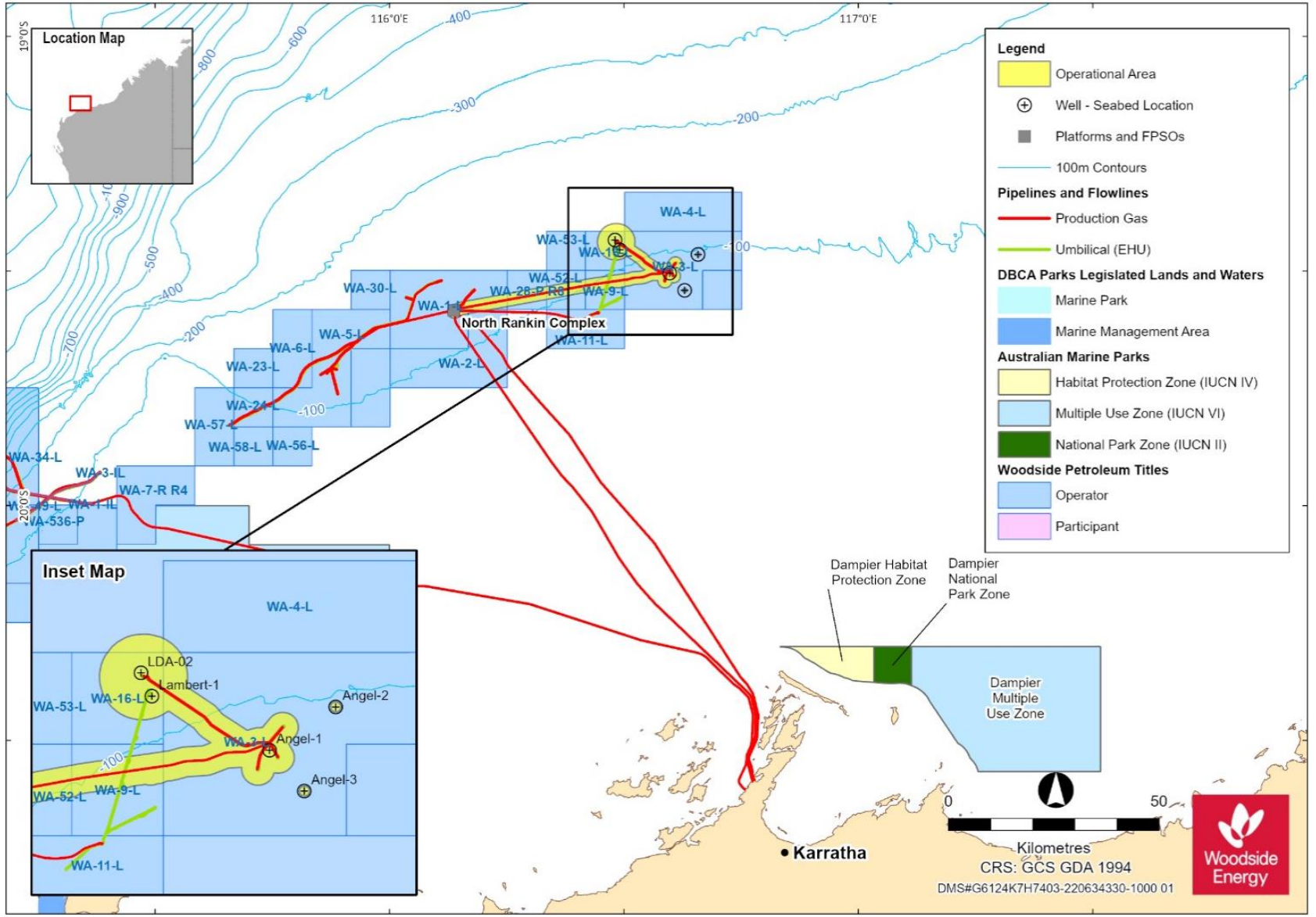


Figure 3-1: Location of activity

4. DISPERSANT APPLICATION

Dispersant is not considered an appropriate response strategy for this activity as there is limited to no surface expression predicted above the minimum response threshold (>50 g/m^2) for either scenario for the duration of the spill. The addition of dispersant would not provide a net environmental benefit.

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) ***Hydrocarbon release caused by loss of well control***	Lambert Deep Condensate	31,185 m^3 (2,187 m^3 at surface followed by 28,998 m^3 subsea)	9.9% (3,087 m^3)	12 hours (BP < 180 °C)	41.8%	*NWS Condensate*
				24 hours (180 °C < BP < 265 °C)	24.6%	
				Several days (265 °C < BP < 380 °C)	23.8%	
CS-02 ***Hydrocarbon release due to vessel collision (instantaneous release)***	Marine Diesel Oil (MDO)	1,000 m^3	5% (50 m^3)	12 hours (BP < 180 °C)	6%	*Diesel Fuel Oil – Southern USA 1 (API 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	[redacted]
2	NOPSEMA Incident Report Form	[redacted]
3	Marine Pollution Report (POLREP – AMSA)	[redacted]
4	AMOSC Service Contract	[redacted]
5	Marine Pollution Report (POLREP – DoT)	[redacted]
6a	OSRL Initial Notification Form	[redacted]
6b	OSRL Mobilisation Activation Form	[redacted]
7	RPS Response Oil Spill Trajectory Modelling Request	[redacted]
8	Aerial Surveillance Observer Log	[redacted]
9	Tracking buoy deployment instructions	[redacted]

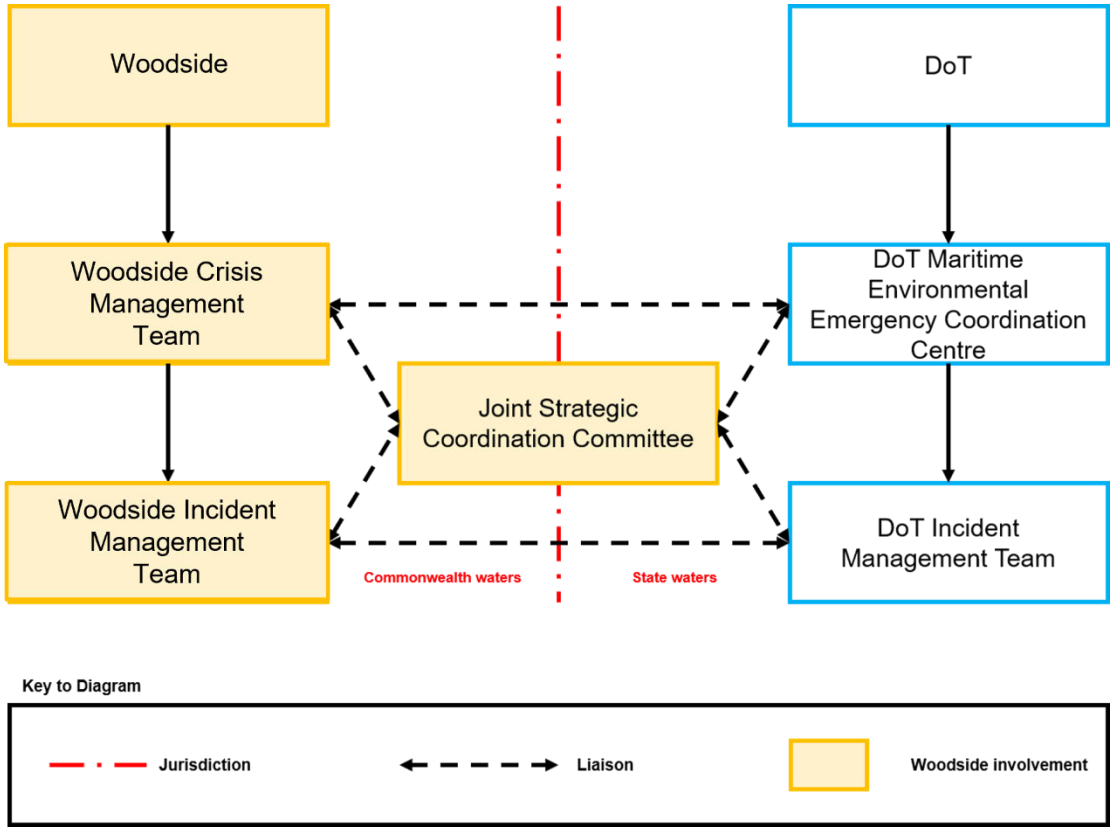
FORM 1 – RECORD OF INITIAL VERBAL NOTIFICATION TO NOPSEMA

NOPSEMA phone:		
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	[redacted]	
NOPTA	[redacted]	
DEMIRS	[redacted]	

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]



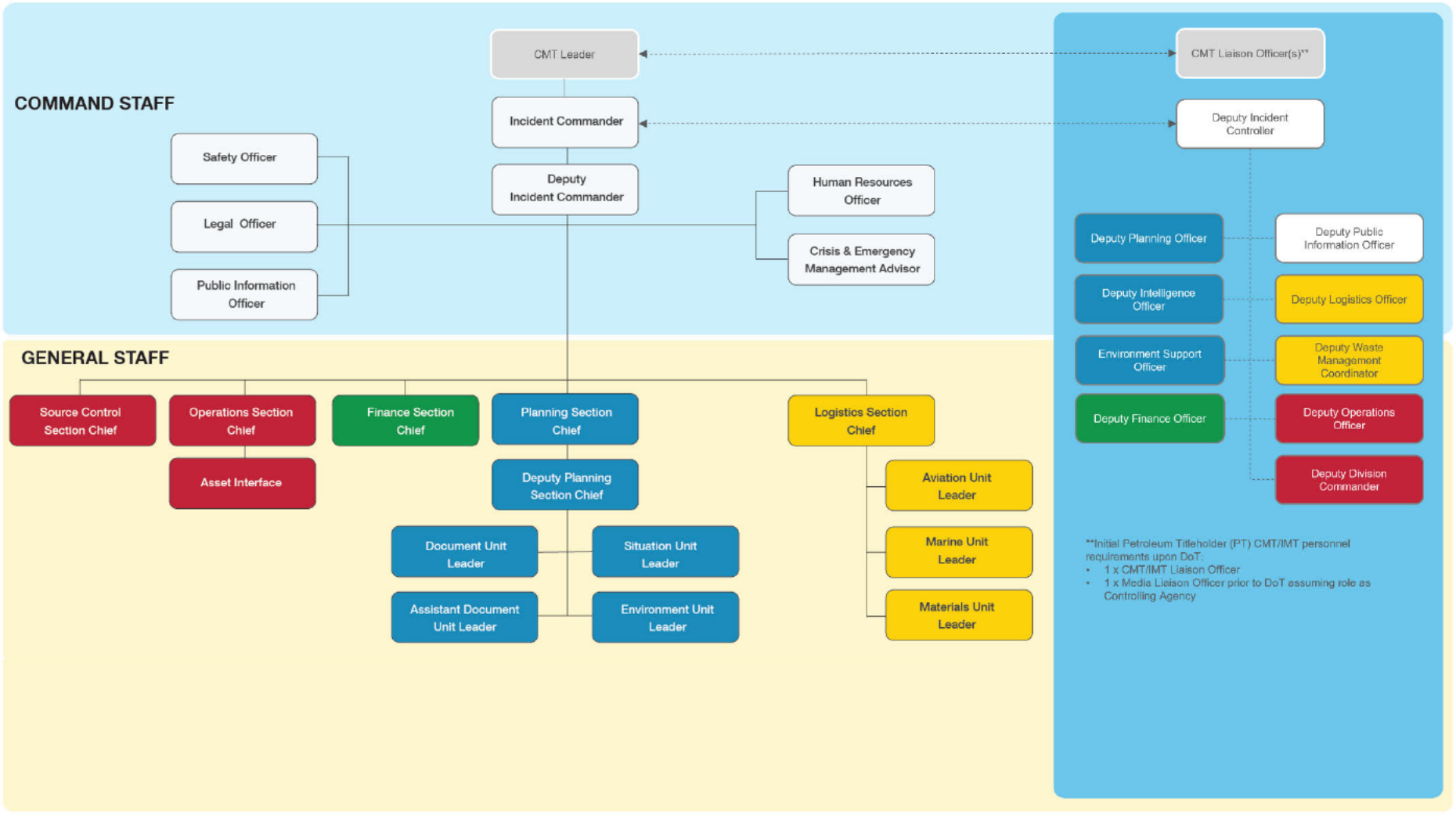
The Control Agency for a hydrocarbon spill in Commonwealth waters resulting from an offshore petroleum activity is Woodside (the Petroleum Titleholder).

The Control Agency/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 ICC as soon as possible after the formal request has been made by the State Marine Pollution Coordinator (SMPC), and no later than 8am on the day following the request being formally made. 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 personnel[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.	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* [redacted]

Area	Role	Woodside personnel[4]	Key Duties	#
			• 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.	
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.	1

Area	Role	Woodside personnel[4]	Key Duties	#
			• 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.	
DoT IMT Logistics	Deputy Logistic 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.	1

Area	Role	Woodside personnel[4]	Key Duties	#
			• Identify efficiencies and assist to resolve potential conflicts around resource allocation and simultaneous operations of PT and DoT response efforts.	
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. • 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.	1
			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 PT. • Facilitate the provision technical advice from DoT to the Petroleum Titleholder Incident Controller as required.	1
Woodside CIMT 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 H: LAMBERT WEST DRILLING OIL POLLUTION FIRST STRIKE PLAN

Lambert West Drilling – Oil Pollution First Strike Plan

Corporate HSE

Hydrocarbon Spill Preparedness

January 2024
Revision 0a

TABLE OF CONTENTS

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) Incident Commander (IC)
	State waters	1	Woodside	CIMT IC
		2/3	Department of Transport (DoT)	DoT Incident Controller
	Within port limits	1	Woodside	CIMT IC
		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

As detailed in the table above, in the event of a hydrocarbon spill (hereafter 'spill') where Woodside Energy 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 (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:

[redacted]

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:

[redacted] 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/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 this activity, please refer to the related Angel Operations pre-operational Net Environmental Benefit Analysis (NEBA).	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 this activity, please refer to the related Angel Operations pre-operational Net Environmental Benefit Analysis (NEBA).

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

In the event of an incident impacting live well infrastructure, also activate Angel Operations Oil Pollution First Strike Plan

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)	CIMT IC	[redacted]	Verbally notify WCC of event and estimated volume and hydrocarbon type.	Verbal	
Within 2 hours	Woodside Site Rep (WSR), CIMT IC or Delegate	National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA[1])	Incident notification office	[redacted]	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 National Offshore Petroleum Titles Authority (NOPTA) and Department of Energy, Mines Industry Regulation and Safety (DEMIRS)).	[redacted]	
Within 3 days	WSR, CIMT IC 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 [redacted] NOPTA [redacted] DEMIRS [redacted]	[redacted]	
As soon as practicable	CIMT IC or Delegate	Woodside	Environment Unit Leader	As per roster	Verbally notify Environment Unit Leader 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 IC or Delegate	WA Department of Transport (DoT)	DoT Maritime Environmental Emergency Response Unit (MEER) Duty Officer	[redacted]	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 Marine Pollution Report (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 CIMT.	[redacted]	
As soon as practicable	CIMT IC or Delegate	Department of Climate Change, Energy, the Environment and Water (DCCEEW) Director of National Parks	Marine Park Compliance Duty Officer	[redacted]	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	CIMT IC or Delegate	WA Department of Biodiversity, Conservation	Duty Officer	[redacted]	Phone call notification	Verbal	

[1] Notification to NOPSEMA must be from a Woodside Representative.

by WA Department of Biodiversity, Conservation and Attractions		and Attractions (DBCA)					
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 and tourism operators may be affected, Woodside would, at the relevant time, engage with these parties as appropriate. 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 additional cultural authorities may be affected, Woodside would, at the relevant time, engage with these parties as appropriate. 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 Act, part II, section 11(1)	Vessel Master	Australian Maritime Safety Authority (AMSA)	Response Coordination Centre (RCC)	[redacted]	Verbally notify AMSA RCC of the hydrocarbon spill. Follow up with a written POLREP as soon as practicable following verbal notification.	[redacted]	
ADDITIONAL LEVEL 2/3 NOTIFICATIONS							
As soon as practicable	CIMT IC or Delegate	Australian Marine Oil Spill Centre (AMOSC)	AMOSC Duty Manager	[redacted]	Notify AMOSC that a spill has occurred and follow-up with an email from the **CIMT IC/ CIMT Deputy IC/ Crisis Management Team (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.	[redacted]	
As soon as practicable	CIMT IC or Delegate	Oil Spill Response Limited (OSRL)	OSRL Duty Manager	[redacted]	Contact OSRL Duty Manager and request assistance from technical advisor in Perth. Send the completed notification form to OSRL as soon as practicable.	[redacted]	
					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.	[redacted]	
As soon as practicable if extra personnel are required for incident support	CIMT IC or Delegate	Marine Spill Response Corporation (MSRC)	MSRC Response Manager	[redacted]	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
	MDO	Cond.					
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	**DAY 1:** For manned facility/vessel, tracking buoy deployed within 2 hours. **DAY 2:** 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 [redacted]
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	**DAY 1:** 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 to download immediately and follow steps*
	Yes	Yes	ALL	Send Oil Spill Trajectory Modelling (OSTM) form ([redacted] to RPS Response ([redacted]).	Situation	**DAY 1:** 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 [redacted]	Logistics – Aviation	**DAY 1:** 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 to download immediately 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: [redacted] • OSRL Duty Manager: [redacted] • KSAT: [redacted] • Others identified by CIMT	Situation	**DAY 1:** 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)	Yes	Yes	ALL	Consider the need to mobilise resources to undertake pre-emptive assessment of sensitive receptors at risk (OM04).	Planning or Environment	**DAY 2:** 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)	Yes	Yes	ALL	Consider the need to mobilise resources to undertake shoreline assessment surveys (OM05).	Planning or Environment	**DAY 2:** 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 Lambert Deep condensate or marine diesel oil (MDO) as there is limited to 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 Lambert Deep condensate or marine diesel as there			

Technique	Spill type		Level	Pre- Identified Tactics	Responsible	ALARP Commitment Summary	Link to Operational Plans for notification numbers and actions
	MDO	Cond.					
				is limited to no surface expression predicted above response threshold (>50 g/m^2). Containment and Recovery of Condensate poses a significant safety risk and low flash points. Corralling low 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 Lambert Deep condensate or marine diesel as there is no surface expression predicted above threshold at any RPA.			
Shoreline clean-up	No	No	N/A	This response strategy is not recommended for Lambert Deep condensate or marine diesel as there is no shoreline accumulation predicted above threshold 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	No	Yes	L2/3	Debris clearance equipment to be mobilised prior to deployment of capping stack (if feasible).	Source Control	**DAY 2:** Remotely Operated Vehicle (ROV) on Mobile Offshore Drilling Unit (MODU) ready for deployment within 48 hours	• Source Control Emergency Response Planning Guideline • Activity Source Control Emergency Response Plan
Subsea Dispersant	No	No	N/A	This response strategy is not recommended. Whilst the Lambert West (LDA02) well is in water depths of 130 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 until at least day 33 (below response threshold – 10 g/m^2). The use of subsea dispersant would therefore increase dispersed/ entrained hydrocarbon levels and exposure of subsea biota to potentially higher toxicity substances without providing a net environmental benefit.			
Capping Stack	No	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	**DAY 1:** Identify source control vessel availability within 24 hours. Capping stack on suitable vessel mobilised to site within 16 days.	
Relief Well	No	Yes	L2/3	Undertake tactics per Source Control Emergency Response Plan (SCERP).	Source Control	**DAY 1:** Identify source control vessel availability within 24 hours. ROV on MODU ready for deployment within 48 hours. MODU mobilised to location	

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.

Table 3-1: Receptors for priority protection with potential impact within 48 Hours

Receptor	Distance and Direction from Operational Area (km)	Minimum time to shoreline contact (above 100g/m^2) in days	Maximum shoreline accumulation (above 100g/m^2) in m^3	Tactical Response Plans
Open ocean	Contact at 10 g/m^2 predicted up to 10 km west (condensate) and 65 km south-west (marine diesel) from Operational Area	N/A – Open ocean	N/A – Open ocean	N/A – Open ocean

Hydrocarbon spill modelling results indicate that no sensitive receptors have the potential to be contacted by hydrocarbons at or above shoreline impact or response thresholds (>100 g/m^2) for the duration of the spill for either scenario.

Oil Spill Trajectory Modelling specific to the spill event will be required to determine the regional sensitive receptors to be contacted beyond 48 hours of a spill.

If required, Tactical Response Plans can be accessed via the Oil Spill Portal - Tactical Response Plans and include the details of potential forward operating bases and staging 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 Lambert West Drilling Operational Area.

Table 3-2: Assets in the vicinity of the Lambert West Drilling Operational Area

Asset	Distance and Direction from Operational Area	Operator
North Rankin Complex	0 km	Woodside
Okha	5 km south	Woodside
Goodwyn Alpha	22 km west	Woodside
Reindeer	50 km south-east	Santos

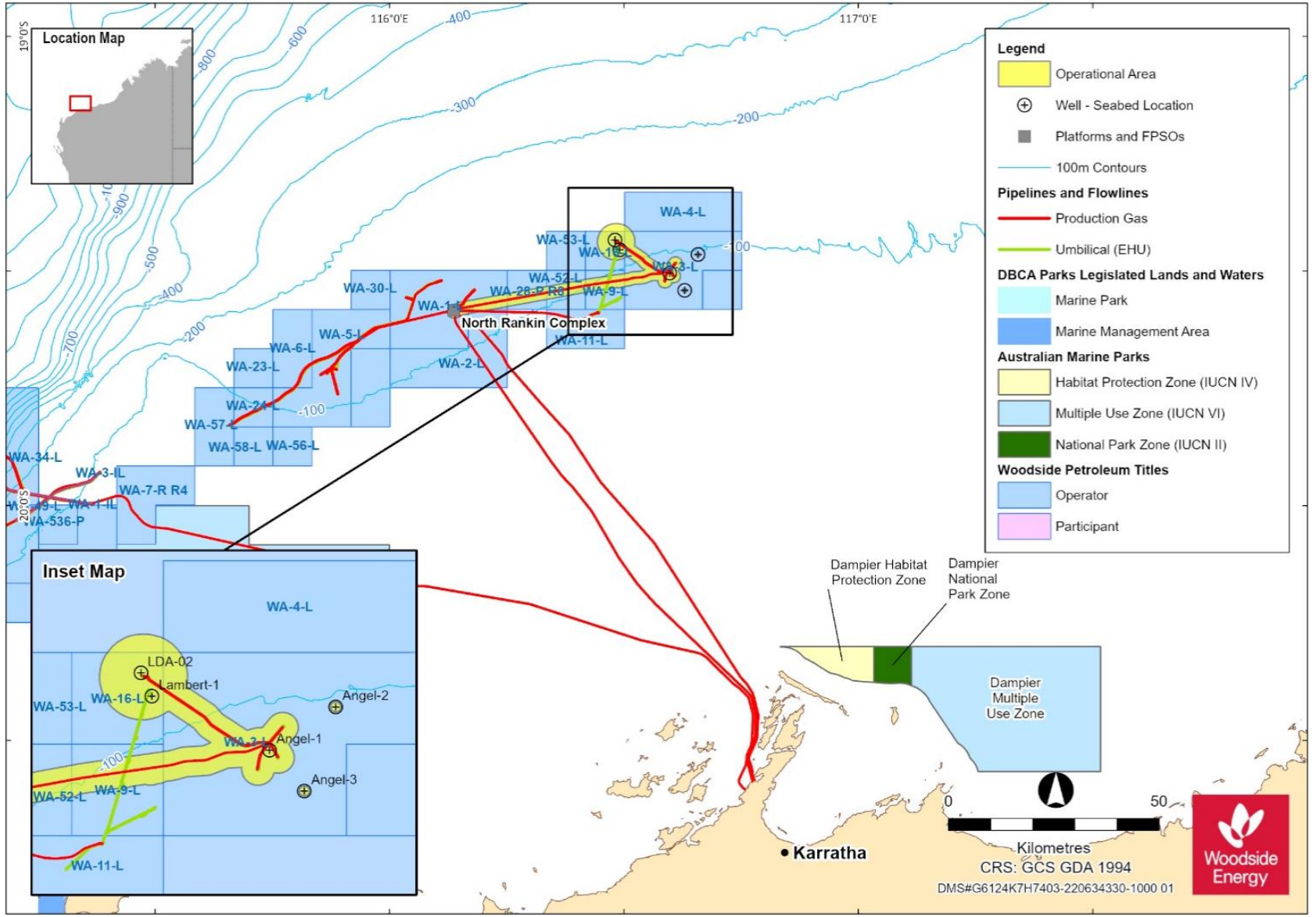


Figure 3-1: Location of activity

4. DISPERSANT APPLICATION

Dispersant is not considered an appropriate response strategy for this activity as there is limited to no surface expression predicted above the minimum response threshold (>50 g/m^2) for either scenario for the duration of the spill. The addition of dispersant would not provide a net environmental benefit.

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) ***Hydrocarbon release caused by loss of well control***	Lambert Deep Condensate	31,185 m^3 (2,187 m^3 at surface followed by 28,998 m^3 subsea)	9.9% (3,087 m^3)	12 hours (BP < 180 °C)	41.8%	*NWS Condensate*
				24 hours (180 °C < BP < 265 °C)	24.6%	
				Several days (265 °C < BP < 380 °C)	23.8%	
CS-02 ***Hydrocarbon release due to vessel collision (instantaneous release)***	Marine Diesel Oil (MDO)	1,000 m^3	5% (50 m^3)	12 hours (BP < 180 °C)	6%	*Diesel Fuel Oil – Southern USA 1 (API 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	[redacted]
2	NOPSEMA Incident Report Form	[redacted]
3	Marine Pollution Report (POLREP – AMSA)	[redacted]
4	AMOSC Service Contract	[redacted]
5	Marine Pollution Report (POLREP – DoT)	[redacted]
6a	OSRL Initial Notification Form	[redacted]
6b	OSRL Mobilisation Activation Form	[redacted]
7	RPS Response Oil Spill Trajectory Modelling Request	[redacted]
8	Aerial Surveillance Observer Log	[redacted]
9	Tracking buoy deployment instructions	[redacted]

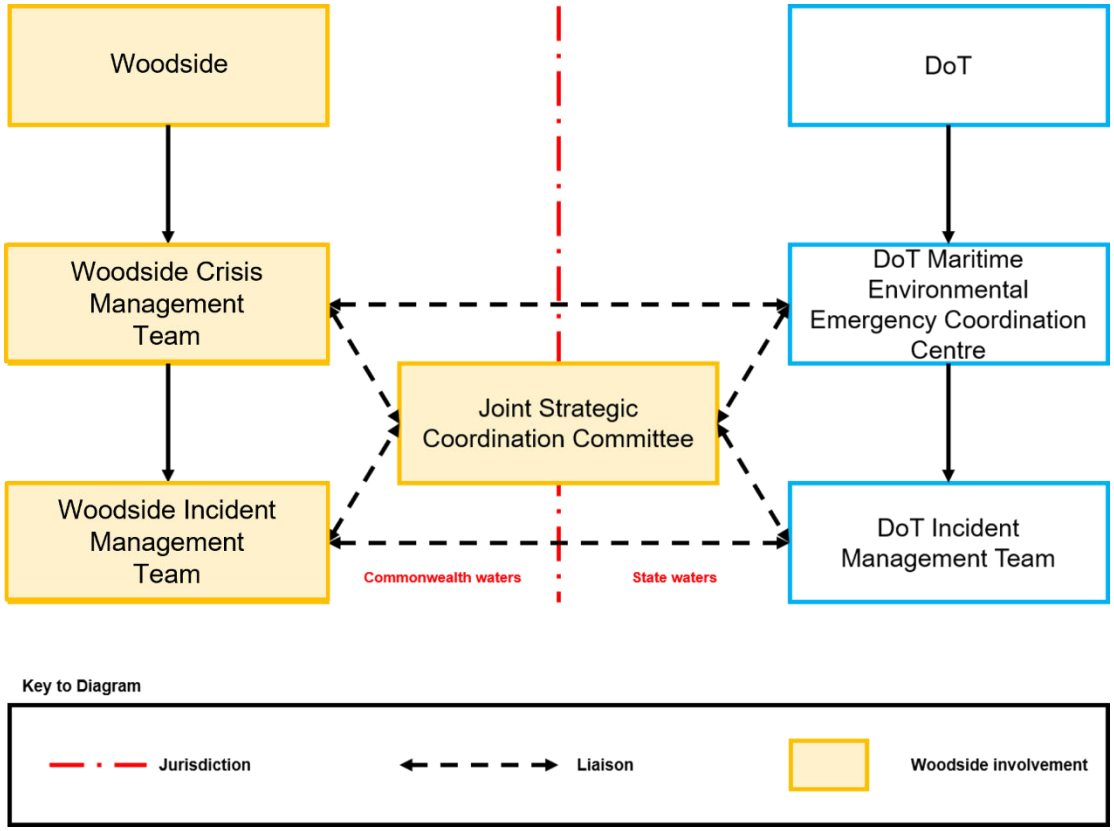
FORM 1 – RECORD OF INITIAL VERBAL NOTIFICATION TO NOPSEMA

NOPSEMA phone:		
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	[redacted]	
NOPTA	[redacted]	
DEMIRS	[redacted]	

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]



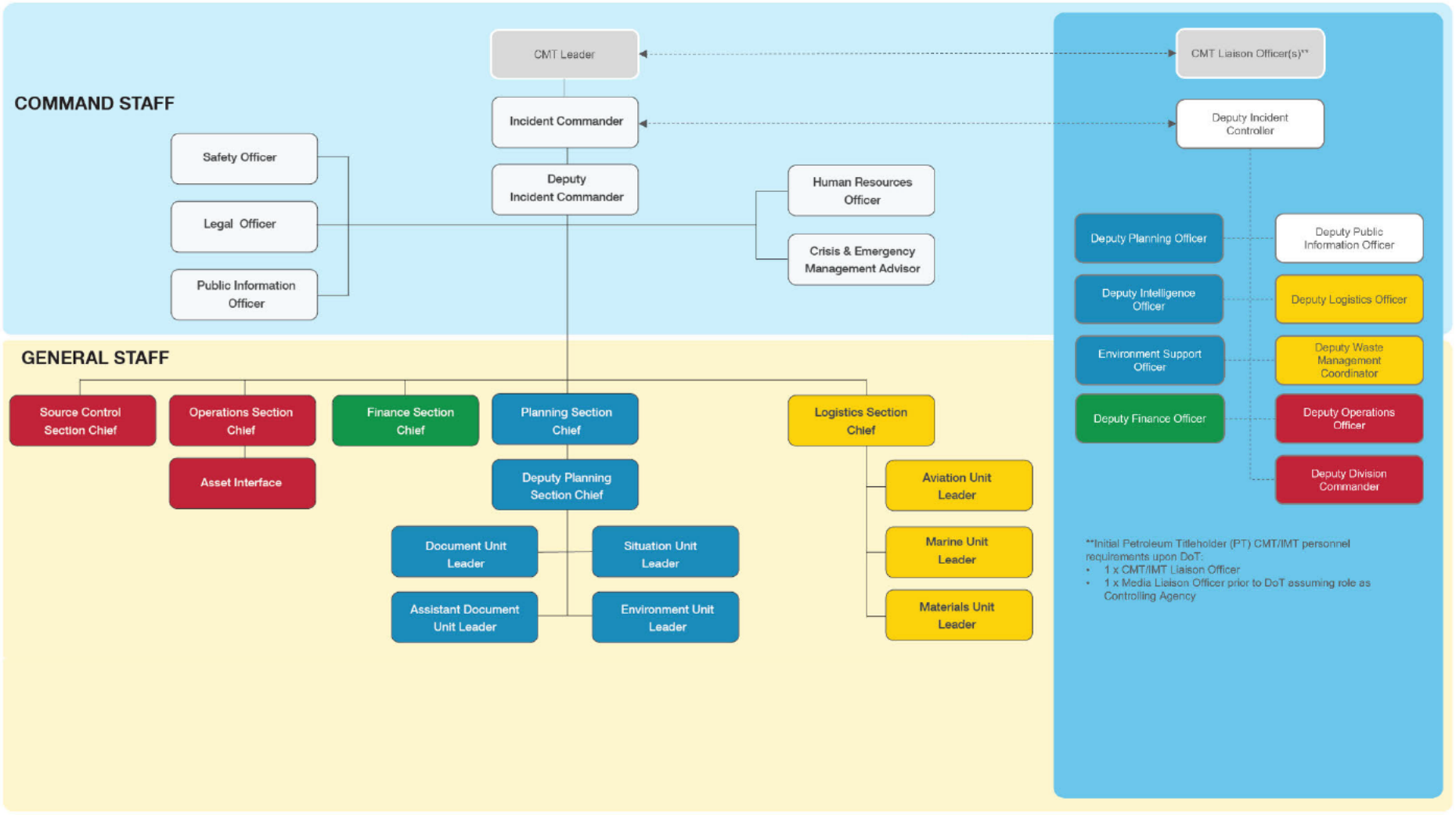
The Control Agency for a hydrocarbon spill in Commonwealth waters resulting from an offshore petroleum activity is Woodside (the Petroleum Titleholder).

The Control Agency/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 ICC as soon as possible after the formal request has been made by the State Marine Pollution Coordinator (SMPC), and no later than 8am on the day following the request being formally made. 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 personnel[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.	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* [redacted]

Area	Role	Woodside personnel[4]	Key Duties	#
			• 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.	
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.	1

Area	Role	Woodside personnel[4]	Key Duties	#
			• 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.	
DoT IMT Logistics	Deputy Logistic 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.	1

Area	Role	Woodside personnel[4]	Key Duties	#
			• Identify efficiencies and assist to resolve potential conflicts around resource allocation and simultaneous operations of PT and DoT response efforts.	
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. • 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.	1
			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 PT. • Facilitate the provision technical advice from DoT to the Petroleum Titleholder Incident Controller as required.	1
Woodside CIMT 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 I: PROGRAM OF ONGOING ENGAGEMENT WITH TRADITIONAL CUSTODIANS

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 has developed a Collaboration Agreement which is currently under internal Woodside review. Once settled internally it will be put to BTAC for their consideration.	The draft Collaboration Agreement will be provided to BTAC for consideration in October 2023. Woodside will follow up on a monthly basis for at least six months with BTAC once they are in receipt of the draft proposed Collaboration Agreement from Woodside, or until the Agreement is in place.
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 will continue to communicate with YMAC, seeking to collaborate and reach agreement on the proposed Collaboration Framework and funding agreement. At the point of EP submission, Woodside is seeking a meeting with YMAC at YMAC's earliest convenience.	Woodside will follow up with YMAC on a monthly basis for at least six months, seeking to progress the Collaboration Framework and funding agreement.
Wirrawandi Aboriginal Corporations (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 is in contact with the WAC CEO and is currently developing a response to the proposed Framework Agreement put forward by WAC. WAC do not object to Woodside progressing environmental plans on the proviso that both parties enter into an Agreement suitable to each party. WAC have suggested a timeframe to settle the Agreement over the next 2-3 months. Woodside will be aiming to reach agreement within a shorter timeframe.	Ongoing Framework Agreement settled in 2023.
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 has provided in-principle support for NAC's proposal and is currently developing a draft Framework Agreement which once settled internally will be sent to NAC for their response.	In accordance with NAC's proposed timeframe, Woodside aims to prepare a draft Framework Agreement, settle internally and then meet to discuss in 2023.
Nganhurra Thanardi Garrbu Aboriginal Corporation (NTGAC)	In a meeting during August 2023, NTGAC proposed a Framework Agreement. This included terms for ongoing	Woodside and NTGAC/YMAC have agreed in writing to develop a Framework Agreement. Woodside have been responding to queries from NTGAC who have passed	Woodside will follow up with NTGAC on a monthly basis for at least six months, seeking to

	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.	information provided by Woodside onto their Environmental Scientist. Woodside are awaiting a proposed draft of a Framework Agreement and general report. YMAC's preference is to prepare the drafts, Woodside have offered to assist with drafting and remain ready to respond on receipt of documents.	progress the Framework Agreement and General report.
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's Proposal suggests meeting with YAC every 3 months to progress matters. The Proposal suggests committing to work continuing between meetings with each party nominating focal points. A Scope of Work and schedule of rates is included to re-imburse the cost of ongoing consultation. Woodside's Proposal includes timeframes for anticipated milestones and has suggested the Proposal be in place for an initial 2-year period. Woodside has provided the draft Framework Agreement to YAC; they have advised that they will seek direction from the YAC Board on the proposal.	Woodside will continue following up with YAC on a monthly basis for at least six months, seeking to progress the Framework 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 within the next 2 months.	Woodside will follow up with RRKAC monthly for at least six months, seeking to progress a Framework Agreement.
Ngarluma Yindjibarndi Foundation Limited (NYFL)	NYFL and Woodside have an existing Agreement in place which enables quarterly communication about Woodside activities. NYFL has said they are working with other First Nations organisation and representative Bodies developing a Framework Agreement.	Woodside has not yet seen a draft of the Framework Agreement. Woodside's expectation is that it will outline principles of engagement, details of resourcing, timeframes to meet agreed outcomes etc. Woodside look forward to receiving a draft Agreement and will engage with NYFL to settle on the details of any proposal.	Woodside will continue to follow up monthly with NYFL for at least six months, seeking to progress a Framework Agreement.
Kariyarra Aboriginal Corporation (KAC)	In September 2023 KAC proposed an agreement which would include meeting arrangements, ongoing consultations, specialist advice and contact protocols.	Woodside support funding request 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 will propose a first draft of an agreement and put to KAC in the first instance. Woodside will prepare a draft agreement within the next two months to for KAC's consideration.	Woodside will continue to follow up monthly with KAC for at least six months, seeking to progress a Framework Agreement.